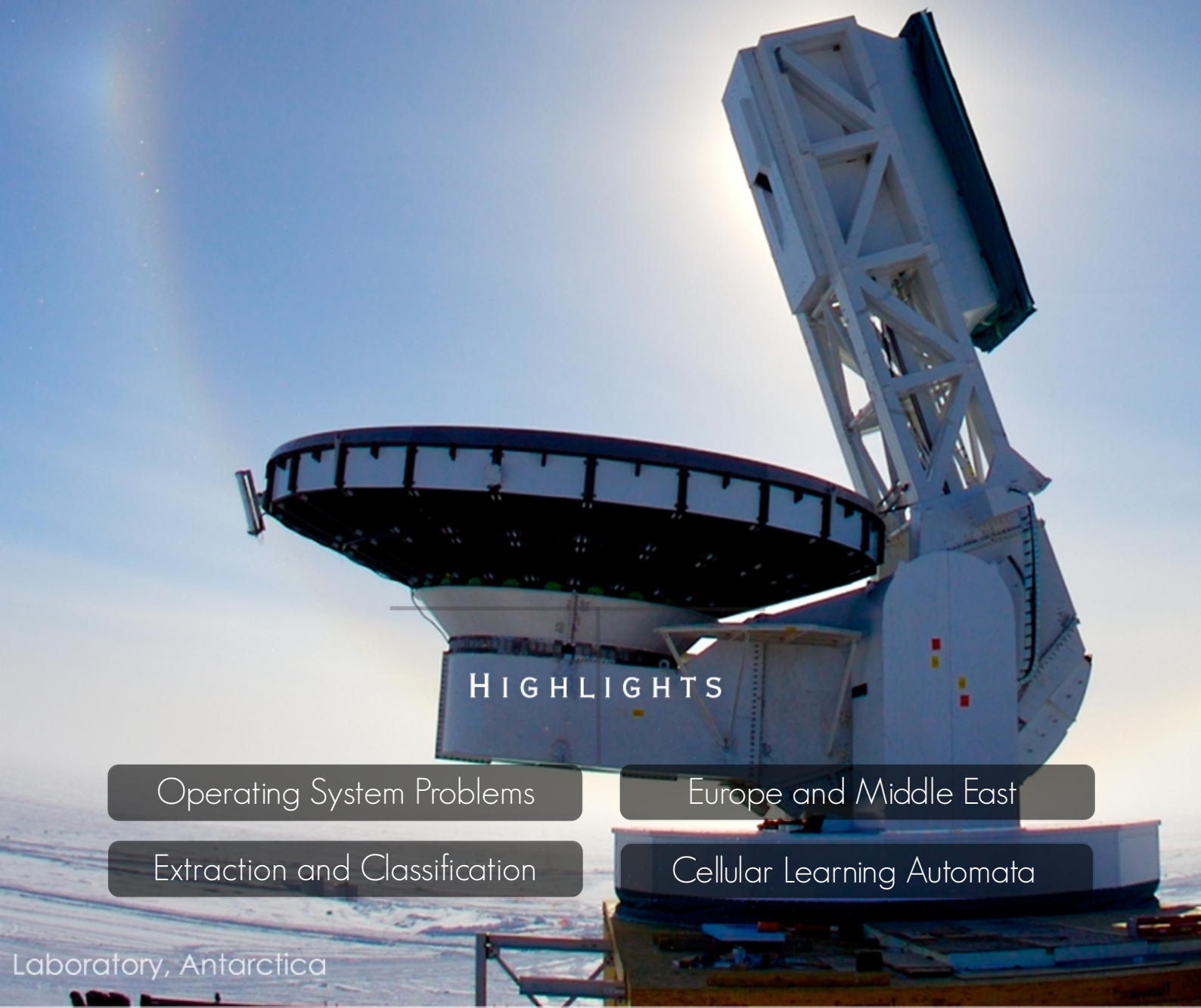
Online ISSN : 0975-4172
Print ISSN : 0975-4350

Global Journal of Computer Science & Technology

DISCOVERING THOUGHTS AND INVENTING FUTURE



Highlights

Operating System Problems

Europe and Middle East

Extraction and Classification

Cellular Learning Automata

Laboratory, Antarctica

Volume 12 | Issue 8 | Version 1.0

ENG

Global Journal of Computer Science and Technology

Global Journal of Computer Science and Technology

Volume 12 Issue 8 (Ver. 1.0)

Open Association of Research Society

Incorporation No.: 0423089
License No.: 42125/022010/1186
Registration No.: 430374
Import-Export Code: 1109007027
Employer Identification Number (EIN):
USA Tax ID: 98-0673427

Global Journals Inc.

(A Delaware USA Incorporation with "Good Standing"; Reg. Number: 0423089)

Sponsors:Global Association of Research

Open Scientific Standards

Publisher's Headquarters office

Global Journals Inc., Headquarters Corporate Office, Cambridge Office Center, II Canal Park, Floor No. 5th, ***Cambridge (Massachusetts)***, Pin: MA 02141 United States

USA Toll Free: +001-888-839-7392

USA Toll Free Fax: +001-888-839-7392

Offset Typesetting

Global Association of Research, Marsh Road, Rainham, Essex, London RM13 8EU United Kingdom.

Packaging & Continental Dispatching

Global Journals, India

Find a correspondence nodal officer near you

To find nodal officer of your country, please email us at *local@globaljournals.org*

eContacts

Press Inquiries: *press@globaljournals.org*
Investor Inquiries: *investers@globaljournals.org*
Technical Support: *technology@globaljournals.org*
Media & Releases: *media@globaljournals.org*

Pricing (Including by Air Parcel Charges):

For Authors:
22 USD (B/W) & 50 USD (Color)
Yearly Subscription (Personal & Institutional):
200 USD (B/W) & 250 USD (Color)

Editorial Board Members (HON.)

Dr. Bart Lambrecht
Director of Research in Accounting and FinanceProfessor of Finance
Lancaster University Management School
BA (Antwerp); MPhil, MA, PhD (Cambridge)

Dr. Carlos García Pont
Associate Professor of Marketing
IESE Business School, University of Navarra
Doctor of Philosophy (Management), Massachusetts Institute of Technology (MIT)
Master in Business Administration, IESE, University of Navarra
Degree in Industrial Engineering, Universitat Politècnica de Catalunya

Dr. Fotini Labropulu
Mathematics - Luther College
University of ReginaPh.D., M.Sc. in Mathematics
B.A. (Honors) in Mathematics
University of Windso

Dr. Lynn Lim
Reader in Business and Marketing
Roehampton University, London
BCom, PGDip, MBA (Distinction), PhD, FHEA

Dr. Mihaly Mezei
ASSOCIATE PROFESSOR
Department of Structural and Chemical Biology, Mount Sinai School of Medical Center
Ph.D., Etvs Lornd University
Postdoctoral Training,
New York University

Dr. Söhnke M. Bartram
Department of Accounting and FinanceLancaster University Management SchoolPh.D. (WHU Koblenz)
MBA/BBA (University of Saarbrücken)

Dr. Miguel Angel Ariño
Professor of Decision Sciences
IESE Business School
Barcelona, Spain (Universidad de Navarra)
CEIBS (China Europe International Business School).
Beijing, Shanghai and Shenzhen
Ph.D. in Mathematics
University of Barcelona
BA in Mathematics (Licenciatura)
University of Barcelona

Philip G. Moscoso
Technology and Operations Management
IESE Business School, University of Navarra
Ph.D in Industrial Engineering and Management, ETH Zurich
M.Sc. in Chemical Engineering, ETH Zurich

Dr. Sanjay Dixit, M.D.
Director, EP Laboratories, Philadelphia VA Medical Center
Cardiovascular Medicine - Cardiac Arrhythmia
Univ of Penn School of Medicine

Dr. Han-Xiang Deng
MD., Ph.D
Associate Professor and Research Department Division of Neuromuscular Medicine
Davee Department of Neurology and Clinical NeuroscienceNorthwestern University Feinberg School of Medicine

Dr. Pina C. Sanelli
Associate Professor of Public Health
Weill Cornell Medical College
Associate Attending Radiologist
NewYork-Presbyterian Hospital
MRI, MRA, CT, and CTA
Neuroradiology and Diagnostic Radiology
M.D., State University of New York at Buffalo,School of Medicine and Biomedical Sciences

Dr. Roberto Sanchez
Associate Professor
Department of Structural and Chemical Biology
Mount Sinai School of Medicine
Ph.D., The Rockefeller University

Dr. Wen-Yih Sun
Professor of Earth and Atmospheric SciencesPurdue University Director
National Center for Typhoon and Flooding Research, Taiwan
University Chair Professor
Department of Atmospheric Sciences, National Central University, Chung-Li, TaiwanUniversity Chair Professor
Institute of Environmental Engineering, National Chiao Tung University, Hsin-chu, Taiwan.Ph.D., MS The University of Chicago, Geophysical Sciences
BS National Taiwan University, Atmospheric Sciences
Associate Professor of Radiology

Dr. Michael R. Rudnick
M.D., FACP
Associate Professor of Medicine
Chief, Renal Electrolyte and Hypertension Division (PMC)
Penn Medicine, University of Pennsylvania
Presbyterian Medical Center, Philadelphia
Nephrology and Internal Medicine
Certified by the American Board of Internal Medicine

Dr. Bassey Benjamin Esu
B.Sc. Marketing; MBA Marketing; Ph.D Marketing
Lecturer, Department of Marketing, University of Calabar
Tourism Consultant, Cross River State Tourism Development Department
Co-ordinator , Sustainable Tourism Initiative, Calabar, Nigeria

Dr. Aziz M. Barbar, Ph.D.
IEEE Senior Member
Chairperson, Department of Computer Science
AUST - American University of Science & Technology
Alfred Naccash Avenue – Ashrafieh

Contents of the Volume

Global Journal of Computer Science and Technology
Volume 12 Issue 8 Version 1.0 April 2012
Type: Double Blind Peer Reviewed International Research Journal
Publisher: Global Journals Inc. (USA)
Online ISSN: 0975-4172 & Print ISSN: 0975-4350

3D Searching

By Pranav Agarwal
Pune University MAEER's MIT COE, India

Abstract - As the number of 3D models available on the Web grows, there is an increasing need for a search engine to help people. Unfortunately, traditional text-based search techniques are not always effective for 3D data. The key challenges are to develop query methods simple enough for novice users and matching algorithms robust enough to work for arbitrary polygonal models. We present a web-based search engine system that supports queries based on 3D sketches, 2D sketches, 3D models, and/or text keywords. We also present a web-based search engine system that supports multimodel queries which include both text query and sketch query. This results in faster retrieval of the result and the percentage efficiency also increases. The net result is a growing interactive index of 3D models available on the Web (i.e., a Google for 3D models).

Keywords : *Search engine, sketch query, text query, multimodel query, teddy, sketch, repository.*

GJCST Classification: *H.3*

Strictly as per the compliance and regulations of:

3D Searching

Pranav Agarwal

Abstract - As the number of 3D models available on the Web grows, there is an increasing need for a search engine to help people. Unfortunately, traditional text-based search techniques are not always effective for 3D data. The key challenges are to develop query methods simple enough for novice users and matching algorithms robust enough to work for arbitrary polygonal models. We present a web-based search engine system that supports queries based on 3D sketches, 2D sketches, 3D models, and/or text keywords. We also present a web-based search engine system that supports multimodel queries which include both text query and sketch query. This results in faster retrieval of the result and the percentage efficiency also increases. The net result is a growing interactive index of 3D models available on the Web (i.e., a Google for 3D models).

Keywords : Search engine, sketch query, text query, multimodel query, teddy, sketch, repository.

I. Introduction

Over the last few decades, computer science has made incredible progress in computer aided retrieval and analysis of multimedia data. For example, suppose you want to obtain an image of a horse for a Power point presentation. A decade ago, you could: 1) draw a picture, 2) go to a library and copy a picture, or 3) go to a farm and photograph a horse. Today, you can simply pick a suitable image from the millions available on the web. Although web search is commonplace for text, images, and audio, the information revolution for 3D data is still in its infancy. However, three recent trends are combining to accelerate the proliferation of 3D models, leading to a time in the future when 3D models will be as ubiquitous as other multimedia data are today: (1) new scanners and interactive tools are making construction of detailed 3D models practical and cost effective, (2) inexpensive graphics hardware is becoming faster, causing an increasing demand for 3D models from a wide range of people, and (3) the web is facilitating distribution of 3D models.[1]

a) Need for 3d Search Engine

Now a days, developments are changing the way we think about 3D data. For years, a primary challenge in computer graphics has been how to construct interesting 3D models. In the near future, the key question will shift from "how do we construct them?" to "how do we find them?". For example, consider a person who wants to build a 3D virtual world representing a city scene. He will need 3D models of cars, street lamps, stop signs, etc. Will he buy a 3D modeling tool and build them himself? Or, will he acquire them from a large repository of 3D models on the Web? We believe that research in retrieval, matching, recognition, and classification of 3D models will follow the same trends that can already be observed for text, images, audio, and other media. An important question then is how people will search for 3D models. Of course, the simplest approach is to search for keywords in filenames, captions, or context. However, this approach can fail: (1) when objects are not annotated (e.g., "B19745.wrl"), (2) when objects are annotated with inspecific or derivative keywords (e.g., "yellow.wrl" or "sarah.wrl"), (3) when all related keywords are so common that the query result contains a flood of irrelevant matches (e.g., searching for "faces" – i.e., human not polygonal), (4) when relevant keywords are unknown to the user (e.g., objects with misspelled or foreign labels), or (5) when keywords of interest were not known at the time the object was annotated. In these cases and others, a 3D search engine is needed.[1]

b) How to Search For 3d Models

We hypothesize that shape-based queries will be helpful for finding 3D objects. For instance, shape can combine with function to define classes of objects (e.g., round coffee tables). Shape can also be used to discriminate between similar objects (e.g., desk chairs versus lounge chairs). There are even instances where a class is defined entirely by its shape (e.g., things that roll). In these instances, "a picture is worth a thousand words." Our work investigates methods for automatic shape-based retrieval of 3D models.

The challenges are two-fold. First, we must develop computational representations of 3D shape (shape descriptors) for which indices can be built and similarity queries can be answered efficiently. In this paper, we investigate combinations of 3D sketching, 2D sketching, text, and interactive refinement based on shape similarity. We have integrated these methods into a search engine that provides a publicly available index of 3D models on the Web (Figure 1.1).

Author : Computer Department, Pune University MAEER's MIT COE, India. E-mail : Pranav.pranaw@gmail.com

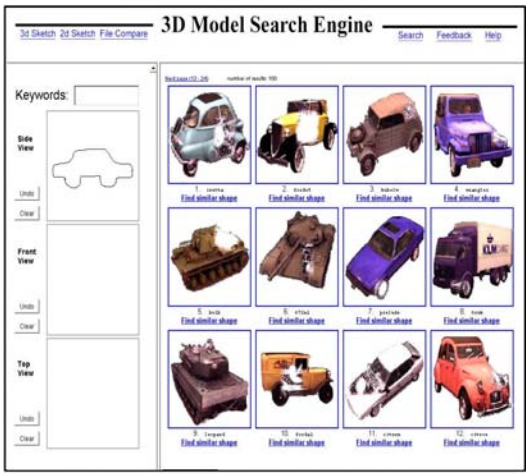


Fig. 1.1: Screenshot of our search engine

It allows a user to specify a query using any combination of keywords and sketches (left). Then, for each query, it returns a ranked set of thumbnail images representing the 16 best matching 3D models (right). The user may retrieve any of the 3D models by clicking on its thumbnail, and/or he may refine the search by editing the original input or by clicking on the "Find Similar Shape" link below any thumbnail.[1]

II. System Overview for 3D Models

The organization of our system is shown in Figure 2.1. Execution proceeds in four steps: crawling, indexing, querying, and matching. The first two steps are performed off-line, while the last two are done for each user query. The following text provides an overview of each step and highlights its main features:

1) Crawling: We build a database of 3D models by crawling the Web. 3D data still represents a very small percentage of the Web, and high quality models represent an equally small percentage of all 3D data. So, we have developed a focused crawler that incorporates a measure of 3D model "quality" into its page rank. Using this crawler, we have downloaded 17,834 VRML models from the Web. We augment this database with 2,873 commercial models provided by 3D vendors.
2) Indexing: We compute indices to retrieve 3D models efficiently based on text and shape queries. In particular, we have developed a new 3D shape descriptor based on spherical harmonics that is descriptive, concise, efficient to compute, robust to model degeneracies, and invariant to rotations.
3) Querying: We allow a user to search interactively for 3D models. Our system supports query methods based on text keywords, 2D sketching, 3D sketching, model matching, and iterative refinement. We find that methods based on both text and shape combine to produce better results than either one alone.
4) Matching: For each user query, our web server uses its index to return the sixteen 3D models that best match the query. Our method answers 3D shape queries in less than a quarter of a second for our repository; and, in practice, it scales sub-linearly with the number of indexed models. The main research issue at the heart of this system is how to provide shape-based query interfaces and matching methods that enable easy and efficient retrieval of 3D models from a large repository. In the following two sections, we discuss these issues in detail for different query interfaces.[1]

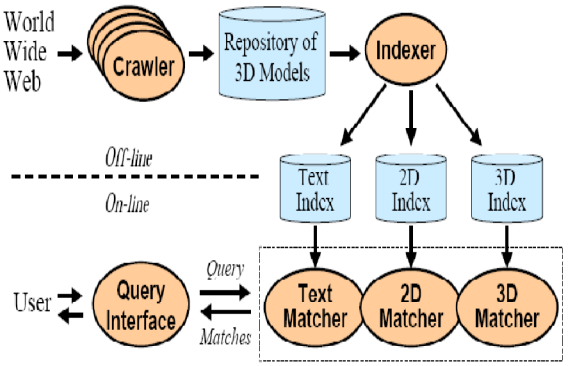


Figure 2.1: System Organization

a) Sketch Query

Of course, shape similarity queries are only possible when the user already has a representative 3D model. In some cases, he will be able to find one by using a text search. However, in other cases, he will have to create it from scratch (at least to seed the search). An interesting open question then is "What type of modeling tool should be used to create shapes for 3D retrieval queries?". This question is quite different than the one asked in traditional geometric modeling research. Rather than providing a tool with which a trained user can create models with exquisite detail and/or smoothness properties, our goal is to allow novice users to specify coarse 3D shapes quickly. In particular, the interface should be easy to learn for first time visitors to a website. Of course, this requirement rules out almost every 3D modeling tool available today – i.e., it would not be practical to require everybody who wants to use a 3D search engine to take a three week training course to learn the complicated menu structure of a commercial CAD tool. Instead, we have investigated two alternatives.

The first approach is to specify shape queries with a simple 3D sketching tool, such as Teddy [2] or Sketch [3]. To investigate this approach, we have developed a query interface in which the user creates a simple 3D model with Teddy, and then the system retrieves similar models (see Figure 3.1).

Unfortunately, our early experiences suggest that even its simple gesture interface is still too hard for

novice and casual users to learn quickly. During informal studies, we observed that most people do not readily understand "extrusions" and "cuts," and they have a difficult time getting used to rotating a 3D model to get the proper viewpoint for modeling operations. Moreover, only certain types of shapes can be created with Teddy. We believe that making 3D tools even simpler would require further constraints on the types of shapes that could be produced. Thus, we were motivated to look for alternate sketching paradigms.[2][3]

Fig 3.1: 3D sketch query interface

Our second approach is to draw 2D shapes with a pixel paint program and then have the system match the resulting image(s) to 2D projections of 3D objects (Figure 3.2). The main advantage of this approach is that the interface is easy to learn. All but the most novice computer users have used a 2D paint program before, and there are no complicated viewing or manipulation commands. Of course, the main disadvantage is that 2D images generally have less shape information than 3D models. We compensate for this factor somewhat by allowing the user to draw multiple 2D projections of an object in order to better define its shape.

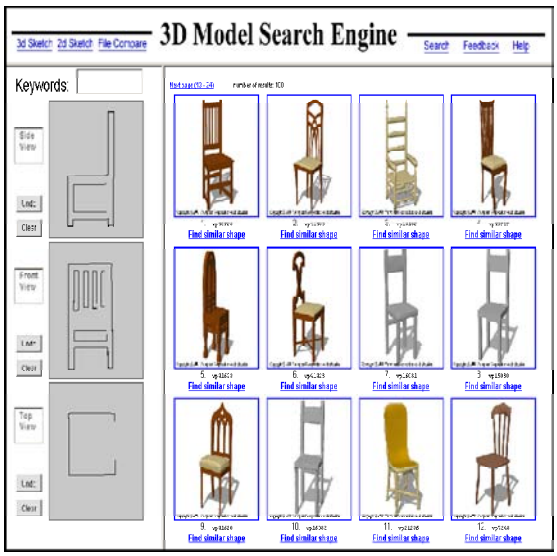


Fig. 3.2: 2D sketch query interface

b) Text Query

Our system also supports searching for 3D models by matching keywords in their textual descriptions. To support this feature, we construct a representative document for each 3D model. The text in that document includes the model filename, the anchor and nearby text parsed from its referring Web page, and ASCII labels parsed from inside the model file. Each document is preprocessed by removing common words (stop words) that don't carry much discriminating information, such as "and", "or", "my", etc. We use the SMART system's stop list of 524 common words as well as words specific to our domain (e.g. "jpg", "www", "transform", etc.). Next, the text is stemmed (normalized by removing inflectional changes) using the Porter stemmer. Finally, synonyms of the filename (without the extension) are added using Word-Net.

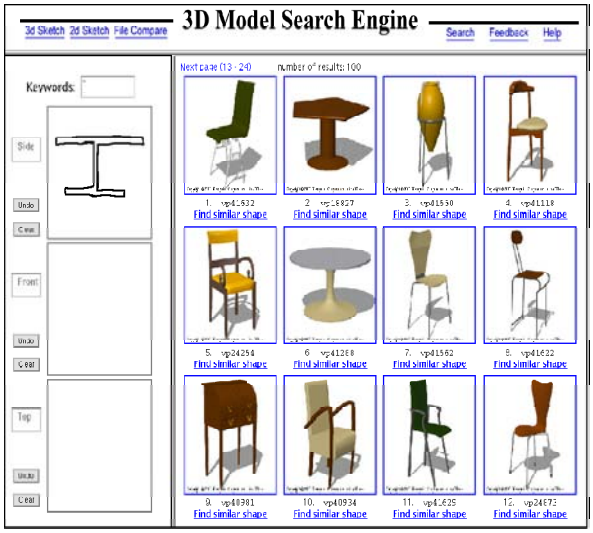
In order to match documents to user-specified keywords or to other documents, we use the TF-IDF/Rocchio method [5], a popular weighting and classification scheme for text documents. This method assigns a similarity score based on a term's frequency in the document and its inverse frequency over all documents.

Fig 3.3: Text interface

c) Multi-Model Query

Since text and shape queries can provide orthogonal notions of similarity corresponding to function and form, our search engine allows them to be combined. We support this feature in two ways. First, text keywords and 2D/3D sketches may be entered in a single multimodal query. Second, text and shape information entered in successive queries can be combined so that a user can refine search terms adaptively. For instance, if a user entered text keywords in a first query, and then clicked a "Find Similar Shape" link, the text and 3D shape would combine to form a second query. These types of multimodal queries are often helpful to focus a search on a specific subclass of objects (Figure 3.4). For example, a query with only keywords can retrieve a class of objects (e.g., tables), but it is often hard to home in on a specific subclass with text alone (e.g., round tables with a single pedestal). Similarly, a query with only a sketch can retrieve objects with a particular shape, but it may include objects with different functions (e.g., both tables and chairs). Multimodal input can combine ways of describing objects to form more specific queries (Figure 3.4(c)).[1]

(a) Text Query



(b) 2D sketch query

(c) Multimodal query

Fig. 3.4: Multimodal queries are often effective at finding specific types of objects.

III. Limitation

Better 2D image matching methods: our 2D sketching interface would be more effective with better image matching algorithms. Sometimes users create query sketches with interior texture and/or details (e.g., eyes and mouth of a human face), and our search engine matches them with projected images containing only boundary outlines (e.g., just the outline of the face). For matching purposes, the interior details in sketches are "interpreted" as boundaries of holes in projected images, and unexpected results are sometimes returned to the user. Of course, this problem could be rectified somewhat by providing users with instructions or examples about how to draw their sketches.

New modeling tools: future 3D modeling systems should consider integrating shape based matching and retrieval methods into interactive sketching tools. For instance, consider a 3D model synthesis paradigm in which a user draws a rough sketch of a desired 3D model and the system "fills in the details" semi-automatically by suggesting matching detailed parts retrieved from a large database. In such a paradigm, the user could retain much of the creative control over model synthesis, while the system performs most of the tedious tasks required for providing model detail.

IV. Conclusion

In summary, it investigates issues in building a search engine for 3D models. The main research contributions are: (1) New query interfaces that integrate text, 2D sketches, 3D sketches, and 3D models. (2) We provide a large repository of 3D models and a way to find the interesting ones.

References Références Referencias

1. Thomas Funkhouser, Patrick min, Michael Kazhdan, Joyce Chen, Alex Halderman, and David Dobkin Princeton University, "A Search Engine for 3D Models" ACM Transactions on Graphics, Vol. V, No. N, 10 202002,.
2. Zeleznik, R. C., Herndon, K. P., and Hughes, J. F. 1996. Sketch, "An Interface for Sketching 3D Scenes", In Proceedings of SIGGRAPH 96. Computer Graphics Proceedings, Annual Conference Series. 163–170.
3. Igarashi, T.,Matsuoka, S., and Tanaka, H. 1999. Teddy: "A Sketching Interface for 3D Freeform Design". In Proceedings of SIGGRAPH 1999. Computer Graphics Proceedings, Annual Conference Series., Los Angeles, CA, 409–416.

Global Journal of Computer Science and Technology Volume XII Issue VIII Version I April 2012
6

This page is intentionally left blank

Global Journal of Computer Science and Technology
Volume 12 Issue 8 Version 1.0 April 2012
Type: Double Blind Peer Reviewed International Research Journal
Publisher: Global Journals Inc. (USA)
Online ISSN: 0975-4172 & Print ISSN: 0975-4350

Rubik's Cube Application for Android Mobile Phones with Addressing Android Operating System Problems

By Amar Changdeo Gadekar, Amit Uttamrao Jagtap, Amit Jugmandar Kunchalas & Arpita Jadhav

Pune University Dehu Phata, Kelgaon- Alandi(D), Maharashtra India

Abstract - Android Smart phones enable a new, rich user experience in pervasive computing, but their hardware is still very limited in terms of computation, memory, and energy reserves, thus limiting potential applications. In this paper, we are dealing with battery drain problems and stack overflow problems of android mobile phones. For that we are going to develop Rubik's cube game application. We will test this app on several mobile phones of same configuration and of different manufacturer i.e. Samsung, Motorola, HTC, Sony Ericson, Micromax. In this research we will measure the performance of our app and will conclude about some parameters of Android Operating System i.e. heap utilization, power consumption, smooth and faster execution which will give meaningful information to reveal or solve or address Android Operating System problems in a detailed manner.

Keywords : *Rubik's Cube, Android Operating System, Problems.*

GJCST Classification: *D.m*

Strictly as per the compliance and regulations of:

Rubik's Cube Application for Android Mobile Phones with Addressing Android Operating System Problems

Amar Changdeo Gadekar [α], Amit Uttamrao Jagtap [σ], Amit Jugmandar Kunchalas [ρ] & Arpita Jadhav [ω]

Abstract - Android Smart phones enable a new, rich user experience in pervasive computing, but their hardware is still very limited in terms of computation, memory, and energy reserves, thus limiting potential applications. In this paper, we are dealing with battery drain problems and stack overflow problems of android mobile phones. For that we are going to develop Rubik's cube game application. We will test this app on several mobile phones of same configuration and of different manufacturer i.e. Samsung, Motorola, HTC, Sony Ericson, Micromax. In this research we will measure the performance of our app and will conclude about some parameters of Android Operating System i.e. heap utilization, power consumption, smooth and faster execution which will give meaningful information to reveal or solve or address Android Operating System problems in a detailed manner.

Keywords : Rubik's Cube, Android Operating System, Problems.

I. Introduction

Smart phones with Internet access, GPS, sensors, and various applications are recently seeing explosive adoption. The Apple iPhone, Blackberry smart phones, and the Google Android phone are a few prominent examples. In a slightly more advanced capability bracket also lie mobile Internet devices (MIDs) such as the Nokia N8 and Moblin-based devices that provide a richer untethered Internet experience. With popularity, such devices also see new applications by a broader set of developers, beyond the mobile staples of personal information management and music playback. Now mobile users play games; capture, edit, annotate and upload video; handle their finances; manage their personal health and "wellness" (e.g., iPhone Heart Monitor and Diamedic). However, with greater application power comes greater responsibility for the mobile execution platform: it is now important to track memory leaks and runaway processes sucking up power, to avoid or detect malicious intrusions and private data disclosure, and to manage applications with expensive tastes for high volume data or advanced computational capabilities such as floating-point or vector operations.

a) Mobile Performance Parameters

Android Phones has limited processing capabilities. To maximize it following parameters are considered while developing an Android application.

a) Processor
b) RAM
c) Heap Utilization
d) Power Consumption
e) Type of Touch Screen

b) Rubik's Cube

The Rubik's Cube is a 3-D mechanical puzzle invented by a Hungarian sculptor Erno Rubik. In a classic Rubik's Cube, each of the six faces is covered by nine stickers, among six solid colors (traditionally white, red, blue, orange, green, and yellow). For the puzzle to be solved, each face must be a solid color.

Our aim is to develop a Rubik's cube game application for touch screen mobile phones on the Android operating system platform using the Android OpenGL graphics library. In our project, we can control the vector cube in a 3D virtual environment (panning/tilting) to solve the timed puzzle. This is implemented in three modules:

I. Memory representation of the cube-It deals with a standard 3×3×3 cube, exploring the group of available moves and its action on sets of the cube's constituent parts ultimately showing the group of moves to be better-understood.
II. Visualization- In the actual implementation, the observer is moved in a spherical shape around the origin. To the user, the cube appears to be rotating because the background always remains same.
III. Designing of the touch UI- action-reaction of the touch user interface is developed. Concept of Group Theory is used as the fundamental platform for implementing these. Rubik's Cube is an age old and popular game. Through make this

Author α : Department of Computer Engineering, Maharashtra Academy of Engineering, Pune University Dehu Phata, Kelgaon-Alandi(D), Maharashtra-412105, India.
E-mail: amargadekar36@gmail.com
Author σ : Department of Computer Engineering, Maharashtra Academy of Engineering, Pune University Dehu Phata, Kelgaon-Alandi(D), Maharashtra-412105, India.
E-mail: amit.scorpian@gmail.com
Author ρ : Department of Computer Engineering, Maharashtra Academy of Engineering, Pune University Dehu Phata, Kelgaon-Alandi(D), Maharashtra-412105, India.
E-mail: amitkunchalas1090@gmail.com

timeless game available on the mobile platform, for the user who is always on the go.

II. Proposed Research Work

Gaming application utilizes maximum processor power capabilities, and maximum utilization of heap. Sometimes app requires memory beyond the heap size, at that time there is possibility of application crashing i.e. Force Close message in Android Phones. So basically we are tend to solve these problems where application which has to be developed should be able to run without crashing on minimal configuration smart phone. We know that there are app store from where we can buy, purchase or can download free apps i.e. Android Market. Free application's license fee is paid by advertisement sponsors and user is able to play the game with advertisements appearing on the screen. Billion users mostly download the free applications. They purchased it until and unless it is required. So this advertisement requires internet connection while playing the games and also uses heap which affects the performance of game app.

So we are dealing with following android phone problems:

a) Android Battery Drain Problem
b) Stack Overflow
c) Advertisement overhead for free apps

a) Battery Drain Problem

An Android application will run on a mobile device with limited computing power and storage, and constrained battery life. Because of this, it should be *efficient.* Battery life is one reason you might want to optimize your app even if it already seems to run "fast enough". Battery life is important to users, and Android's battery usage breakdown means users will know if your app is responsible draining their battery. There are two basic rules for writing efficient code considering battery: Don't do work that you don't need to do. Don't allocate memory if you can avoid it.

Smartphone's always tries to access for the internet for the services like GPS, phone log updating, messenger services, software upgradation, wifi-hotspot detection, GPRS-EDGE connectivity, 3G network searching etc. While playing the game, most of the app requires internet connections though they are not necessary.

b) Stack Overflow

In a Smartphone several processes are running in background. It means it supports multitasking. So in multitasking operation stack or heap plays important role for the main app. If heap size gets fully occupied then there are chances of app crashing. So to avoid this we are developing algorithm in which the app will automatically kill the processes which are idle and not required to stay in the processes queue. Mostly Priorities are assigned to processes on which we can sort out which processes has to be killed.

Restricted access to network:

We are solving this problem by building an advertisement container for free app.

c) Advertisement Overhead

Free app's license fees are paid by sponsors. User is able to play the game with little bit interference of advertisements. This advertisements are get downloaded when user runs the app. For this app always requires internet connection. And which consumes more power. So we will develop advertisement container in which we will install the ads, this container will be updated once in a day. So that user doesn't require internet access when he wishes to play the app. So this internet overhead can be reduced by this advertisement container.

As we are building advertisement container, in this container when we are downloading or updating the stack of ads, these ads get compressed and we can put them into low resolution. So when user plays the game these add will access minimum area of heap without affecting the performance of game.

III. Mathematical Model

Data:

$$Cube = \{ANDR, MAT, PHY_{MEM}, HEAP, TI, Pow, APKO, E|\emptyset Cube\}$$

Where,

ANDR=Android OS,
MAT= Six 2D Matrices for each face of cube,
PHYMEM= Physical Memory,
HEAP= Shared memory,
TI= Touch Interface,
Pow= Power consumed per unit time,
APKO= Other applications overhead on the system,
E=Exceptions,
ØCube= Rules.

Success : Successful execution of Rubik's Cube application with minimum power consumption per unit time.

Failure : Memory or power not available.

Input State Validation:

Input State Validation
{PHYMEMAVAIL > PHYMEMREQ}

Objective Functions:

1. To match the pattern:

The initial input to the pattern matching function:
IP= {Six 2D matrices, Goal state patterns}
Output states after execution of pattern matching function:

Success: If input matrices matches with the pattern.
Failure: If input matrices do not match with the pattern.

2. To consume lesser power:
The initial power requirement can be stated as below:

$$\mathrm{Pow_{AVAIL}} > \mathrm{Pow_{REQ}} + \mathrm{Pow_{OVRHD}} > 0$$

In general, the power consumed by the app can be calculated as:

$$\mathrm{POW_{REQ}} = \sum \mathrm{POW_{GAME}}, \mathrm{POW_{ADDS}}, \mathrm{POW_{OVRHD}}, \mathrm{POW_{NW}}, \mathrm{POW_{TI}}$$

Function 'battery consumption':

$$\mathrm{POW_{REQ}} = \{\mathrm{POW_{GAME}}, \mathrm{POW_{ADDS}}, \mathrm{POW_{OVRHD}}, \mathrm{POW_{NW}}, \mathrm{POW_{TI}}\}$$

Where,

POWREQ= Total power consumed by app
POWGAME= Power required by game app
POWOVRHD= Power required by other apps
POWNW= Power required by network
POWTI= Power required by touch interface
Power consumption after function execution:

$$\mathrm{POW_{REQ}} = \sum \mathrm{POW_{GAME}}, \mathrm{POW_{TI}} - \sum \mathrm{POW_{ADDS}}, \mathrm{POW_{NW}}, \mathrm{POW_{OVRHD}}$$

3. Avoid stack overflow:

$$\mathrm{FREE_{STACK}} = \{\mathrm{MEM_{TOTAL}}, \mathrm{MEM_{APP}}, \mathrm{MEM_{OTHRAPP}}, \mathrm{APP_{ID}}, \mathrm{APP_{PRIO}}\}$$

Where,

MEMTOTAL= Total memory of system
MEMAPP= Memory being consumed by game app
MEMOTHRAPP= Memory being consumed by other apps
APPID= Application or process IDs of current apps
APPPRIO= Application or process priorities of current apps

Function:
If,

$$\sum \mathrm{MEM_{APP}}, \mathrm{MEM_{OTHRAPP}} > \mathrm{MEM_{TOTAL}}$$

Then,

KILLAPP= MINPRIO(APPPRIO) && APPIDLE

Table.1: Android Smart Phone Comparison

	RAM (MB)	ROM (MB)	Processor (MHz)	Touch Screen Type	Battery (Talk time in hrs)
Samsung Galaxy Fit S5670	280	180	600	Capacitive	12 hrs 2G 9 hrs 3G
DELL XCD35	256	512	600	Capacitive	9 hrs 2G 8 hrs 3G
Samsung Galaxy POP	280	180	600	Capacitive	10 hrs 2G 9 hrs 3G

Above table gives comparison of several android smart phones with respect to their hardware configuration.

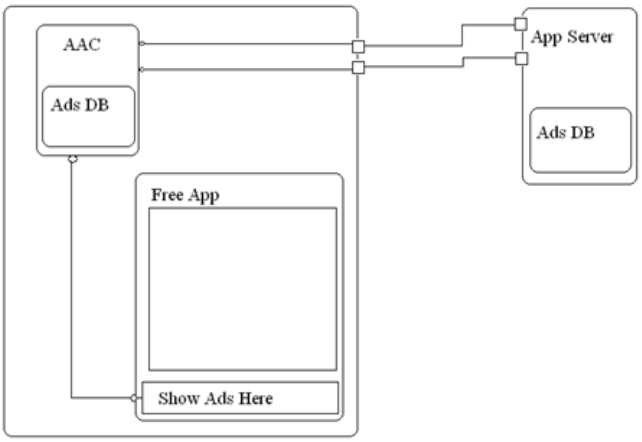


Figure.1: Application Advertisement Container (AAC) Framework

Application Advertisement Container (AAC) will connect to application server to fetch several new ads from advertise database once a week when user have an active internet connection.

Application (while running) need not to be connected to the internet in order to show ads. Ads are fetched from application advertisement container (AAC).

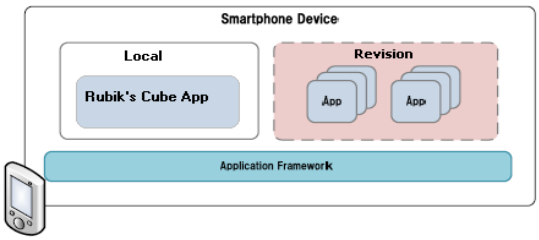


Figure.2 : handling heap & crashing problem framework

Local area contains active foreground application i.e. current running application.

Revision area contains background running applications. These applications are revised. It means to improve processor power we have to kill processes which are not required. These applications are put up in the revision area and by analysis it processes which are not required are killed. Active flag is marked for system and antivirus applications. Active flag tasks are not killed.

IV. Conclusion

The Rubik's Cube game is being brought to the virtual world of mobility using the popular operating system Android. Android is an operating system for mobile devices such as cellular phones, tablet computers etc. There are currently over 70,000 apps available for Android, which makes it the second most popular mobile development target.

Popular with a huge mass of people with varied age-groups having competitions held world wide for the person solves in the minimum time span.

In this project, we propose the modules for Rubik's cube application viz. Memory representation of the cube, visualization and designing of the touch UI. The memory implementation comprises of the representation of a 3D cube in 2D, whereas, in visualization the actual appearance of the cube and its functions are implemented and in the last module, the function of the touch interface is designed.

There are various options available for the user to change the settings according to naive and advanced users for adjusting the speed, vibration, sound options, brightness etc. The Goal for the user is to make each face of a solid color, initial state of the Rubik's cube will be in scrambled state. Born with Google integration, open source, constantly improved- courtesy the big brain at Google. More options available to manage your phone and Gmail account. An intuitive User interface packed with options and flexibility, smoother, more efficient aesthetically pleasing display technically superior fast and powerful. Thus our application of Rubik's cube on android for touch screen mobile phones keeps the adrenaline of user's pumping high. It works great in development of brain in small children helping to develop logic and analytical skills at a tender age. It's not just a game but a life time experience, so come, play and experience.

References Références Referencias

1. "Device Requirements" Android Source Code <git://android.git.kernel.org/platform/development/pdk/docs/guide/system_requirements.jd>
2. "Dalvik" Android Source Code <git://android.git.kernel.org/platform/development/pdk/docs/guide/dalvik.jd>
3. L. Xie, X. Zhang, A. Chaugule, T. Jaeger, and S. Zhu, "Designing System-Level Defenses against Cell phone Malware," *Reliable Distributed Systems, 2009.* SRDS '09. 28th IEEE
4. International Symposium on, 2009, pp.83 -90.
5. Kunkle, D.; Cooperman, G. "Twenty-six Moves Suffice for Rubik's Cube." Proceedings of the International Symposium on Symbolic and Algebraic Computation (ISSAC '07), ACM Press.
6. McPhail, B. (2003). The Complexity of Puzzles: NP-Completeness Results for Rubrics cube and Minesweeper. Thesis for BA, Division of Mathematics and Natural Sciences, Reed College.
7. A. Rudenko, P. Reiher, G. J. Popek, and G. H. Kuenning. Saving portable computer battery power through remote process execution. *MCCR.*
8. H. Kim et al., "Detecting Energy-Greedy Anomalies and Mobile Malware Variants," in International Conference on Mobile Systems, Applications, and Services (MobiSys), 2008.
9. A. P. Fuchs et al., "SCanDroid: Automated Security Certification of Android Applications," 2010.
10. Http://portal.acm.org/citation.cfm?id=801054&dl=GUIDE&coll=GUIDE&CFID=10178237&CFTOKEN=61248052
11. Http://www.arm.com/files/pdf/26379.pdf
12. Developer.android.com/guide/tutorials/hello-world.html
13. Group Theory and the Rubik's Cube. Texas State Honors Math Camp.
14. Adventures of Group Theory: Rubik's Cube, Merlin's Machine, and Other Mathematical Toy.

Global Journal of Computer Science and Technology
Volume 12 Issue 8 Version 1.0 April 2012
Type: Double Blind Peer Reviewed International Research Journal
Publisher: Global Journals Inc. (USA)
Online ISSN: 0975-4172 & Print ISSN: 0975-4350

Creating Safe Region for Continuous Moving Objects

By M.Swapna, S.China Venkateswarlu, B.Venkateswarlu & M.Suresh Babu

Holy Mary Institute of Technology/ Affiliated to JNTUH, Hyderabad

Abstract - Monitoring the continuous moving objects while monitoring the two fundamental things are privacy and efficiency are considered. First, evaluating the safe region is nothing but creating the safe region and the monitoring is done when objects are moving from one region to another region. We provide detailed algorithms for query evaluation/reevaluation and safe region computation in this framework. The framework distinguishes itself from the existing work by being the first to holistically address the issues of location updating in terms of monitoring accuracy, efficiency, and privacy, particularly, when and how mobile clients should send location updates to the server. Based on the notions of safe region and most probable result, this project performs location updates only when they would likely alter the query results.

Keywords : *Customer, database monitoring, deregister, object Indexes, Mobile Client, Evaluation, Spatial Query.*

GJCST Classification: *H.2.0*

Strictly as per the compliance and regulations of:

Creating Safe Region for Continuous Moving Objects

M.Swapna [α], S.China Venkateswarlu [σ], B.Venkateswarlu [ρ] & M.Suresh Babu [ω]

Abstract - Monitoring the continuous moving objects while monitoring the two fundamental things are privacy and efficiency are considered. First, evaluating the safe region is nothing but creating the safe region and the monitoring is done when objects are moving from one region to another region. We provide detailed algorithms for query evaluation/reevaluation and safe region computation in this framework. The framework distinguishes itself from the existing work by being the first to holistically address the issues of location updating in terms of monitoring accuracy, efficiency, and privacy, particularly, when and how mobile clients should send location updates to the server. Based on the notions of safe region and most probable result, this project performs location updates only when they would likely alter the query results.

Keywords : Customer, database monitoring, deregister, object Indexes, Mobile Client, Evaluation, Spatial Query.

I. Introduction

This paper is a location based service and it is used to identify the location of the customer. Early work assumed a static data set and focused on efficient access methods and query evaluation algorithms. Recently, a lot of attention has been paid to moving-object databases, where data objects or queries or both of them move in a safe region.

A database monitoring continuous spatial queries over moving objects is needed in numerous applications such as public transportation, logistics and location-based services. In the monitoring system, this consists of a base station, a database server, application servers, and a large number of moving objects like mobile clients. The database server manages the location information of the objects. The application servers gather monitoring requests and register spatial queries at the database server, which then continuously updates the query results until the queries are deregistered. The fundamental problem in a monitoring system is when and how a mobile client should send location updates to the server because it determines three principal performance measures of monitoring issues like accuracy, efficiency and privacy.

Author α : MTech Student from Dept of CSE-HITS COE, Hyderabad.
Author σ : Professor in Department of ECE ,HITS COE-HYDERABAD.
E-mail : cvenkateswarlus@gmail.com
Author ρ : Assistant Professor in Dept. of CSE-HITS COE,Hyderabad.
Author ω : Assistant Professor in Dept of CSE-MRGI, Hyderabad.

II. Design of Safe region Evaluation & Object Indexs

There are four module, they are as follows

a) Safe Region Evaluation

In this safe region is assumed as a rectangle change of object inside the rectangle would not affect spatial query in the database. The safe region is computed based on the queries in such a way that the current results of all queries remain valid as long as all objects reside inside their respective safe regions.

The Client updates its location on the server only when the client moves out of its safe region based on the location of client. The safe region ring is based on the rectangle of the centric.

b) Object Index

Object index is the server side information about spatial query range and used to evaluate safe region.

The object index is the server-side view on all objects. To evaluate queries, the server must store the spatial range, in the form of a bounding box, within which each object can possibly locate. Note that this bounding box is different from a δ- square because its shape also depends on the client-side location updater. That is, it must be a function (denoted by $\odot$) of the last updated δ- square and the safe region. As such, this box is called a bbox as a mark of distinction. In particular, for the standard update strategy, the bbox is the safe region enlarged by $\delta/2$ on each side, or formally, the "Minkowski sum"2 of the safe region and a $\delta/2$- square.

c) The Query Index

Query Index as the following parameter query point, current query result and the quarantine area. The quarantine area is used to identify the queries whose results might be affected by an incoming location update.

For each registered query, the database server stores: 1) the query parameters (e.g., the rectangle of a range query, the query point, and the k value of a kNN query); 2) the current query results; and 3) the quarantine area of the query. The quarantine area is used to identify the queries whose results might be

affected by an incoming location update. It originates from the quarantine line, which is a line that splits the entire space into two regions: the inner region and the outer region. An object becomes a result object if it enters the inner region; likewise, it becomes a non result object once it enters the outer region. However, the ideal quarantine line is difficult to compute, especially in the context of the most probable result. In addition, as object locations have extensions rather than points, the quarantine line is not unique for a query. As such, we allow fuzziness by relaxing the line to an area called "quarantine area." That is, the entire space is split into three regions: the inner region, the quarantine area, and the outer region. The former two are separated by the inner bound of the quarantine area, whereas the latter two are separated by the outer bound of the quarantine area. To ease the computation of these two bounds, an object becomes a result object if its δ- square moves totally inside the inner bound; on the other hand, an object becomes a non result object once its δ- square crosses or is outside the outer bound. Therefore, a query Q is not affected only if "of the updated δ- square p and its last updated δ- square p_{lst}, both of them are totally inside the inner bound or both of them cross or are outside the outer bound of the quarantine area."

The number of objects is some orders of magnitude larger than that of queries. As such, the query index can accommodate all registered queries in main memory, while the object index can only accommodate all moving objects in secondary memory

d) Query Processing

In the PAM framework, based on the object index, the query processor evaluates the most probable result when a new query is registered, or reevaluates the most probable result when a query is affected by location updates.

Obviously, the reevaluation is more efficient as it can be based on previous results.

e) Location Update

Each time client detects the genuine point location, it is wrapped into a bounding box. Then, the client-side location updater decides whether or not to update that box to the server without any other knowledge about the client locations or moving patterns, upon receiving such a box, the server can only presume that the genuine point location is distributed uniformly in this box.

III. Algorithms

Algorithm1: Overview of Database Behavior

1. While receiving a request do
2. if the request is to register query q then
3. evaluate q;
4. compute its quarantine area and insert it into the
5. query index;
6. return the results to the application server;
7. update the safe regions of objects;
8. else if the request is to deregister query q then
9. remove q from the query index;
10. else if the request is a location update from object p
11. then determine the set of affected queries;
12. for each affected query q do
13. reevaluate q;
14. update the results to the application server;
15. recomputed its quarantine area and update the query index;
16. update the safe region of p ;

Algorithm2: Evaluating a new kNN Query
Input: root: root node of object index
Q : the query point
Output: C: the set of KNNs
Procedure

1. Initialize queue H and H;
2. enqueue (root, d(q ,root)} into H;
3. While |C| < k and H is not empty do
4. U= H.pop ();
5. If u is a leaf entry then
6. While d (q,u) >D(q,v) do
7. V=H.pop ();
8. Insert v into H;

Algorithm3: Reevaluating a kNN Query
Input: **C:** Existing set of KNNs
P: The updating object
Output: C: The new set of KNNs
Procedure

1. Initialize queue H and H;
2. Enqueue{ root ,d(q,root)} into H;
3. While d(q,u) >D(q,v) do
4. V=H.pop ();
5. Insert v into H;
6. Else if u is an index entry then
7. For each child entry v into u do
8. Enqueue (v,d(v,q)) into H;
9. Else if u is an index entry then
10. For each child entry v into u do
11. enqueue (v,d(v,q)) into H;

IV. Context Diagram of Work-The System Architecture

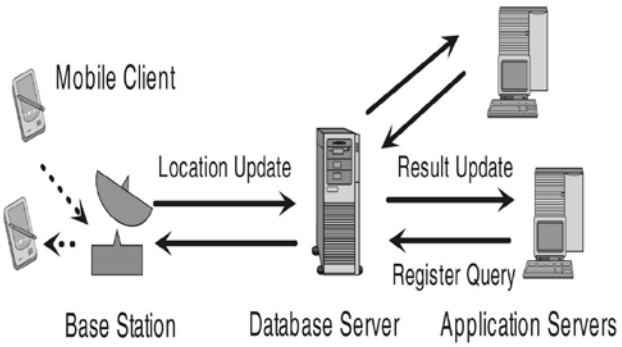


Figure 1: The system architecture

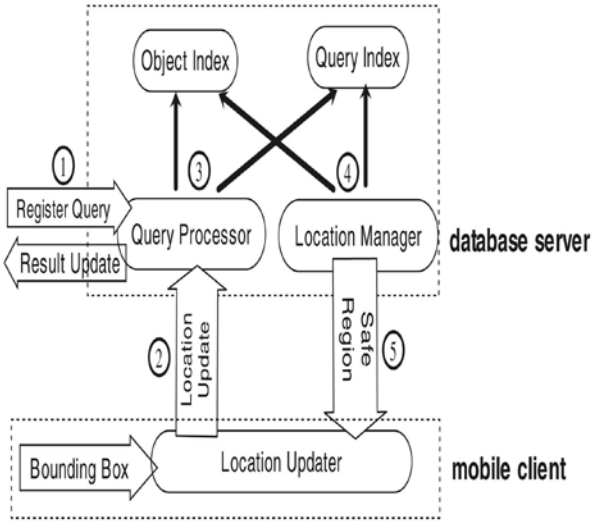
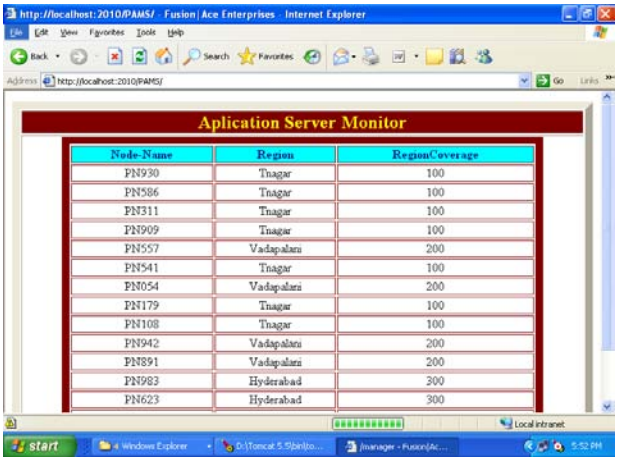


Figure 2 : Framework overview

V. Implementations



Node-Name	Region	RegionCoverage
PN930	Tnagar	100
PN586	Tnagar	100
PN311	Tnagar	100
PN909	Tnagar	100
PN557	Vadapalani	200
PN541	Tnagar	100
PN054	Vadapalani	200
PN179	Tnagar	100
PN108	Tnagar	100
PN942	Vadapalani	200
PN891	Vadapalani	200
PN983	Hyderabad	300
PN623	Hyderabad	300

Figure 3 : Application Server Monitor

This screen will display the monitoring of the application server when the server is on. It contain the node number, region name and distance of that particular region.

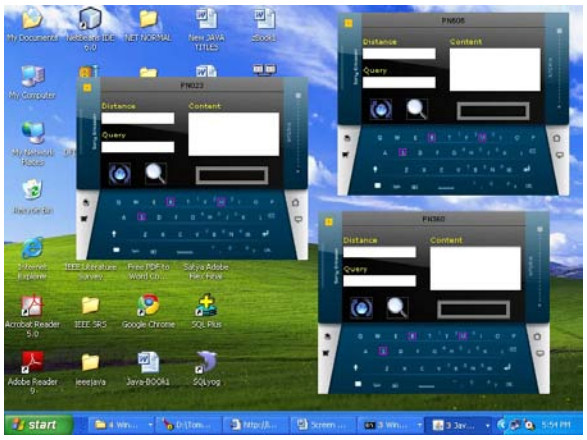


Figure 4 : Creation of multiple nodes

This screen shot is about the opening of the nodes it is done by running few nodes are open.

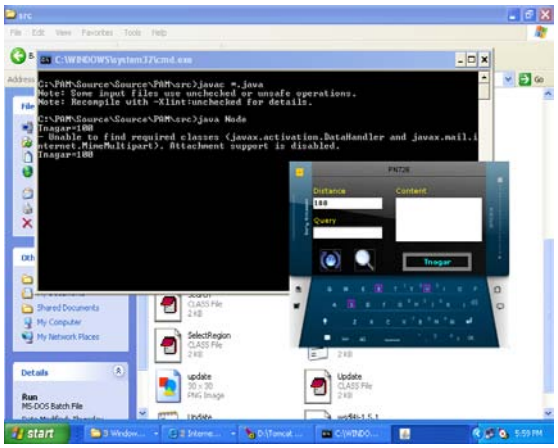


Figure 5 : Entry the query and distance in the node

This screen shot is about run the node and monitoring the server the server is activated for this particular node. By entering the distance it specify whether it is a safe region or not, if it a Safe region it display that particular region otherwise not i.e no region is mentioned.

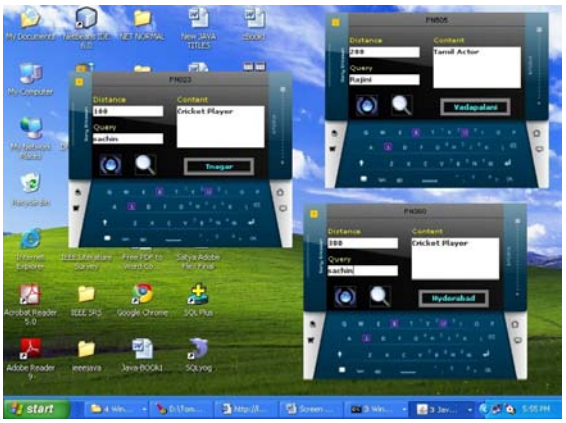
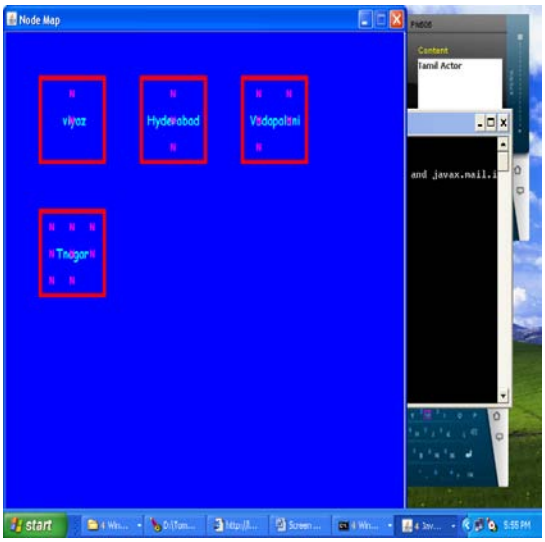


Figure 6 : Displaying the entry of distance and query in the Multiple nodes

This screen shot is about the opening the multiple node by running it. After opening enter the distance after entering the distance it check whether the distance is a safe region or not. If it is a safe region then enter the query, if it also registered query then displays the content otherwise not. This screen shot is a node map it contains few nodes and these nodes are registered node only displayed in the node map. It also contains the queries in that node and these queries are registered queries only. This screen shot is about updated Application server monitored after added the few nodes in the node map.



Screen 7: Displaying the nodes in the node map

VI. Results Analysis

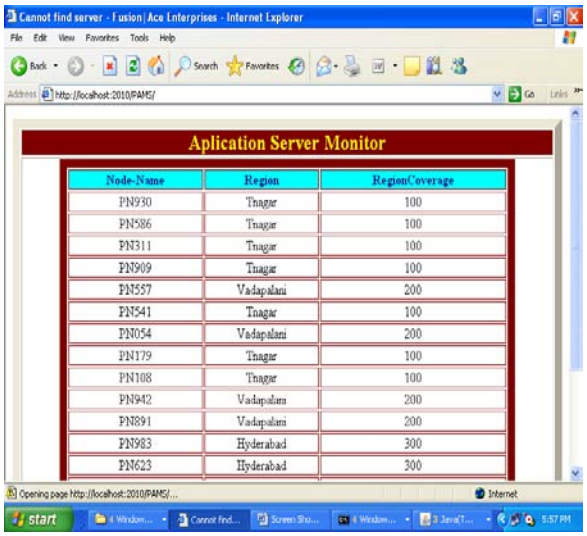


Figure 8 : Update Application Server Monitor

VII. Design of Test Cases

A specific executable test that examines all aspects including inputs and outputs of a system and then provides a detailed description of the steps that should be taken, the results that should be achieved, and other elements that should be identified. Steps explained in a test case include all details even if it they are assumed to be common knowledge. Test cases are used as a technical explanation and reference guide for systems.

Test Case No	Description	Expected Result	Pass/ Fail	Result
1	Enter the distance then click on submit button	It shows the region	pass	It has shown the exact region
2	Enter the query then click on the submit button	It shows the designation of that query	pass	It shown the designation of that query
3	Enter the distance beyond the limit specified in database region then click on submit button	It shows the given distance does not belongs to safe region	pass	It shown the given distance does not belongs to safe region
4	Enter the distance and query then click on submit button	It shows the exact location of the query	pass	It shown the exact location of the query
5	Enter the new distance and query then click on submit button	It shows the current location of the query	pass	It shown the current location of the query

VIII. Conclusion & Future Scope

This paper proposes a framework for monitoring continuous spatial queries over moving objects. The framework is the first to holistically address the issue of location updating with regard to monitoring accuracy, efficiency, and privacy. We provide detailed algorithms for query evaluation/ revaluation and safe region computation in this frame-work. We also devise

three-client update strategies that optimize accuracy, privacy, and efficiency respectively. The performance of our framework is evaluated through a series of experiments.

The results show that it substantially outperforms periodic monitoring in terms of accuracy and CPU cost while achieving a close-to-optimal communication cost. To further optimize the performance of the framework. The minimum cost update strategy shows that the safe region is a crude approximation of the ideal safe area, mainly because of separately optimize the safe region for each query, but not globally. A possible solution is to sequentially optimize the queries but maintain the safe region accumulated by the queries optimized so far. Then, the optimal safe region for each query should depend not only on the query, but also on the accumulated safe region. Furthermore, the framework is must be robust and scales well with various parameter settings, such as privacy requirement, moving speed, and the number of queries and moving objects.

Global Journal of Computer Science and Technology Volume XII Issue VIII Version I April 2012
16

This page is intentionally left blank

Global Journal of Computer Science and Technology
Volume 12 Issue 8 Version 1.0 April 2012
Type: Double Blind Peer Reviewed International Research Journal
Publisher: Global Journals Inc. (USA)
Online ISSN: 0975-4172 & Print ISSN: 0975-4350

Artificial System to Compare Energy Status in the Context of Europe and Middle East

By Linkon Chowdhury, Md.Sarwar Kamal & Sonia Farhana Nimmy
BGC Trust University Bangladesh

Abstract - Now-a-days Global economy depends on the supply of energy and proper use of it. Energy is very compelling and critical issues all over the world. But the price of energy especially oil is increasing day by day. It is an obvious duty for all government throughout the world that estimation of cost of Oil for future development. The main purpose of this research is to develop a dynamic future and instant oil price prediction model for Business organization, Ministry of Finance, Ministry of Economic, Oil Company, Think Tank of the Government, Prime-Minister, World Bank Policy Maker, International Monetary Fund (IMF) etc. In this work, we first apply chi square test to separate factors such as demand of Oil and Gas, over population, Increasing rate Industry, completion of Development and etc. We then make a automate comparison of the production and export rate of the Oil and Gas in various countries among Middle East and Europe. The main purpose of applying it is feature selection to data. Degree of freedom is used to P-value (Probability value) for best predicators of dependent variable. After being separation of factors we have had examined the desired outcome using Bayes' Networks (BN). The BN helps to determine the actual result based on our input factors. We should bear in mind that our activities for this work are dynamic and our system can inspect dynamically irrespective of any volume of dataset.

Keywords : *Intelligent System, Dynamic Price Prediction, P-Value, BN, Chi Value, IMF, World Bank.*

GJCST Classification: *I.2.0*

Strictly as per the compliance and regulations of:

Artificial System to Compare Energy Status in the Context of Europe and Middle East

Linkon Chowdhury [α], Md.Sarwar Kamal [σ] & Sonia Farhana Nimmy [ρ]

Abstract - Now-a-days Global economy depends on the supply of energy and proper use of it. Energy is very compelling and critical issues all over the world. But the price of energy especially oil is increasing day by day. It is an obvious duty for all government throughout the world that estimation of cost of Oil for future development. The main purpose of this research is to develop a dynamic future and instant oil price prediction model for Business organization, Ministry of Finance, Ministry of Economic, Oil Company, Think Tank of the Government, Prime-Minister, World Bank Policy Maker, International Monetary Fund (IMF) etc. In this work, we first apply chi square test to separate factors such as demand of Oil and Gas, over population, Increasing rate Industry, completion of Development and etc. We then make a automate comparison of the production and export rate of the Oil and Gas in various countries among Middle East and Europe. The main purpose of applying it is feature selection to data. Degree of freedom is used to P-value (Probability value) for best predicators of dependent variable. After being separation of factors we have had examined the desired outcome using Bayes' Networks (BN). The BN helps to determine the actual result based on our input factors. We should bear in mind that our activities for this work are dynamic and our system can inspect dynamically irrespective of any volume of dataset.

Keywords : Intelligent System, Dynamic Price Prediction, P-Value, BN, Chi Value, IMF, World Bank.

I. Inroduction

Oil and Gas are the important natural source of energy throughout the world. They play an important role for the development of the universe irrespective of rich and poor. An energy export oriented contract for safeguarding ensuring country's energy security is essential at any time. But there are lot of anomalies towards proper supply of oil and Gas as well as the demand is increasing day by day. Here we depict some scenario below. Crude rose in Asia Tuesday as traders monitored the crisis in Libya, with rebels claiming victory but one of Moamer Kadhafi's sons insisting his father was still in control, analysts said. Also supporting prices was expectations that it could take years before the North African country's oil output is back to pre-revolt levels. Brent North Sea crude for October delivery rose 58 cents to $108.94 a barrel from Monday's close of $108.36.New York's main contract, West Texas Intermediate (WTI) light sweet crude for October delivery rose 97 cents to $85.39.Brent in particular experienced sharp swings, with the October contract losing as much as 18 cents at one point a day after it tumbled as it emerged that Libyan rebels were on the verge of toppling Kadhafi. "You would have expected Brent (price) to be bearish now but that could be because the market is waiting for a direction," said Shailaja Nair, managing editor with energy news specialist Platts' Asia desk in Singapore."Until it reaches a conclusion one way or the other, you are going to see volatility in prices," she told AFP. Brent is more affected than WTI by the situation in Libya as oil from the North Sea as well as from Libya serves the European markets. Around 85 percent of Libyan oil output was exported to Europe until the revolt disrupted the country's production six months ago. Libya's rebels declared the "Kadhafi era" over after taking charge of most of Tripoli, but his son Seif al-Islam claimed Tuesday his father was still in control of the capital. "Tripoli is under our control. Everyone should rest assured. All is well in Tripoli," he told journalists outside Kadhafi's compound at Bab al-Azizya. Meanwhile, analysts cautioned it could take Libya two years before oil production returns to normal and that disputes over who would hold power in any post-Kadhafi regime could also delay rebuilding the economy.

Tensions between the United States and Iran these days are as high as they've ever been in years. With Iran threatening to block US ships from entering the Persian Gulf, and the United States imposing sanctions, the stage seems to be set for a protracted confrontation. Add to this, fears that Europe's new embargo on Iran, set to start in July, could spark tensions in the region; also the increased likelihood that Israel could launch an attack on Iran's underground nuclear facilities over the next few months. So how would the world cope with an Iranian oil crisis, if it came to that? The West wants to prevent Iran from developing a nuclear weapon. The plan, for now at least, is to use sanctions as pressure hoping that the resulting economic pain might induce the Iranian regime to give up any thought of a weapons programmed. The Iranians, not surprisingly, don't like being squeezed. The latest sanctions idea is to make it hard for Iran to sell its oil. In theory, that should hurt as the country depends heavily on oil revenue .What we're seeing around Iran right now is largely an economic war.

Author α : Chittagong, Bangladesh.
E-mail : linkon_cse_cu@yahoo.com
Author σ : Chittagong, Bangladesh.
E-mail : sarwar.saubdcoxbazar@gmail.com
Author ρ : Chittagong, Bangladesh. E-mail : nimmy_cu@yahoo.com

Despite the military overture of the stalemate, what's happening with Iran may be more of an economic confrontation than a military standoff. Even Iran's military threats have economic significance; the more the Iranians talk about closing the Strait of Hormuz, the more oil traders get unnerved. Oil prices jump. Forcing oil prices up is a way to hurt the US and European economies. So what impact will the current stalemate have on the oil price in the international market? The main driver of global oil prices so far this year has been concern about the potential disruption to supplies from the Middle East as a result of tensions with Iran. Going forward, I can think of three possible scenarios: a gradual tightening of economic sanctions on Iran, an escalation of the crisis to a military conflict, or, more positively, a reduction in tensions if Iran scales back its nuclear ambitions. The immediate focus is the tightening of economic sanctions. In principle, sanctions against Iran could result in the withdrawal of a significant amount of supply from global markets thus raising the price of crude oil in the international market. However, the impact on global prices is likely to be diluted by three main factors. First, sanctions will only be implemented gradually and with plenty of room to maneuver. Second, a gradual tightening of sanctions would allow more time for the market to adapt. Saudi Arabia has signaled that it has ample spare capacity to help meet any shortfall while Libyan production continues to come back on stream more quickly than many had anticipated. In the meantime, the threat of EU sanctions may well force Iran to accept lower bids from other buyers, notably China, thus putting downward pressure on global prices. A third factor that is not so widely discussed is that European countries, and particularly the southern economies who currently trade most with Iran, are likely to require less oil anyway as the region slides back into recession. The upshot is that we would see the first scenario (a gradual tightening of sanctions on Iran) as broadly neutral for global oil prices. But this situation is also unlikely to be sustainable because of the huge pressure that the loss of oil revenues would put on the Iranian economy, which is already fragile. The issue then becomes which way the Iranian regime would jump.

The worst case is that Iran decides it has little more to lose and attempts to disrupt supplies through the Strait of Hormuz. This could lift the price of Brent crude oil in the international market as high as $150 per barrel from the current price of about $110, although only temporarily. But neither side would want tensions to spiral this far out of control. The Iranian regime is very unlikely to seek a military conflict that ultimately it would be sure to lose, not least given the huge suffering of its people during the war with Iraq in the 1980s. The US, especially under a Democratic President, will talk tough in an election year, but will not want to risk another spike in oil prices either.

II. Collected Statistical Data

As part of the data-understanding phase we carried out the cross-tabulation for each variable and the natural resources prediction after preparing and cleaning the data. The Table 1 reports the results of oil prediction (thousands barrels in daily) and oil reservation (million barrels) in 2009 shares of the total change over the world according to BP statistical review of world energy June 2012.In table 2 represents another natural resources of Gas prediction (billion cubic meters) and Gas reservation (Trillion cubic meters).

Table 1: Descriptive statistics of natural resources (oil)

	United Arab Emirates	Iran	Saudi Arabia	USA	UK	Canada	Total
Gas production (2009 share of total percentage)	1.6	4.4	2.6	20.1	2.0	5.4	36.1
Gas proved reserved(2009 share of total percentage)	3.4	15.8	4.2	3.7	0.2	0.9	28.2
Total	5.0	20.2	6.8	23.8	2.2	6.3	64.3

Table 2 : Descriptive statistics of natural resources (Gas):

	United Arab Emirates	Iran	Saudi Arabia	USA	UK	Canada	Total
Oil production (2009 share of total percentage)	3.2	5.3	12.0	8.5	1.8	4.1	34.9
Oil proved reserved(2009 share of total percentage)	7.3	10.3	19.8	2.1	0.2	2.5	42.2
Total	10.5	15.6	31.8	10.6	2.0	6.6	77.1

Oil production and reservation is most in middle-east countries than Europe countries. For gas production and reservation Europe countries are in advanced.

III. Our Contribution

At first, we have calculated the chi square values of collected data. The procedures of chi square values are given bellow:

Step 1: First insert the observed value in each cell of observable table. Inserted value collected from record.

Domain category	Option1	Option 2	Total
Cotegory1	a	b	a + b
Category 2	c	d	c + d
Total	a + c	b +d	a + b + c + d

Step 2: Calculate expected value for every cell of the describing table.

Domain	Option 1	Option 2	Total
Cotegory1	a1=(a+b)*(a+c)/(a+b+c+d)	b1=(a+b)*(b+d)/(a+b+c+d)	a1 + b1
Category2	c1=(a+c)*(b+d)/(a+b+c+	d1=(c+d)*(b+d)/(a+b+c+d)	c1 + d1
Total	a1 + c1	b1 +d1	a1+ b1+ c1+ d1

Step 3: calculating chi value for every cell using the following formula:

$\chi^2 = (observed\ value\text{-}expected\ value)^2/expected\ value$

Step 4: calculate total chi –value for domain using the following formula

$$\chi^2 = \sum_{i=1}^{n} (observed\ value\text{-}expected\ value)^2/expected\ value$$

Step 5: calculating degree of freedom using following rule

Degree of freedom df = (No.of.rows-1)*(No.of.columns-1)

Step 6: calculate p-value (probability value) using following method in Ms Excel

P-value=CHIDIS (Chi value, df)

IV. Explanation of Chi-Square (χ^2) and P-Value

Step 1: consider the domain is oil and gas in table 1 and table 2 respectively

Step 2: calculating expected value for each cell using describing formula

Table 3: Observation value for oil production & oil Reservation

	United Arab	Iran	Saudi Arabia	USA	UK	Canada	Total
Oil production (2009 share of total percentage)	4.75	7.06	14.39	4.80	0.91	2.99	34.9
Oil proved reserved(2009 share of total percentage)	5.75	8.54	17.41	5.80	1.1	3.61	42.2
Total	10.5	15.6	31.8	10.6	2.0	6.6	77.1

Table 4: Observation value for gas production & reservation:

	United Arab Emirates	Iran	Saudi Arabia	USA	UK	Canada	Total
Gas production (2009 share of total percentage)	0.28	6.35	3.82	13.36	1.24	3.54	36.1
Gas proved reserved(2009 share of total percentage)	2.19	8.86	2.98	10.44	0.96	2.76	28.2
Total	5.0	20.2	6.8	23.8	2.2	6.3	64.3

Step 3: calculating chi value for every cell using the describing formula:

Table 5: Chi- value for gas and oil domain

	United Arab Emirates	Iran	Saudi Arabia	USA	UK	Canada
Oil production (2009 share of total percentage)	1.72	0.44	0.40	2.85	.87	0.41
Oil proved reserved(2009 share of total percentage)	0.42	0.36	0.33	2.36	0.2	0.74
Gas production (2009 share of total percentage)	0.52	4.23	0.39	3.4	0.47	0.98
Gas proved reserved(2009 share of total percentage)	0.67	5.44	0.50	4.35	0.60	1.25

Step 4: calculate total chi –value for domain oil production

$X_2 = 1.72+0.44+0.40+2.85+0.87+0.41=6.69$

Table 6: Individual Chi-value for each category

Prediction categories	Chi-value
Oil production (2009 share of total percentage)	6.69
Oil proved reserved(2009 share of total percentage)	4.41
Gas production (2009 share of total percentage)	9.99
Gas proved reserved(2009 share of total percentage	12.81

Step 5: calculating degree of freedom using following the rule

Degree of freedom df = (6-1)*(2-1)
= 5

Step 6: calculate p-value (probability value) using in Ms Excels

P-value =CHIDIS (11.1, 5)
= 0.05

V. Factors Selection

Factors selection is an important process to assess the prediction of countries and natural resources. The prediction has related the variable that determines the much oil or gas production or reservation countries. The number of predictor variables is not so large and we don't have to select the subset of variables for further analysis which is the main purpose of applying feature selection to data. However, feature selection could be also used as a pre-processor for predictive data mining to rank predictors according to the strength of their relationship with dependent or outcome variable. During the factors selection process no specific form of relationship, neither linear nor nonlinear, is assumed. The outcome of the factors selection would be a rank list of predictors according to their importance for further analysis of the dependent variable with the other methods for regression and classification. Here the figure below shows the relative outcome of the predictor's value.

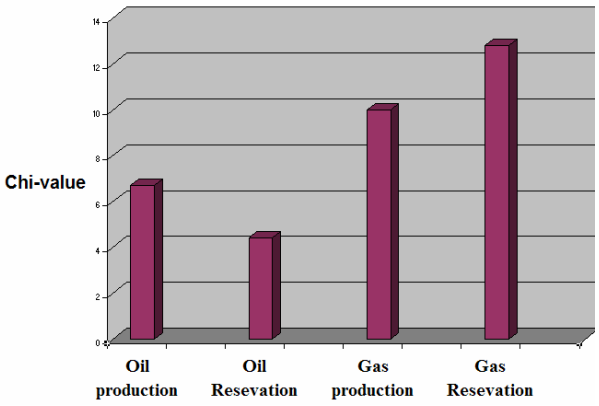


Fig 1: Importance plot for predictors

Results of factors selection has presented in Figure 1. The top four predictors are oil prediction, oil reservation, gas production and gas reservation.

In all three cases, i.e. for all three definitions of the dependent variable, if the top 4 variables are selected, we get the same list of predictors. Therefore we can conclude that the list of important predictors is quite robust to changes in the outcome definition. We may proceed into the next step using the top 4 variables:

1. Gas reservation
2. Gas production
3. Oil production
4. Oil reservation

We follow an advice given in Luan & Zhao (2006) who suggested that even though some variables may have little significance to the overall prediction outcome, they can be essential to a specific record.

VI. Knowledge Base For Collected Data

A knowledge base in artificial intelligence is a place where information are stored or designed for machine or device by which it will work. In general, a knowledge base is a consolidate stock for information: a library, a database of related information about a particular subject could all be considered to be examples of knowledge bases. The process of building knowledge base is called knowledge engineering. A knowledge base is integrated collection of choosing logic, building a knowledge base, implementing [31] the proof theory, inferring new facts. The main advantage of engineering is that it requires less commitment and thus less work. To help the focus the development of knowledge base and to integrate the designer's thinking the following five step methodology can be used:

1. Decide what to talk about
2. Decide on a vocabulary of predicates, function, and constant.
3. Encode general knowledge about the domain.
4. Encode a description of the specific problem instance.
5. Pose queries to the inference procedure and answers.

In our work we have described a simple method of probabilistic inference that is, the computation from observed evidence of posterior probabilities for query propositions. We have used the joint probability as the knowledge base from which answer to all question may be derived. We have had built the knowledge base by considering two Boolean variables. The table 7 is an example of two valued propositional logic which is the bases of knowledge base representation:

Table 7: Concepts of propositional logic to design a Knowledge Base using the proposition of Boolean events A, B and C

	B		⌐B	
	C	⌐C	C	⌐C
A	111	110	101	100
⌐A	011	010	001	000

Based on table 7, we have designed the knowledge base (Joint probability distribution) for our research activity. Here we have considered those events

which have true (one or 1) Boolean values. Table 8 is an example of knowledge base for events A, B and C:

Table 8: Fully Joint probability distribution

	B		⌐	
	C	⌐C	C	⌐C
A	P(A)*P(B)*P(C)	P(A)*P(B)*P(⌐C)	P(A)*P(⌐B)*P(C)	P(A)*P(⌐B)*P(C)
⌐A	P(⌐A)*P(B)*P(C)	P(⌐A)*P(B)*P(⌐C)	P(A)*P(⌐B)*P(C)	P(A)*P(⌐B)*P(C)

By keeping the similarities s with the table 8, we compared our factors as oil production and oil reservation so on. The designing of knowledge base for the factors which we are considered as Gas preservation and gas production

Table 9: Fully joint distribution for consideration oil Production

	Oil production(>3 thousand million barrel)					
	United Arab Emirates	Iran	Saudi Arabia	USA	UK	Canada
Gas proved reserved(>3 trillion cubic	0.83*0.67*0.17=0.09	0.83*0.67*0.17=0.09	0.83*0.67*0.17=0.09	0.83*0.67*0.17=0.09	0.83*0.67*0.17=0.09	0.83*0.67*0.17=0.09
Gas proved reserved(<3 trillion cubic meters)	0.83*0.33*0.17=0.05	0.83*0.33*0.17=0.05	0.83*0.33*0.17=0.05	0.83*0.33*0.17=0.05	0.83*0.33*0.17=0.05	0.83*0.33*0.17=0.05

Table 10: Fully joint distribution for consideration oil Reservation

	Oil production(<3 thousand million barrel))					
	United Arab Emirate	Iran	Saudi Arabia	USA	UK	Canada
Gas proved reserved(>3 trillion cubic meters)	0.17*0.67*0.17=.02	0.17*0.67*0.17=.02	0.17*0.67*0.17=.02	0.17*0.67*0.17=.02	0.17*0.67*0.17=.02	0.17*0.67*0.17=.02
Gas proved reserved(<3 trillion cubic meters)	0.17*0.33*0.17=0.01	0.17*0.33*0.17=0.01	0.17*0.33*0.17=0.01	0.17*0.33*0.17=0.01	0.17*0.33*0.17=0.01	0.17*0.33*0.17=0.01

VII. Bayes'Theorem and Conditional Probability

Bayes' theorem and conditional probability are opposite to each other. Given two dependent events A and B. The conditional probability of P (A and B) or P (B/A) will be P (A and B)/P (A). Related to this formula a rule is developed by the English Presbyterian minister Thomas Bayes (1702-61).According to the Bayes rule it is possible to determine the various probabilities of the first event given the outcome of the second event in a sequence of two events.
The conditional probability:

$$P(B/A) = \frac{P(AandB)}{P(A)} \quad (1)$$

The equation (1) will help to find out the probabilities of B after being occurrences of the A. we get the Bayes' theorem for these two events as follows:

$$P(A/B) = \frac{P(A).P(B/A)}{P(B)} \quad (2)$$

If there are more events like A1, A2, and B1, B2.In this case the Bayes theorem to determine the probability of A1 based on B1will be as follows:

$$P(A1/B1) = \frac{P(A1).P(B1/A1)}{P(A1).P(B1/A1) + P(A2).P(B2/A2)}$$

Now applying the Bayes theorem on table 5 we have got the following outcomes:

If one Gas proved reserved (>3 trillion cubic meters) based on Iran and Oil production (>3 thousand million barrel)) then

P (Gas proved reserved (>3 trillion cubic meters) | Iran ^ Oil production (>3 thousand million barrel)) =

P (Gas proved reserved (>3 trillion cubic meters) Iran ^ Oil production (>3 thousand million barrel))

P (Iran ^ Oil production (>3 thousand million barrel))
P (Gas proved reserved (>3 trillion cubic meters) Iran ^ Oil production (>3 thousand million barrel)) =0.09

P (Iran ^ Oil production (>3 thousand million barrel)) =0.14

P (Gas proved reserved (>3 trillion cubic meters)| Iran ^ Oil production (>3 thousand million barrel))
= 0.09/0.14
=0.64

The total resultant of Bayes Theorem of all data considering financial condition we have got the following table 11:

Rule	Outcome
P(Gas proved reserved (>3 trillion cubic meters) | Iran^ Oil production (>3 thousand million barrel))	64.2%
P(Gas proved reserved (>3 trillion cubic meters) | Saudi Arabia^ Oil production (>3 thousand million barrel))	64.2%
P(Gas proved reserved (>3 trillion cubic meters) | UK^ Oil production (>3 thousand million barrel))	64.2%
P(Gas proved reserved (<3 trillion cubic meters) |United Arab Emirates^ Oil production (>3 thousand million barrel))	35.7%
P(Gas proved reserved (<3 trillion cubic meters) | Iran^ Oil production (>3 thousand million barrel))	35.7%
P(Gas proved reserved (<3 trillion cubic meters) | USA^ Oil production (>3 thousand million barrel))	35.7%
P(Gas proved reserved (>3 trillion cubic meters) | Iran^ Oil production (<3 thousand million barrel))	66.67%
P(Gas proved reserved (<3 trillion cubic meters) | USA^ Oil production (<3 thousand million barrel))	33.33%

VIII. Conclusion

This study examines the background information from BP statistical review of world energy June 2012 that impacts upon the energy status of Europe and Middle East countries. Based on results from table 11 by implementing the knowledge of propositional knowledge base and Bayes theorem based on knowledge base to predict the energy status it was found that the most important factors that help to comparison oil and gas production and reservation in context of Europe and Middle East. Demographic data such as gas production and reservation are related to comparison outcome.

This study is limited in three main ways that future research can perhaps address. Firstly, this research is based on background information only. Secondly, we used a dichotomous variable for the comparison with only two categories: oil and gas. Thirdly, from a methodological point of view an alternative to a classification tree should be considered. The prime candidates to be used with this data set are logistic regression and neural networks.

References références referencias

1. Al-Radaideh, Q. A., Al-Shawakfa, E. M., & Al-Najjar, M. I. (2006). Mining student data using decision trees. In the Proceedings of the 2006 International Arab Conference on Information Technology (ACIT'2006*)*.
2. Baker, R. S. J. D., & Yacef, K. (2009). The state of educational data mining in 2009: A review and future visions. Journal of Educational Data Mining, 1, 3-17.
3. Bean, J. P., & Metzner, B. S. (1985). A conceptual model of nontraditional undergraduate student attrition. *Review of Educational Research, 55, 485-540.*
4. Boero, G., Laureti, T., & Naylor, R. (2005). An econometric analysis of student withdrawal and progres- sion in post-reform Italian universities. Centro Ricerche Economiche Nord Sud - CRENoS Working Paper 2005/04.
5. Cortez, P., & Silva, A. (2008). Using data mining to predict secondary school student performance.
6. Proceedings of 5th Annual Future Business Technology Conference, Porto, Portugal, 5-12. Dekker, G. W., Pechenizkiy, M., & Vleeshouwers, J. M. (2009). Predicting student drop out: A case study.
7. Proceedings of the 2nd International Conference on Educational Data Mining (EDM'09). July 1-3, Cordoba, Spain, 41-50.
8. Hastie, T., Tibshirani, R., & Friedman, J. (2009). *The elements of statistical learning: Data* mining, inference and prediction (2nd ed.). New York: Springer.
9. Han, J., & Kamber, M. (2006). Data mining: Concepts and techniques (2nd ed.). Amsterdam: Elsevier. Herrera, O. L. (2006). Investigation of the role of pre- and post admission variables in undergraduate insti-
10. mutational persistence, using a Markov student flow model. PhD Dissertation, North Carolina State University, USA.
11. Horstmanshof, L., & Zimitat, C. (2007). Future time orientation predicts academic engagement among first-year university students. British Journal of Educational Psychology, *77*(3): 703-718.
12. Ishitani, T. T. (2003). A longitudinal approach to assessing attrition behavior among first-generation stu- dents: Time-varying effects of precollege characteristics. *Research in Higher Education, 44(4), 433-449.*
13. Ishitani, T. T. (2006). Studying attrition and degree completion behavior among first-generation college students in the United States. Journal of Higher Education, 77(5), 861-885.
14. Md.Nurul Moustafa, Linkon Chowdhury, Md.Sawar Kamal, "Student Dropout Prediction for Intelligent System from Tertiary Level in Developing Country, IEEE/IAPR ICIEV Conference, May, 18-19, 2012, Dhaka Bangladesh.
15. Jun, J. (2005). Understanding dropout of adult learners in e-learning. PhD Dissertation, The University of Georgia, USA.
16. Kember, D. (1995). *Open learning courses for adults: A model of student progress*. Englewood Cliffs, NJ: Education Technology.
17. Luan, J., & Zhao, C-M. (2006). Practicing data mining for enrollment management and beyond. New Di- rections for Institutional Research, 31(1), 117-122.

Global Journal of Computer Science and Technology
Volume 12 Issue 8 Version 1.0 April 2012
Type: Double Blind Peer Reviewed International Research Journal
Publisher: Global Journals Inc. (USA)
Online ISSN: 0975-4172 & Print ISSN: 0975-4350

Online Criminal Record

By Mr. Sandeep D. Nawale, Ms. Poonam C. Songra & Rashmi Karnik
Dhole Patil College of Engineering, Wagholi, Pune University

Abstract - In this project, we build a website for criminal record global it is useful for police to get information of the criminals in less time which reduce the human efforts. In this project, we use a scanner for scanning the fingerprints for identity of criminals.

The project includes three phases. In the first phase, user chooses their tasks independently online through LAN. In phase two, user/police can search, modify, and update the criminal data at the server database. Server is capable of independently executing necessary client request. In phase three, the administrator can save the final criminal record and the client's results in the database. The project manages several servers, one for each laboratory. The project is intended to reduce the workload of the policemen/ investigators, managing the record. The project can be used in various departments.

GJCST Classification: H.3.5

Strictly as per the compliance and regulations of:

Online Criminal Record

Mr. Sandeep D. Nawale [α], Ms. Poonam C. Songra [α] & Prof. Rashmi Karnik [α]

Abstract - In this project, we build a website for criminal record global it is useful for police to get information of the criminals in less time which reduce the human efforts. In this project, we use a scanner for scanning the fingerprints for identity of criminals.

The project includes three phases. In the first phase, user chooses their tasks independently online through LAN. In phase two, user/police can search, modify, and update the criminal data at the server database. Server is capable of independently executing necessary client request. In phase three, the administrator can save the final criminal record and the client's results in the database. The project manages several servers, one for each laboratory. The project is intended to reduce the workload of the policemen/ investigators, managing the record. The project can be used in various departments.

I. Introduction

India is very vast country. Different types of people lives in it. Many people travel from one place to another to fulfil their basic needs such as food, cloth, shelter. Keeping and maintaining the records of such people is a difficult task. Criminals take the advantages of such situation. They do the crimes and leave the place.

Hence it requires much more time for investigation. It increases the workload of the police. They have to travel to the related city for information. It takes few days or months for investigation.

As we are much more familiar with existing system. It is manual and work based i.e. a lot of paper work has to be done by the authority. We have to face many problems in the existing system which is manual as well. To overcome from these types of problems we need to change our system.

Our very first objective for designing this system is to computerized the existing manual system. This will not only speed up the process of searching criminal records, matching the criminal records, identifying criminals in a very secured way and also within a second of time but also reduce the paper work.

Developing centralized, computerized system and techniques to overcome the lengthy and traditional process of maintaining criminal records. The portal can handle data of criminals who are under the judicial surveillance or are under trial. This portal will be most useful for DEFENCE for searching of details of the criminals. Missing citizen search, secure registration and profile management facilities for detectives and security agencies.

Author α : Dhole Patil College of Engineering, Wagholi, Pune. (Pune University). E-mail : poonam.songra@gmail.com

That we have to face many problems in the existing system which is manual as well. To overcome from these types of problems we need to change our system. Our very first objective for designing this system is to computerized the existing manual system. This will not only speed up the process of the searching criminal records, matching the criminal records, sending the files of critical case to the Judicial authorities in a very secured way and also within a second of time but also reduce the paper work.

There are also some other reasons behind the need of the new system. The existing system is fully manual and use paper i.e. a lot of paper work has to be done by the authority. Now a day, when computer is used everywhere then why not in the police stations. To make our police stations computerized the existing system doesn't help any more.

To do effective investigation of crime and criminal, the proposed system provide facility to use one of the biometrics technique i.e. fingerprint scanning and matching.

A fingerprint scanner has basically two tasks; to acquire an image of a fingerprint, and to decide whether or not this image matches the image of a previously enrolled fingerprint. The decision phase is done by extracting features from the image and then comparing these features to templates stored in a database.

A fingerprint contains a lot of information. Storing and using all this information, would take too much space and unnecessary effort while a lot of the information in fact is redundant. Instead, fingerprint scanners focus on the essential information to make the fingerprint as unique as possible and thus useful in identification and verification situations.

The key objectives of this project include:

a) Providing enhanced Information Technology tools for investigation, crime prevention, law and order maintenance and other functions;
b) Increasing operational efficiency by reducing manual and repetitive tasks (data to be entered only once which would automatically prepare all the registers).
c) Better communication and automation at the back-end.
d) Sharing crime and criminals' databases across the country at state and central levels.
e) Sharing intelligence on real-time basis.
f) Improving service delivery to the public and other stakeholders.

II. Working of Proposed System

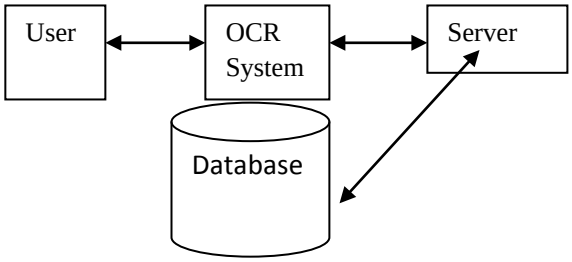


Figure 1: The System Structure

III. Algorithms Used

a) Pattern Recognition

Pattern recognition is a more global method for identifying fingerprints compared to minutiae analysis. It focuses on general flows and directions more than special points. Core points and delta points will appear clearly in the pattern, and be used for identification.

Pattern recognition operates by acquiring biometric data from an individual, extracting a feature set from the acquired data, and comparing this feature set against the template set in the database.

Pattern recognition is a more global method for identifying fingerprints compared to minutiae analysis. It focuses on general flows and directions more than special points. Core points and delta points will appear clearly in the pattern, and be used for identification.

During authentication, biometric information is detected and compared against the database through pattern recognition techniques that involve a feature extractor and a biometric matcher working in cascade.

An enrolment procedure is used to extract pertinent information from the fingerprint and store the information to a template (or feature vector) which then represents the user. When matching is based on pores, the template consists of vital information about these features. For pores, the position relative to a local reference point, size, and shape could be stored:

pore features: {(p1,m1,s1), (p2,m2,s2), ... (pPE,mPE,sPE)},

Where, PE is the number of enrolled pores, p is the position (defined as the centre of mass of the pore), m is the size, and s is the shape.

The method used to extract the pores as fingerprint features is critical to the matching routine.

The pore's position, size and shape are features which make it distinct from other objects in an image. Techniques used for the fingerprint data capture can be used to enhance the pore information.

A particular matching technique will produce a score representing the fraction of features matching between the enrolled and the live-scan prints. Generally, the number of features detected in the two different prints, NE and NC, will be different. Therefore, the matching routine must compare two sets, or configurations, with a different number of elements. For example, a pore match score, S_p, can be defined as:

$$S_p = \frac{2n_m - n_n}{N_T}$$

Where

N_T = (NE + NC) = total number of pores in both segments

n_m = number of pores that match

n_n = number of pores that do not match and using $n_n = N_T - 2n_m$,

The pore matching score, S_p, can be rewritten as:

$$S_p = \frac{4n_m - N_T}{N_T}$$

A match occurs when a pore is detected in the comparison image at an enrolled pore's location. A mismatch occurs when a detected pore from either image does not correspond to one from the other image. Based on SP, a decision is made to accept or reject the claimed identity of the user.

b) Minutiae Algorithm

Minutiae-based techniques first find minutiae points and then map their relative placement on the finger.

Minutiae matching to be effective the input fingerprint should be registered to the template fingerprint using the minutiae information of both the fingerprints. After registration the minutiae sets are compared using the spatial distance, which must be smaller than a particular threshold for two minutiae to be declared as matched.

A minutiae *m* is described by the triplet *m={x, y, θ}*, where *x, y* indicate the minutiae location coordinates and θ denotes the minutiae orientation, which is the orientation evaluated for the minutiae location from the orientation image obtained during the enhancement process.

Let T and I be the representation of the template and input fingerprint, respectively. Let the minutiae sets of the two fingerprints be given by:

$T=\{m_1, m_2 \ldots\ldots, m_m\}$ m_i = $\{x_i, y_i, \theta_i\}$, i=1..m

$I=\{m_1, m_2 \ldots\ldots, m_n\}$ m_j = $\{x_i, y_i, \theta_i\}$, j=1..n

A minutia *mj'* in I and a minutia *mi* in *T* are considered to be matched if their spatial and orientation differences are within specified thresholds *ro* and θ*o*. The matching algorithm returns a percentage match score, which is then used to take the match-no match decision based on the security criterion.

Minutiae extraction was carried out using the crossing number approach [39]. Crossing number of pixel '*p*' is defined as half the sum of the differences between pairs of adjacent pixels defining the 8-neighborhood of '*p*'.

Mathematically it is expressed as,

$$Cn(p) = \frac{1}{2}\sum_{i=1..8} |val(p_{imod8}) - val(p_{i-1})|$$

Where *p0* to *p7* are the pixels belonging to an ordered sequence of pixels defining the 8-neighborhood of *p* and *val (p)* is the pixel value.

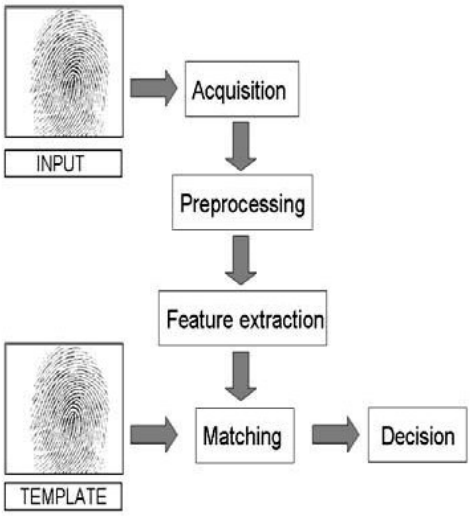


Figure 2:

IV. Expected Results

The input to the system is the information about criminal and fingerprints of the criminal which result into the excepted fingerprints and the record of the criminal whose fingerprint matches with input fingerprints.

V. Conclusion

We can implement a system for investigating crimes by keeping their record in less time and which reduce human effort. The system will be centralized, to store data which makes easy access.

Global Journal of Computer Science and Technology Volume XII Issue VIII Version I April 2012
26

This page is intentionally left blank

Global Journal of Computer Science and Technology
Volume 12 Issue 8 Version 1.0 April 2012
Type: Double Blind Peer Reviewed International Research Journal
Publisher: Global Journals Inc. (USA)
Online ISSN: 0975-4172 & Print ISSN: 0975-4350

Opinion Extraction and Classification of Real Time Facebook Status

By Akash Shrivatava & Bhasker Pant
Graphic Era University, Dehradun

Abstract - Social media like Facebook today are not only just a website. They are now become much popular communication tool for internet users. It is a medium through which users belonging to any of category, profession can make their comments. These all comments have contained some features along with it. These comments or status are really useful which are actually viewed as their 'OPINIONS'. Opinions are really important while we need to analyze any of product, topic, discussion and whatever which will require some user opinions to draw some inferences and conclusions from them. Social media plays an important role for this intention. In this paper we focused on facebook statuses, which we can view as opinions of users or their reaction on concern we want to analyze. We develop tool status puller that automatically collects random facebook statuses. Then we make classifier that performs classifications on that corpus collected from facebook. Our classifier is able to extract three features GOOD, BAD and AVERGAE from that statuses respectively. As per classifier results we perform evaluations experiments which further can be work for feature mining of user opinions on facebook. It's pure new and unique technique proposed in the field of opinion mining.

Keywords : *Opinion mining, classification, facebook status mining, Data mining, web mining, text categorization, support vector machine.*

GJCST Classification: *H.3.5*

Strictly as per the compliance and regulations of:

Opinion Extraction and Classification of Real Time Facebook Status

Akash Shrivatava [α] & Bhasker Pant [σ]

Abstract - Social media like Facebook today are not only just a website. They are now become much popular communication tool for internet users. It is a medium through which users belonging to any of category, profession can make their comments. These all comments have contained some features along with it. These comments or status are really useful which are actually viewed as their '*OPINIONS*'. Opinions are really important while we need to analyze any of product, topic, discussion and whatever which will require some user opinions to draw some inferences and conclusions from them. Social media plays an important role for this intention. In this paper we focused on facebook statuses, which we can view as opinions of users or their reaction on concern we want to analyze. We develop tool status puller that automatically collects random facebook statuses. Then we make classifier that performs classifications on that corpus collected from facebook. Our classifier is able to extract three features GOOD, BAD and AVERGAE from that statuses respectively. As per classifier results we perform evaluations experiments which further can be work for feature mining of user opinions on facebook. It's pure new and unique technique proposed in the field of opinion mining.

Keywords : Opinion mining, classification, facebook status mining, Data mining, web mining, text categorization, support vector machine.

I. Introduction

The dramatic and exponential growth of content available on web and its classification has now become an efficient methodology to make the contents of large repository in an organized manner [1, 4]. Social networking websites are the new era of expressing views. Today every fifth person put their opinions, views, comments on these micro-blogging and social sites like TWITTER[1], FACEBOOK[2] and many more. The format and pattern include in these websites are so easy to use and this is the most genuine reason that their accessing rate exponentially increased from last few years. Authors of those comments, views and opinions write their point of perception on any of discussion topic. It may include any political issue, religious issue, technology, product, movie review and much more daily gossiping issues flooded in their surroundings [2]. Now people are using internet as a communication tool among their social network including friends, family, friends of friends. It signify that they all now moved from traditional trends like mail, blog to these micro-blogging and social network sites. But they do not even realize that by gradually putting and sharing their opinions among their friends on these sites will finally become huge and relevant repository for any of particular entity or organization. Such dataset collected from all these sites can be efficiently used for marketing, case study and social studies. Organizations that required can easily draw inferences and conclusions regarding their product, technology or political point whatever they all are concerning with by going through opinions comes from these sites [3]. It indicates that now to analyze any feedback for anything you are concerning with, there is no major need to survey it home to home or person to person individually by contacting them through any means. In spite of this just need to collect opinions from these social networking sites and draw conclusions that what people like/dislike, what are their intentions towards any issue? Likewise, many queries can be answer by analyzing just their opinions on different aspects of their life posted on these sites. We use the dataset collected from FACEBOOK. FACEBOOK contains large number of comments concerning their personal thoughts and public views from different users belonging different regions and countries. TABLE 1 shows typical example of some FACEBOOK comments. In our paper, we study that how these sites would use for sentiment analysis purposes which not only shown their opinion or point of view towards any matter but also provide their requirements, demands from the current scenario. We show how to use FACEBOOK as a medium for opinion mining. We use facebook for following reason:

- FACEBOOK is well known and frequently accessing site across the globe.
- FACEBOOK is not biased to any particular people category the crowd we will get on facebook is belonging to general public whose opinions are really worthwhile for any general survey.
- FACEBOOK joined by many people from different countries belonging to different category having many languages.

We collected around 2000 comments from facebook which evenly split automatically into three sets as follows:

1. Comments containing positive impact such as Good, Best, Happy and its more synonyms collected into Good.txt file.

Author α σ : Graphic Era University, Dehradun.
E-mail α : akash.10may@gmail.com
E-mail σ : pantbhaskar2@gmail.com

2. Comments containing negative impact Bad, Worst, Sorrow and its more synonyms collected into Bad.txt file.
3. Comments containing average impact Neutral, Average, Fine and its more synonyms collected into Avg.txt file.

We show how to classify these features based on different impact through classifier that extracts features in three separate classes. Finally we use LIBSVM providing multi-classification [9] support vector machine tool to train and testing accuracy of system that up to which extent our system does opinion mining.

matthew 24:14 this good news of the kingdom will be preached in all the inhabited earth for a witness to all the nations;and then the end will come.
Had the best margharita EVER. you know its good when you have a slight burning sensation in your throat.
Nursing, hockey, and some quality time with dad...today life is amazing. Hopefully it keeps running into tomorrow when I finally get some quality time with an awesome friend!
This will teach those pompous pricks to get their hoity toity higher educations! Except athletes: they're good hardworking people who deserve special breaks.
I made an 84 on my math test and my average is an 88!!!! Whoot whoot yes im freakin excited!

Table 1: Example of Facebook Status with User Views

a) Contribution

The contribution of our paper is as follows.

1. Our method shows that how feature can be extracted from comments posted on FACEBOOK on the basis of which inferences can be drawn according to requirement.
2. We have a Facebook status puller which can collect 500 facebook comments at a time. No human efforts need to collect corpus. It is as flexible as according to desire user can collect corpus as per keywords on facebook.
3. We develop a classifier that classify collected corpus from facebook into three classifications which would automatically store as per their feature in separate files. It again reduces time and effort.
4. After collecting corpus we can do linguistic analysis on that corpus.
5. We can also build sentiment classification system based on features including in comments.

We conduct experimental evaluations to produce real time results on a set of real facebook comments posted to prove that our technique is efficient enough and performs better than previously proposed methods.

b) Organizations

The remaining paper is as follows divided into further section. In section 2, we discuss what are the material and tools we have used for extraction facebook comments, training and testing data. In section 3, we give the explanation of approach for collecting the corpora and its classification. Furthe experimental evaluations performed by LIBSVM shown in section 4. Finally we conclude our paper about our work.

II. Material and Tool Used

a) Data Used

Facebook comments are used for our research work which is our primary focus. They will be further use for mine opinion on the basis of features contain in the comments extracted.

b) Support Vector Machine

Support vector machine is kernel based techniques which is major development in the machine learning algorithms. Support vector machines are groups of supervised learning that can be efficiently apply for classification. It represents an extension version to non linear model generalized portrait algorithm developed by Vladimir Vapnik [8]. The algorithm adopted in SVM is based on the statistical learning theory and the Vapnik-Chervonenkis [VC] dimension introduced by Vladimir Vapnik and Alexey Chervonenkis. A support vector machine [SVM] does classification as by constructing N-dimension hyperplane that optimally divided the data into two categories. [5] Even without feature selection performance of SVM can be very efficient [10].

c) SVM Implementation- LIBSVM

LIBSVM is software developed by Chih-Chung chang and Chih-Jen Lin was used for determining the value of two parameters[C, γ]. Our goal is to identify good [C, γ] so that classifier can be easily predict unknown data [i.e. testing data]. [7] LIBSVM is integrated software for Support Vector Classification, [C-SVC, nu-SVC]. It supports multiclass classification [6]. It provides a parameter selection tool using RBF kernel which is cross validation via grid search. A grid search had been performed on C and Gamma using an inbuilt module of libsvm tools as shown in figure 3. Pairs of C and Gamma are tried and which will be best cross

[1] http://twitter.com
[2] http://facebook.com

validated accuracy is picked. The performance of classifiers for classes of facebook comments divided as above will be determined by measuring accuracy. SVM is known to be the most

III. Approach

a) Corpus Collection

We use Facebook API for collecting facebook comments from facebook1. We queried facebook as per keyword in our developed tool. How our tool collect data from facebook shown in figure below and explain step by step in the whole algorithm included further in paper.

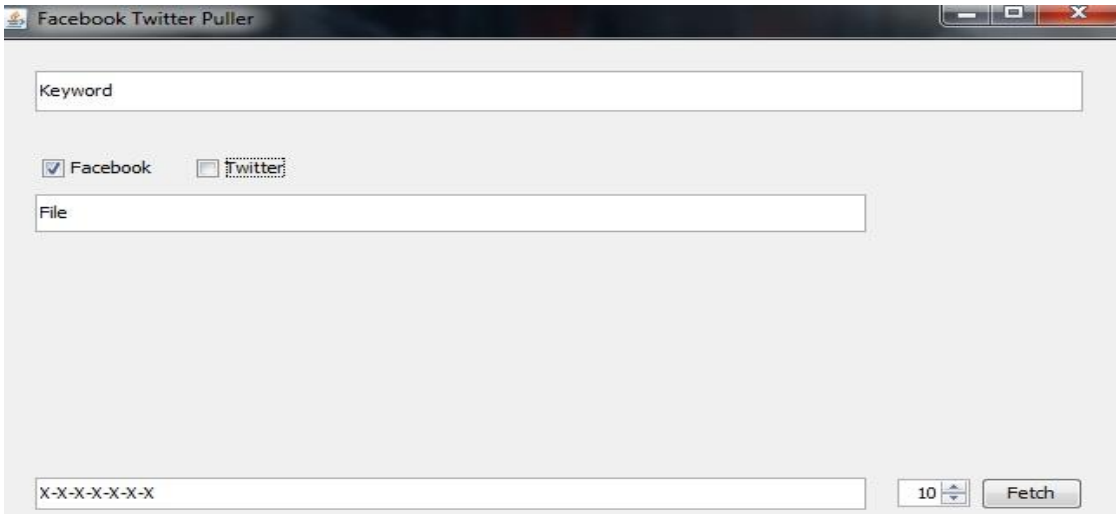


Figure 1: Facebook status puller

As we can see in above figure we can fetch out comments by clicking on fetch button as per keyword would have entered. We can fetch number of comments we want as per requirement but there islimitation in facebook API that it could able to extract 500 random comments at a time. Facebook puller extract comments from site that further will store into text file which can be then used for our purpose of opinion mining. Our tool had been developed in a way which can also able to extract tweets from twitter using Twitter API. This functionality of tool had been designed by keeping in concern that our current research work would be extended further.

b) Feature Extraction and Classification

We collected facebook comments above, which further undergone for feature extraction from those comments individually through classifier we developed as shown below in figure 2. This classifier then classifies these features into three classes defined above automatically and generating files separately for each feature category respectively as shown in figure. These files generated has been strictly follow particular format supported by our training and testing tool LIBSVM and containing threshold (occurrence of word indicating opinion in comment) of words and their synonym containing in comment. The synonym of particular category which defines for our research work can be further extending for more refine research. This time we perform evaluation on the basis of some specific synonym. How this whole work get done will show in further algorithm in 3.4. This pseudo code explains whole concept and approach hidden behind facebook comments collection, feature extraction and classification.

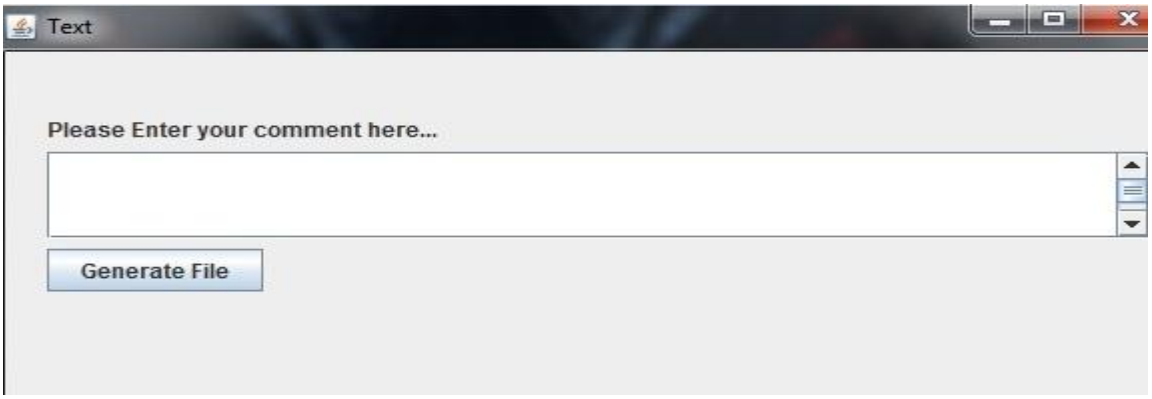


Figure 2 : Classifier that classifies features of facebook comments separately

c) Corpus Analysis

Now we have testing file in particular format containing occurrence of word in facebook comment would shown its impact as good, bad and average. We use tool LIBSVM for analysis the extracted feature from facebook comments. LIBSVM then firstly perform training on testing file shown accuracy level of our mined data. It further does prediction to perform evaluation and experiments on different values. These results will further shown in next section.

d) Proposed Methodology

Step 1: *Corpus collection*

The first step is to collect the number of comments refers instances from Facebook.

Step 2 : *Extraction from Status Puller tool*

In this Step the real-time comments from the Facebook status is been pulled from the status puller tool when connected to the server.

Step 3 : *Classification from Classifier Tool*

The next step is to classify those collected comments into sub-classes as Good, Bad and Average through the classifier tool. The classifier generally takes a single instance and then matches it with the features in domain dictionary containing some synonym of features. This mapping is done to generate the threshold frequency for each feature and automatically generate a text file of it.

Step 4 : *Processing of LIBSVM tool*

The generated text files is then processed in the LIBSVM tool that provides the accuracy rate for testing the classification which is further been traine and predict to be analyzed. The result of the training and predicting produces a conture graph shown in section 4.

Step 5 : *Analyzing the results*

The final step is to analyze the results obtained from the conture graph and conclusions is drawn for the performance of the Classification. The whole process done defined above will be concluded in following algorithm which clears the crystal picture of concept being used for our work:

IV. Results and Discussions

The performance of our system to classification of features mined from facebook comments has been determined by training and predicted our cross validation files. We train our file and get following conture graph as shown below. It demonstrates feature extracted from facebook comments and distinguished it among three subclasses we made. The best accuracy we got is 74.8268% as shown below after cross validation. The tabulated value of C and Gamma for predicting different classes of features of facebook comments and for training dataset in given Table 2.

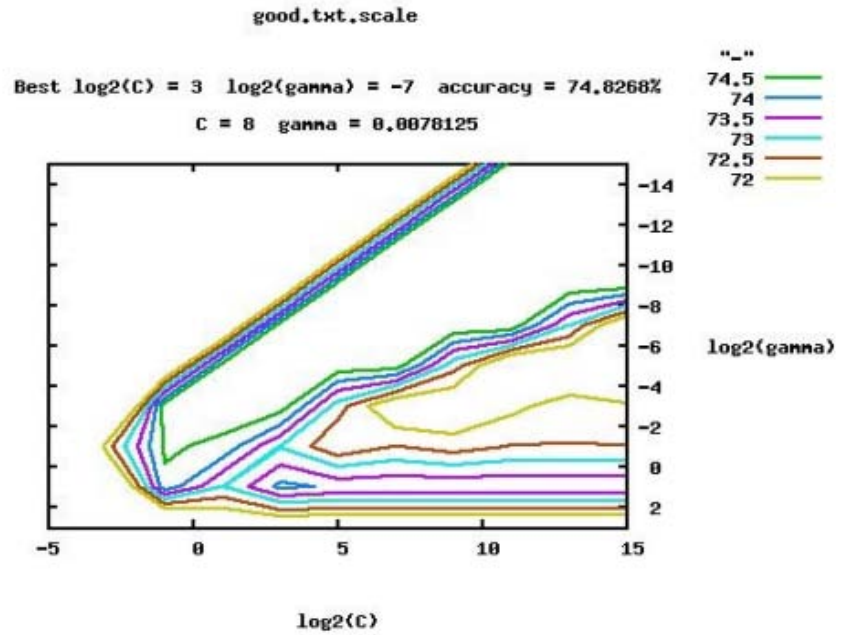


Figure 3 : Shown accuracy of tested corpus of facebook

Class	C	Gamma	Accuracy
Good	8	0.0078125	74.8268%
Bad	0.5	0.5	69.515%
Average	2	0.5	67.4365%

Table 2 : C and Gamma values for training set of facebook comments with accuracies

Further, variation of C and Gamma values could provide more accuracy of training set. On using the RBF kernel with value of parameters[C= 8, γ = 0.0078125] an accuracy of 74% was obtained idistinguishing facebook comments features classes from other two classes. The average accuracy of three classes is 70.592%. This proved that opinion posted on facebook contain impact of view which could be categorized into three classes. The development of such concept will provide efficient method to classify all the opinions and views posted on facebook from different user. It will be further useful for analyzing comments and reviews that had been also found at many social websites.

V. Conclusions

The average accuracy of 70.5% was obtained in classifying various classes. The final conclusion drawn from this research work is we have developed very efficient and time saving method to classify millions of comments posted on facebook. These classified opinions will then become required data to judge the reviews of users regarding any concern belong to any issue. It reduces the manual survey work that had been done for drawing conclusions on opinion posted on facebook. This work could further extended for twitter tweets or any of frequently access social websites containing several reviews from different people.

References Références Referencias

1. L. Cai and T. Hofmann. *Text categorization by boosting automatically extracted concepts*. In *SIGIR '03*, pages 182.189, New York, NY, USA, ACM Press. (2003).
2. Alexander Pak, Patrick Paroubek. *Twitter as a Corpus for Sentiment Analysis and Opinion Mining.* In Proceedings of the Seventh conference on International Language Resources and Evaluation LREC'10 Valletta, Malta: European Language Resources Association ELRA (May 2010).
3. Dave, Steve Lawrence and David M. Pennock. *Mining the Peanut Gallery: Opinion Extraction and Semantic Classification of Product Reviews Kushal* (2003).
4. D. Zhuang, B. Zhang, Q. Yang, J. Yan, Z. Chen, and Y. Chen. *Efficient text classification by weighted proximal SVM.* In *ICDM*, pages 538.545, (2005). 5) Ivanciuc, O. *Applications of Support Vector Machines in Chemistry.* Rev. Comput. Chem., 23, 291-400, (2007).
5. Chang, C.-C., & Lin, C.-J., *LIBSVM: a library for support vector machines* (2003).
6. Wei, Hsu, C., Chung Chang, C., & Chih-Jen Lin, A. *Practical Guide to Support Vector Classification.* (2003).
7. Vladimir N. Vapnik. *The Nature of Statistical Learning Theory.* Springer-Verlag, (1995).
8. K. Crammer and Y. Singer. *On the algorithmic implementation of multiclass kernel-based vector machines. J. Mach. Learn. Res.*, 2:265.292, (2002).
9. H. Taira and M. Haruno. *Feature selection in svm text categorization.* In *AAAI '99/IAAI '99*, pages 480.486, Menlo Park, CA, USA, (1999).

This page is intentionally left blank

Global Journal of Computer Science and Technology
Volume 12 Issue 8 Version 1.0 April 2012
Type: Double Blind Peer Reviewed International Research Journal
Publisher: Global Journals Inc. (USA)
Online ISSN: 0975-4172 & Print ISSN: 0975-4350

A Comparative Analysis for Detecting Uncertain Deterioration of Node Energy in MANET through Trust Based Solution

By Shilpa Bade & H K Sawant
Bharati Vidyapeeth Deemed University College Of Engineering, Pune

Abstract - Energy is consumed in MANET during the transmission and reception of data, propagation of control packets, retransmission and overhearing. We concentrate in reducing the energy consumption during the transmission and reception of data. Each node in MANET transmits data with the maximum energy regardless of the distance between the nodes. Also the mobile nodes expend some energy in transmission and reception of data. We have utilized the metrics received signal strength, link quality and the distance between the nodes to compute the energy required to transmit the data from a node to its neighboring node. The energy computed is involved in the selection of the optimal path which requires minimum energy to route the data from source to destination. Nodes within an ad hoc network generally rely on batteries (or exhaustive energy sources) for energy. Since these energy sources have a limited lifetime, power availability is one of the most important constraints for the operation of the ad hoc network.

GJCST Classification: C.2.1

Strictly as per the compliance and regulations of:

A Comparative Analysis for Detecting Uncertain Deterioration of Node Energy in MANET through Trust Based Solution

Shilpa Bade [α] & H K Sawant [σ]

Abstract - Energy is consumed in MANET during the transmission and reception of data, propagation of control packets, retransmission and overhearing. We concentrate in reducing the energy consumption during the transmission and reception of data. Each node in MANET transmits data with the maximum energy regardless of the distance between the nodes. Also the mobile nodes expend some energy in transmission and reception of data. We have utilized the metrics received signal strength, link quality and the distance between the nodes to compute the energy required to transmit the data from a node to its neighboring node. The energy computed is involved in the selection of the optimal path which requires minimum energy to route the data from source to destination. Nodes within an ad hoc network generally rely on batteries (or exhaustive energy sources) for energy. Since these energy sources have a limited lifetime, power availability is one of the most important constraints for the operation of the ad hoc network.

I. Introduction

Mobile Ad-hoc networks are self-organizing and self-configuring multihop wireless networks, where the structure of the network changes dynamically. This is mainly due to the mobility of the nodes [1]. Nodes in these networks utilize the same random access wireless channel, cooperating in an intimate manner to engaging themselves in multihop forwarding. The node in the network not only acts as hosts but also as routers that route data to/from other nodes in network . In mobile ad-hoc networks there is no infrastructure support as is the case with wireless networks, and since a destination node might be out of range of a source node transferring packets; so there is need of a routing procedure. This is always ready to find a path so as to forward the packets appropriately between the source and the destination. Within a cell, a base station can reach all mobile nodes without routing via broadcast in common wireless networks. In the case of ad-hoc networks, each node must be able to forward data for other nodes. This creates additional problems along with the problems of dynamic topology which is unpredictable connectivity changes.

a) *Properties of Ad-Hoc Routing Protocols*

The properties that are desirable in Ad-Hoc Routing protocols are:

- *Distributed operation:* The protocol should be distributed. It should not be dependent on a centralized controlling node. This is the case even for stationary networks. The dissimilarity is that the nodes in an ad-hoc network can enter or leave the network very easily and because of mobility the network can be partitioned.
- *Loop free:* To improve the overall performance, the routing protocol should assurance that the routes supplied are loop free. This avoids any misuse of bandwidth or CPU consumption.
- *Demand based operation:* To minimize the control overhead in the network and thus not misuse the network resources the protocol should be reactive. This means that the protocol should react only when needed and should not periodically broadcast control information.
- *Unidirectional link support:* The radio environment can cause the formation of unidirectional links. Utilization of these links and not only the bi-directional links improves the routing protocol performance.
- *Security:* The radio environment is especially vulnerable to impersonation attacks so to ensure the wanted behavior of the routing protocol we need some sort of security measures. Authentication and encryption is the way to go and problem here lies within distributing the keys among the nodes in the ad-hoc network.
- *Power conservation:* The nodes in the ad-hoc network can be laptops and thin clients such as PDA's that are limited in battery power and therefore uses some standby mode to save the power. It is therefore very important that the routing protocol has support for these sleep modes.
- *Multiple routes:* To reduce the number of reactions to topological changes and congestion multiple routes can be used. If one route becomes invalid, it is possible that another stored route could still be valid and thus saving the routing protocol from initiating another route discovery procedure.
- *Quality of Service Support:* Some sort of Quality of service is necessary to incorporate into the routing protocol. This helps to find what these networks will be used for. It could be for instance real time traffic support.

Author α σ : Department of Information Technology, Bharati Vidyapeeth Deemed University College Of Engineering, Pune-46.

b) Problems in Routing with Manet

- *Asymmetric links:* Most of the wired networks rely on the symmetric links which are always fixed. But this is not a case with ad-hoc networks as the nodes are mobile and constantly changing their position within network.
- *Routing Overhead:* In wireless ad hoc networks, nodes often change their location within network. So, some stale routes are generated in the routing table which leads to unnecessary routing overhead.
- *Interference:* This is the major problem with mobile ad-hoc networks as links come and go depending on the transmission characteristics, one transmission might interfere with another one and node might overhear transmissions of other nodes and can corrupt the total transmission.
- *Dynamic Topology:* Since the topology is not constant, so the mobile node might move or medium characteristics might change. In ad-hoc networks, routing tables must somehow reflect these changes in topology and routing algorithms have to be adapted. For example in a fixed network routing table updating takes place for every 30sec. This updating frequency might be very low for ad-hoc networks.

II. Analysis of Energy Aware Routing Techniques

The main focus of research on routing protocols in MANETs has been network performance. There has been some study on Energy aware routing protocols for MANETs. Presented below is a brief review of some of them.

a) Node Alarming Mechanism (Noal)

Node Alarming Mechanism (NOAL) [24] where an intermediate node having low energy alarms its status to others. With NOAL, we propose two routing algorithms: LEAR with NOAL (LENOAL) and FEAR with NOAL (FENOAL) that can balance the energy consumption among mobile nodes in ad hoc networks. The simulation study shows that LENOAL and FENOAL can balance energy consumption over networks Node Alarming Mechanism (NOAL), in which a node forwarding data packet alarms its energy status to others when it has low energy. The basic idea of NOAL is to protect node against consuming much energy. By notifying its energy status to others, it can prevent others from sending more data to itself, which stops consuming more energy by forwarding data packets. NOAL to energy-aware algorithms called LEAR with NOAL which can achieve an energy balancing even after route discovery.

b) Low Energy Routing Protocols

The main focus of research on routing protocols in MANETs has been network performance. There has been some study on energy aware routing protocols for MANETs. Presented below is a brief review of some of them.

i. *Minimum Energy Routing*

Reference [23] proposes a routing algorithm based on minimizing the amount of energy per bit required to get a packet from source to destination. More precisely, the problem is stated as:

$$\text{Minimize } \sum_{i \in E} E(i, i+1)$$

Where *E(i,i+1)* denotes the energy expended for transmitting (and receiving) between two consecutive nodes, i and i+1(a.k.a. link cost), in the route. This link cost can be defined for two cases:

- When the transmit energy is fixed.
- When the transmit energy is varied dynamically as a function of the distance between the transmitter and intended receiver.

For the first case, energy for each operation (receive, transmit, broadcast, discard, etc.) on a packet is given by [8],

$$E(\text{packet}) = b \times \text{packet\_size} + c$$

where *b* and *c* are the appropriate coefficients for each operation. Coefficient *b* denotes the packet size-dependent energy consumption whereas *c* is a fixed cost that accounts for acquiring the channel and for MAC layer control negotiation. Route selection depends on the packet size; hence in case of variable packet size transmission many routes should be selected. The second case is more involved. Reference [23] proposes a local routing algorithm for this case. The authors assume that the power needed for transmission and reception is a linear function of d^{α} where d is distance between the two neighboring nodes and α is a parameter that depends on the physical environment. They make use of the GPS position information to transmit packets with the minimum required transmit energy. The key requirement of this technique is that the relative positions of nodes are available to all nodes. However, this information may not be easy readily available. The GPS-based routing algorithm has two drawbacks. One is that GPS cannot provide the nodes much information about the physical environment and the second is the power dissipation overhead of the GPS device is additional.

ii. *Max-Min Battery Cost Aware Routing*

The main disadvantage of the problem formulation of the previous approach is that it always selects the least-power cost routes. As a result, nodes along these routes tend to "die" soon because of the battery energy exhaustion. This is doubly harmful since the nodes that die early are precisely the ones that are needed most to maintain the network connectivity (and hence useful service life). Therefore, it is better to use a higher power cost route if it avoids using nodes that

have a small amount of remaining battery energy. This observation has given rise to a number of "battery cost-aware routing" algorithms as described next.

1. Minimum battery cost routing algorithm [12] that minimizes the total cost of the route. It minimizes the summation of inverse of remaining battery capacity for all nodes on the routing path.
2. Min-Max battery cost routing algorithm [22] is a modification of minimum battery cost routing. This metric always tries to avoid the route with nodes having the least battery capacity among all nodes in all possible routes. Thereby, it results in fair use of the battery of each node.
3. Conditional Max-Min battery capacity routing algorithm proposed in [12, 25]. This algorithm chooses the route with minimal total transmission power if all nodes in the route have remaining battery capacities higher than a threshold; otherwise routes including nodes with the lowest remaining battery capacities are avoided. Several experiments have been done in [22] to compare different battery cost-aware routing in terms of the network lifetime. The result showed that the first node in "Shortest Path routing" metric died sooner than all the battery-cost-aware routing but most of the other nodes had longer expiration time. In that result Minimum battery cost routing showed better performance than Min-Max routing in terms of expiration time of all nodes. Conditional Max-Min routing showed different behavior that depended on the how the threshold value of chosen.

c) Lifetime Prediction Routing

Lifetime Prediction Routing (LPR) [25] is an on demand source routing protocol that uses battery lifetime prediction. The objective of this routing protocol is to extend the service life of MANET with dynamic topology. This protocol favours the path whose lifetime is maximum. We represent our objective function as follow:

$$\text{Max } T_{\pi}(t) = \text{Min } (T_i(t)),\ i \epsilon \pi.$$

$T_{\pi}(t)$: lifetime of path π
$T_i(t)$: predicted lifetime of node i in path

In Lifetime Prediction Each node tries to estimate its battery lifetime based on its past activity. This is achieved using a Simple Moving Average (SMA) predictor by keeping track of the last *N* values of residual energy and the corresponding time instances for the last N packets received/relayed by each mobile node. This information is recorded and stored in each node. We have carefully compared the predicted lifetimes based on the SMA approach to the actual lifetimes for different values of *N* and found *N=10* to be a good value. Motivation of using lifetime prediction is that mobility introduces different dynamics into the network. In [13] the lifetime of a node is a function of residual energy in the node and energy to transmit a bit from the node to its neighbours. This metric works well for static networks for which it was proposed. However, it is very difficult to efficiently and reliably compute this metric when we have mobility since the location of the nodes and their neighbours constantly change. PSR does not use prediction and only uses the remaining battery capacity. We believe LPR is superior to PSR since LPR not only captures the remaining (residual) battery capacity but also accounts for the rate of energy discharge. This makes the cost function of LPR more accurate as opposed to just using battery capacity. This is true in MANETs since mobility can change the traffic patterns through the node, which thereby affects the rate of depletion of its battery. Also, recent history is a good indicator of the traffic through the node and hence we chose to employ lifetime prediction. This approach is a dynamic distributed load balancing approach that avoids power-congested nodes and chooses paths that are lightly loaded. This helps LPR achieve minimum variance in energy levels of different nodes in the network.

d) Local Energy-Aware Routing (Lear)

In generic on-demand ad hoc algorithms, all nodes participate in the phase of path searching, while the final decision is made in the source or destination node. The Woo et al. [18] algorithm grants each node in the network permission to decide whether to participate in route searching, which thus spreads the decision making process among all nodes. The Local Energy-Aware Routing (LEAR) algorithm has as a main criterion the energy profile of the nodes. The residual energy defines the reluctance or willingness of intermediate nodes to respond to route requests and forward data traffic. When energy *Ei* in a node *i* is lower than a predefined threshold level *Th*:

$$Ei < Th\,,$$

The node does not forward the route request control message, but simply drops it. Thus, it does not participate in the selection and forwarding phase. The technique of shifting the responsibility for reacting to changes in the energy budget of the nodes from the source-destination nodes to the intermediate nodes avoids the need for the periodic exchange of control information, which exchange translates into bandwidth and energy consumption. It has been commonly used for improving the performance of the routing protocols in many more recent approaches. This mechanism is inventive but depends on the way it is implemented.

According to Analysis of energy (power) aware routing protocol we analyze that in local energy aware routing after applying threshold value the neighbored nodes are also trying to establish connection among low energy level node and uncertainly loss their energy. Now in this dissertation we focus on that problem.

III. Roposed Method For Energy Aware Deterioration Routing

The power at the network layer can be conserved by reducing the energy consumed for two main operations, namely, communication and computation. The communication related power consumption is mainly due to transmit-receive module present in the nodes. Whenever a node remains active, that is, during transmission or reception of a packet, energy gets consumed. Even when the node is not actively participating in communication, but is in the listening mode waiting for the packets, the battery keeps discharging. The computation power refers to the power spent in calculations that take place in the nodes during routing and power adjustments.

a) Energy Awareness

Network partitioning interrupts communication sessions and can be caused by node movement or by node failure due to energy depletion. Whereas the former cannot be controlled by the routing protocol, the latter can be avoided through appropriate routing decisions. Operational lifetime is therefore defined in this survey as the time until network partitioning occurs due to battery outage.

A few reasons for energy deterioration in MANETs are limited energy of the nodes, difficulties in replacing the batteries, lack of central coordination, constraints on the Battery source, selection of optimum transmission power, and channel utilization.

b) Proposed Solution for Energy Deterioration Scheme

Ad hoc wireless networks are power constrained since nodes operate with limited battery energy. If some nodes die early due to lack of energy, they cannot communicate with each other. Therefore, inordinate consumption of nodes' energy should be prevented. In fact, nodes energy consumption should be balanced in order to increase the energy awareness of networks. Here we proposed a new energy aware deterioration scheme in MANET. In this scheme we set a threshold value for energy consumption by mobile nodes in our network. If the energy level of any node/s in the network reaches to threshold level that are not participated in communication means it will be inactive in the network. According to our proposed approach a new energy aware deterioration routing (EADR) to make aware our network about the energy of nodes by that we remove the problem of suddenly loss of session to recognize the unfaithful nodes and extend the life cycle of network.

Energy aware deterioration routing scheme deals with efficient utilization of energy resources. By controlling the early depletion of the battery, adjust the power to decide the proper power level of a node and incorporate the low power strategies into the protocols used in various layers of protocol stack. There are little issues and solutions which witnesses the need of energy aware routing in ad hoc wireless networks.

Idle energy consumption constitutes a significant percentage of the overall energy consumed by the wireless interfaces of network nodes. Therefore, reducing this energy should be a cornerstone in any energy conservation efforts. As will be seen, our proposed algorithm, EADR, addresses the issue of idle energy consumption in a manner fair to all network nodes. Different nodes are given equal opportunities to conserve idle energy. When idle energy is addressed, another factor remains that may still affect energy fairness within the network. This is explained as follows:

Since ad hoc network nodes also assume the role of traffic routers, some nodes may need to cooperate in order to direct traffic that may not have been intended for them in the first place. Many routing strategies aim at finding the fastest and shortest routes for the traffic between two nodes that need to communicate. This may penalize some nodes that happen to be in a location that causes it to be part of several optimal routing paths. As an example, consider the network topology of Fig.1. If the decision is to use the shortest path, node 7 would be the obvious choice when routing data between node pairs (1,4), (2,5) and (3,6). This will always be the case as long as node 7 is alive, despite the existence of other routes. For example, if we want to route packets between nodes 2 and 5, and assuming that all adjacent nodes are within radio range of each other, we can use the routes (2-1-6-5) or (2-3-4-5), in addition to (2- 7-5). The problem with continuously using node 7 for packet routing is that it will run out of energy much faster than other nodes in the network.

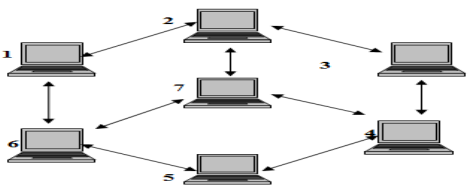


Fig.1: Topology with a node having highest energy consumption in a network

From an energy point of view, this causes two issues:

- Nodes are not treated as equal, which means that some nodes will run out of energy faster than the others due to their strategic location, thus causing them to cease to serve their own users faster than others. This presents a 'local' problem that affects node users.
- Network partitioning may occur. Since some nodes may be critical for routing between certain nodes at some point of time, if these critical nodes run out of energy, routing between these nodes can no longer be done. This presents a 'global' problem that affects parts of the network or the whole network depending on the case.

The EADR algorithm helps address these issues. It provides the underlying routing protocol with the capability to make and implement routing decisions that take into consideration the energy state of the nodes that can be used for routing traffic. This can transform the existing routing algorithm into an energy-conscious one. This strategy helps to maximize the lifetime of network nodes and hence the network operation as a whole. The main goals of the EADA algorithm are fair energy conservation via:

- Rotating sleep periods equally among network nodes thus giving nodes equal opportunity for reducing energy consumption
- Assisting routing algorithms in making routing decisions based on energy fairness
- Little impact on network operation, for example, EADR introduces slight or no additional traffic or energy cost.
- Distributed processing of the algorithm which ensures robust operation that is not affected by the failure of one or more nodes.
- Modular nature which facilitates integrating it with existing routing algorithms

IV. Description of Proposed Eadr Algorithm

Proposed energy aware deterioration routing algorithm is protocol independent their route establishment and data delivery procedure is according to threshold value and given condition.

Initial energy = E
// (Suppose E = 100 Joule)
Threshold energy = Q_1 (10% of E) //for alert the energy level.

1. If {(E > Q_1) && (radio range from source to next hop (up to destination) < 250m)

Then
{Establish connection from source to destination}
Else
{ No connection establishment }

2. If {(E == Q_1)}

{Nodes will stop their working & goes to sleep mode}

3. If {(Node gain energy == 100) && (radio range from source to next hop ≤ 250m)}
{Go to step 1}
End

From a functional point of view, EADR algorithm can be considered to consist of two main units. One of these units handles the energy conservation operation. This is done through managing the nodes' energy level periods. The other unit or aspect of the algorithm takes care of supporting the routing protocol, as far as energy management decisions are concerned. It helps to ensure the routing protocol makes routing decisions that serve a specific goal. For example, whenever possible, nodes carry out routing duties that are proportional to their energy levels compared to each other. Fig.2 shows the interactions of EADA with the network and MAC/PHY layers.

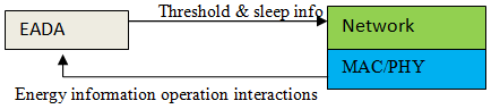


Fig.5.2 : Energy information operations

a) Energy Consumption Management

When EADR algorithm is enabled, nodes operate in one of two main modes: "a*sleep*" or "*awake*". In order to ensure maximum energy fairness, EDA enforces a configurable two-step cycle of operation for each node of the network. One portion of the cycle is a a*sleep* period while the other portion is a *wakeup* period. While awake, a node can communicate normally with other nodes as per the routing protocol that is in use. The length of the mandatory wakeup period affects the connectivity of the network as nodes establish their knowledge of the current neighbors and network conditions during this period. While sleep mode, a node cannot exchange data with the external world. The only exception is sending broadcast messages that pertain to the routing protocol. In this case, the node goes to what is called "a*sleep-pending*" state, where it wakes up for the duration of the broadcast and then it goes back to the sleep state to resume sleeping for whatever is left of the current sleep period. The reason behind not allowing unicast traffic and allowing only the sending of broadcast traffic is as follows. If we are to allow the node to send unicast messages during the sleep period, the node will have to abort the sleep and make sure it remains awake for the period of exchanging the control messages (RTS, CTS and ACK) as well as the data with the other end. This will not only complicate the operation of the algorithm, but will also potentially deprive the node from having a decent sleep period since the amount of time taken by this exchange can be unpredictably long in cases such as transmission errors. This contradicts with the goal of fair energy conservation for all nodes. However, we still allow broadcast messages to be sent by the sleeping node since the interruption of the sleep mode will be minimal in this case and at the same time this permission will help preserve healthy operation of the routing algorithm. Fig. 3 gives a description of how transitions between modes occur. While the node is asleep, other nodes may have some traffic that they need to send or forward to it. In order to make sure that this traffic will not be lost, nodes need to know when the node in question will start its sleep period and when it will become awake again which in turn determines if the node is asleep or awake. With this knowledge, the sending nodes buffer the traffic going to the sleeping node during its sleep period and

then release it when it wakes up. This can be achieved via going-to-sleep and waking-up notifications that the node can send to the outside world upon going to sleep and waking up, respectively.

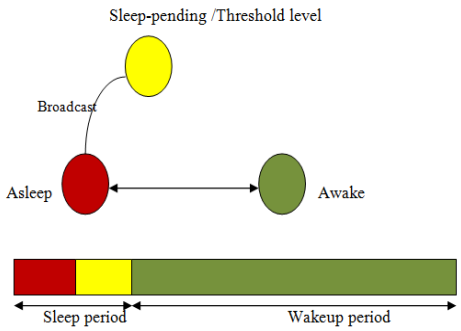


Fig. 5.3 : Eadr Modes of Operation

b) Eadr with Aodv

The second on-demand routing protocol we propose is called EADR with AODV (Energy-Aware Deterioration Routing with AODV). The main objective is to extend the useful service life of an ad hoc network. We are using the following formula to solves the problem of finding a route , at route discovery time t, such that the following cost function is minimized:

$$C(\pi,t) = \sum_{i \in \pi} Ci(t)$$

$$\text{Where } C_i(t) = \rho_i \left(\frac{Fi}{Ri(t)}\right)^{\gamma}$$

$\rho_{i=}$ Transmit power of node i.
Fi = Full charge capacity of node i
Ri= Remaining battery capacity of node i at time t.
γ= Transmit connection request to all reachable neighbour nodes.

The route discovery for EADR with AODV is described below.

In AODV, activity begins with the source node flooding the network with RREQ packets when it has data to send. An intermediate node broadcasts the RREQ unless:

- It gets a path to the destination from its cache, or
- It has previously broadcast the same RREQ packet.

(This fact is known from the sequence number of the RREQ and the sender ID.)

Consequently, intermediate nodes forward only the first received RREQ packet. The destination node only replies to the first arrived RREQ since that packet tends to take the shortest path. In EAD, all nodes except the destination calculate their link cost, and add it to the path cost in the header of the RREQ packet. When an intermediate node receives a RREQ packet, it starts a process to forward the connection establishment request and keeps the cost in the header of that packets transmission or receiving. If the new node has a lower cost, means their energy is less than the threshold value then no connection will establish with this node new value and the new RREQ packet is forwarded other node having value greater then threshold value. Otherwise, the new RREQ packet is dropped. In EADR, the fig.4 represented routing with relible nodes. During the communication in the network each node of different behaviour has do their work properly. Green nodes having a sufficient energy for forwarding and reception of packets. Yellow colour indicates threshold energy level of node forward the route alert (RALE) message to their neighbour and Red colour indicates node is in sleep mode.

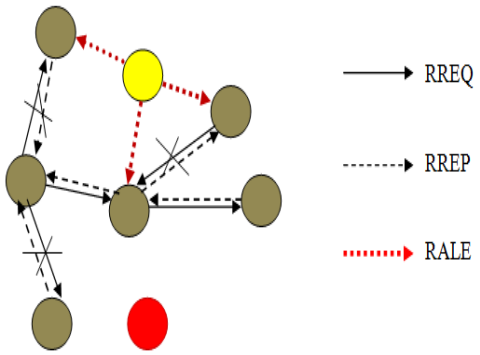


Fig.4 : Routing with reliable nodes

When the session expires, the source node selects the route with the energy greater than threshold value and replies. Subsequently, it will drop any received RREQs. The reply also contains the cost of the selected path appended to it. Every node that hears this route reply adds this route along with its cost to its route cache table. The node having value is less than threshold value has not participated in routing, this node is called *unfaithful node* in the network. Unfaithful nodes present in the network till they reached to sleep mode state but their functioning in the network is continuously forward their energy status to their neighbour nodes. Although this scheme can somewhat increase the latency of the data transfer, it results in a significant energy saving as will be shown in result and graph section.

V. Simulation of Energy Aware Deterioration Scheme

Our simulation model has five major components: ad hoc mobile network formation, packet delivery event generator, mobile nodes migration engine, routing protocol engine and statistics analyzer, as illustrated in Fig.5

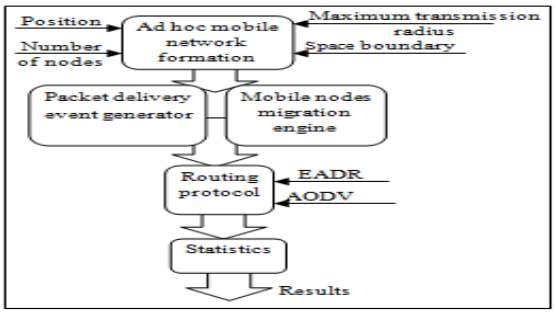


Fig.5 : Energy aware deterioration simulation model

The module of ad hoc mobile network formation takes in parameters of the space boundary, number of network nodes, their positions in space and their maximum transmission radius. This module is implemented using Tcl script [26]. The network formation is the simulation ground for packet delivery and mobile node migration events. The number of active communicating flows can be varied and the mobile nodes' migration speed and pause interval is node dependent. These are parameters inputted at simulation setup. Both events are generated using Tcl script and are subsequently handled by the routing protocol engine. The routing protocol engine employs EADR on top of AODV, in which EADR handles route selection, AODV manages route discovery, route maintenance, route refreshments and through cooperating with MAC and physical layers in the TCP/IP stack, it achieves reliable packet delivery.

VI. Conclusion

The proposed EADR algorithm effectively utilizes the node energy consumption of nodes and minimizes total energy consumption in the network. Such a network lives longer than the others. With proposed algorithm, the life of route nodes increases and it utilizes their energy efficiently. The algorithm monitors energy status of each mobile node and select the reliable paths. All parameters shows good results in threshold level as compare to without threshold level with little enhancement in delay. This method can be incorporated into any ad hoc on-demand routing protocol to improve reliable packet delivery in the face of node movements and minimize the route breaks. Alternate routes are utilized only when data packets cannot be delivered through the primary route. In case studies, EADR has been applied to AODV and performance has been studied via simulations. Simulation results have indicated that new technique provides robustness to mobility and enhances protocol performance. Its performance has been found much better than other existing protocols in dense medium as probability of finding active routes increases. Our work is aimed at realizing architecture for achieving effective energy awareness across different levels in mobile ad hoc network.

References Références Referencias

1. http://compnetworking.about.com/cs/wirelessfaqs/f/adhocwireless.htm.
2. http://www.ietf.org/internet-drafts/draft-ietf-manet-aodv-08.txt.
3. B. SOUJANYA, T. SITAMAHALAKSHMI and C. H.DIVAKAR, "Study of Routing Protocol in MANET", International Journal of Engineering Science and Technology, Vol. 3, No. 4, pp. 2622-2631, 2011.
4. M. Mohammed, "Energy Efficient Location Aided Routing Protocol for Wireless MANETs", International Journal of Computer Science and Information Security, Vol. 4, No. 1 & 2, 2009.
5. Jie Xiang, Samba Sesay, Yiming Wang and Jianhua He, " Ad Hoc State Aware Routing Protocols", IEEE Communication Society Proc. WCNC, pp. 3749-3753, 2007.
6. K. ARULANADAM and Dr. B. P PARTHASARATHY, "A New Energy Level Efficiency Issue in MANET", International Journal of Reviews in Computing, Vol. 1, No.5 pp. 104-109, 2009.
7. Dhiraj Nitnaware & Ajay Verma, "Performance Evaluation of Energy Consumption of Reactive Protocols under Self- Similar Traffic", International Journal of Computer Science & Communication, Vol. 1, No. 1, pp. 67-71, 2010.
8. Hussein Elattar, Hussen Abdelety, and Mohamed About-Dahab, " Improving the Life Time of Wireless Ad Hoc Networks Using Power Aware Routing", 18 Telecommunications forum TEFOR, pp. 416-419, 2010.
9. Z. Guo, & , B. Malakooti, "Energy Aware Proactive MANET Routing with Prediction on Energy Consumption", Proc. 2007 International Conference on Wireless Algorithms, Systems and Applications, pp. 287-293, 2007.
10. V. Kanakaris, D. Ndzi and D. Azzi, "Ad-hoc Networks Energy Consumption: A Review of the Ad-Hoc Routing Protocols", Journal of Engineering Science and Technology Review Vol. 3, No. 1, pp. 162-167, 2010.
11. L. Cao, T. Dahlberg, & Y. Wang, "Performance Evaluation of Energy Efficient Ad hoc Routing Protocols", Proc. IPCCC, IEEE, pp. 306-313, 2007.
12. G. Allard, P. Minet, D. Q. Nguyen, & N. Shresta, " Evaluation of the Energy Consumption in MANET", Adhoc-Now, pp. 170 -183, 2006.
13. Marco Fotino and Floriano De Rango, "Energy Issues and Energy Aware Routing in Wireless Ad-hoc Networks" INTEC Open Access publisher of scientific Books and Research, University of Calabria Italy, pp. 156-167, 2011.
14. Natalia Vassileva, and Francisco Barcelo, "A Survey of Routing Protocols for Maximizing the Lifetime of Ad Hoc Wireless Networks", International Journal of Software Engineering and Its Applications, Vol. 2, No. 3, pp. 77-89, 2008.

15. C. E. Jones, K. M. Sivalingam, P. Agrawal, & J. C. Chen, "A Survey of Energy Efficient Network Protocols for Wireless networks", Wireless Network Journal, pp. 343–358, 2010.
16. S. Kannan, S. Karthik and V. P Arunachalam, "Performance Analysis and Comparison of Mobile Ad hoc Network Routing Protocols", Research General of Applied Sciences, Vol. 6, No. 5, pp. 424-428, 2010.
17. F.Xie, L Du, Y Bai, L.chen, "Energy Aware Reliable Routing Protocol for Mobile Ad hoc Network," Proc. Wireless Communication and Networking Conference (WCNC), IEEE, pp. 4316- 4320, 2007
18. S. Busalo, Olagbegi and Natarajan Meghanathm, "A Review of the Energy Efficient and Secure Routing Protocols for Mobile Ad hoc Networks", GRAPH-HOC, Vol.2, No.2, pp. 62-68, 2010.
19. R. Lent, "Simulating the power consumption of computer networks," in the 15th IEEE International Workshop on Computer Aided Modeling, Analysis and Design of Communication Links and Networks (CAMAD'10), pp. 96-100, 2010.
20. V. Rishiwal, M. Yadav, S. Verma, S. K. Bajapai, "Power Aware Routing in Ad Hoc Wireless Networks, Journal of Computer Science and Technology", Vol. 9, No. 2, pp. 101-109, 2009.
21. M. Bheemalingaiah, M. M Naidu., D. S. Rao, "Energy Aware Clustered based Multipath Routing in Mobile Ad Hoc Networks", I.J Communications, Network and System Sciences, pp. 91-168, 2009.
22. Jhade Srinivas and Dr. P. Chenna Reddy, "Enhancement Study of Power-Aware Routing Protocols in Ad hoc Networks", International Journal of Advanced Research In Technology, Vol. 1, No. 1, pp. 66-70, 2010.
23. F. De Rango, F. Guerriero and P. Fazio, "Link-Stability and Energy aware Routing Protocol in Distributed Wireless Networks," to be published on IEEE Transaction on Parallel and Distributed Systems, pp. 148-153, 2008.
24. Eunkyu Lee, Minsoo Kim, ChansuYu and Myungchul Kim "Node Alarm Mechanism for Energy Balancing in Mobile Ad hoc Network", Proc. of Mobile Computing and Networking (Mobicom), pp. 85-96, 2002.
25. Morteza Maleki, Kartik Dantu And Massoud Pedram "Life Time Prediction Routing in MANET", Wireless Communications and Networking(WCNC), IEEE, pp. 1185-1190, 2005.

Global Journal of Computer Science and Technology
Volume 12 Issue 8 Version 1.0 April 2012
Type: Double Blind Peer Reviewed International Research Journal
Publisher: Global Journals Inc. (USA)
Online ISSN: 0975-4172 & Print ISSN: 0975-4350

Performance Comparison of BNP Scheduling Algorithms in Homogeneous Environment

By Nidhi Arora Navneet Singh & Parneet Kaur
Maharishi Markandeshwar University

Abstract - Static Scheduling is the mapping of a program to the resources of a parallel system in order to minimize the execution time. This paper presents static scheduling algorithms that schedule an edge-weighted directed acyclic graph (DAG) to a set of homogeneous processors. The aim is to evaluate and compare the performance of different algorithms and select the best algorithm amongst them. Various BNP algorithms are analyzed and classified into four groups - Highest Level First Estimated Time (HLFET), Dynamic Level Scheduling (DLS), Modified Critical Path (MCP) and Earliest Time First (ETF). Based upon their performance considering various factors, best algorithm is determined.

Keywords : *DAG, Task graphs, Parallel Processing, List Scheduling, Multiprocessor, Speed up.*

GJCST Classification: *D.4.8*

Strictly as per the compliance and regulations of:

Performance Comparison of BNP Scheduling Algorithms in Homogeneous Environment

Nidhi Arora [α], Navneet Singh [σ] & Parneet Kaur [ρ]

Abstract - Static Scheduling is the mapping of a program to the resources of a parallel system in order to minimize the execution time. This paper presents static scheduling algorithms that schedule an edge-weighted directed acyclic graph (DAG) to a set of homogeneous processors. The aim is to evaluate and compare the performance of different algorithms and select the best algorithm amongst them. Various BNP algorithms are analyzed and classified into four groups - Highest Level First Estimated Time (HLFET), Dynamic Level Scheduling (DLS), Modified Critical Path (MCP) and Earliest Time First (ETF). Based upon their performance considering various factors, best algorithm is determined.

Keywords : DAG, Task graphs, Parallel Processing, List Scheduling, Multiprocessor, Speed up.

I. Introduction

Parallel processing is the simultaneous use of more than one processor to execute a program in order to get faster results. Given an directed acyclic graph (DAG), also called task graph, in which the nodes represent the tasks and edges represent the communication costs as well as the dependencies among the tasks. The problem deals with the scheduling of the tasks onto a set of homogenous processors to minimize the completion time. DAG is generic model of a parallel program consisting of a set of processes. Each process is an indivisible unit of execution, expressed by node. A node has one or more inputs and can have one or more output to various nodes.

The paper is organized as follows. In the next section, we describe the generic DAG model and its suitability to different situations. In section 3, basic scheduling attributes are being discussed. Classification of BNP scheduling algorithms is given in section 4. Section 5, presents a performance comparison of various BNP scheduling algorithms and results are derived. Last section concludes the paper and presents the scope of this work in future.

II. Dag Model

The DAG [Kaur et al, 2011][Ahmad and Kwok,1998] is generic model of a parallel program consisting of a set of processes among which there are dependencies. Each process is an indivisible unit of execution, expressed by node. A node has one or more inputs and can have one or more output to various nodes. When all inputs are available, the node is triggered to execute. After its execution, it generates its output. In this model, a set of nodes $\{ n_1 , n_2 , n_3 \ldots\ldots\ldots n_n \}$ are connected by a set of directed edges, which are represented by (n_i , n_j) where n_i is called the Parent node and n_j is called the child node. A node without parent is called an Entry node and a node without child called an Exit node. The weight of a node, denoted by $w(n_i)$, represents the process execution time of a process. Since each edge corresponds to a message transfer from one process to another, the communication time, denoted by $c(n_i , n_j)$ is equal to the message transmission time from node n_i to n_j. Thus $c(n_i , n_j)$ becomes zero when n_i and n_j are scheduled to the same processor because intraprocessor communication time is negligible compared with the interprocessor communication time. The node and edge weights are usually obtained by estimations. Some variations in the generic DAG model are described below:

Accurate Model [Kaur et al, 2011]: In an accurate model, the weight of a node includes the computation time, the time to receive messages before the computation, and the time to send messages after the computation. The weight of an edge is a function of the distance between the source and destination nodes, and therefore, depends on the node allocation and network topology. It also depends on network contention which can be difficult to model. When two nodes are assigned to a single processor, the edge weight becomes zero, so as the message receiving time and sending time.

Approximate Model 1 [Kaur et al, 2011]: In this model, the edge weight is approximated by a constant, independent of the message transmission distance and network contention. A completely connected network without contention fits this model.

Approximate Model 2 [Kaur et al, 2011]: In this model, the message receiving time and sending time are ignored in addition to approximating the edge weight by a constant. These approximate models are best suited to the following situations; (i) the grain-size of the process is much larger than the message

Author α : Department of Computer Science and Engineering M.M.U, Mullana (Ambala) India. E-mail : er.nidhi152@gmail.com
Author σ : Department of Information Technology Adesh Institute of Engineering & Tech Faridkot-Punjab.
Author ρ : Department of Computer Science and Engineering Adesh Institute of Engineering & Tech Faridkot-Punjab.

receiving time and sending time; (ii) communication is handled by some dedicated hardware so that the processor spends insignificant amount of time on communication; (iii) the message transmission time varies little with the message transmission distance, e.g., in a wormhole or circuit switching network; and (iv) the network is not heavily loaded. In general, the approximate models can be used for medium to large granularity, since the larger the process grain-size, the less the communication, and consequently the network is not heavily loaded. The second reason for using the approximate models is that both the node and edge weights are obtained by estimation, which is hardly accurate. Thus, an accurate model is useless when the weights of nodes and edges are not accurate.

III. List Scheduling

Most scheduling algorithms are based on list scheduling technique [Kwok and Ahmad, 1999]. List scheduling is a class of scheduling heuristics in which the nodes are assigned priorities and placed in a list arranged in a descending order of priority. The node with higher priority will be examined for scheduling before a node with a lower priority. If more than one node has the same priority, ties are broken using some method. List scheduling consists of two phases:

1. Task prioritizing phase: - In this phase the priority of each node in DAG is computed and assigned.
2. Processor selection:-Each task is assigned processor with minimum execution time.

The two main attributes [Hagras and Janeek, 2003] for assigning priority are the t-level (top level) and b-level (bottom level).

Top level : The t-level of a node n_i is the length of the longest path from an entry node to n_i (excluding n_i). Here, the length of a path is the sum of all the node and edge weights along the path. The t-level is computed recursively by traversing the DAG downward starting from the entry node n_{entry}.

$$\text{t-level}(n_i) = \max(\text{t-level}(n_m) + w_m + c_{m,i})$$

where n_m is predecessors of n_i, w_m stands for computational cost, $c_{m,i}$ stands for communication cost and t-level $(n_{entry}) = 0$. The t-level of n_i highly correlates with n_i's earliest start time, denoted by EST (n_i) , which is determined after n_i is scheduled to a processor.

Bottom level: The b-level of a node n_i is the length of the longest path from node n_i to an exit node. The b-level is computed recursively by traversing the DAG upward starting from the exit node n_{exit}.

$$\text{b-level}(n_i) = w_i + \max(\text{b-level}(n_m) + c_{m,i})$$

where n_m is successor of n_i, w_m stands for computational cost, $c_{m,i}$ stands for communication cost and b-level $(n_{exit}) = w(n_{exit})$.

The b-level of a node is bounded by the length of the critical path. A critical path (CP) of a DAG, is the longest path from an entry node to an exit node.

Static b-level: Some BNP scheduling algorithms do not consider the edge weights in computing the b-level. In that case, b-level does not change throughout the scheduling process, therefore it is called static b-level or static level (SL).

$$\text{SL}(n_i) = w_i + \max(\text{SL}(n_m))$$

where n_m is successor of n_i and $\text{SL}(n_{exit}) = w(n_{exit})$

ALAP start time: The ALAP (As-Late-As-Possible) start time of a node is measure of how far the node's start time can be delayed without increasing the schedule length. It is also known as latest start time (LST).

$$\text{LST}(n_i) = \min(\text{LST}(n_m) - c_{m,i}) - w_i$$

where n_m is successor of n_i, w_m stands for computational cost, $c_{m,i}$ stands for communication cost and $\text{LST}(n_{exit}) = \text{EST}(n_{exit})$.

Dynamic Level: It is the difference of Static level and Earliest Start Time.

Some algorithms assign higher priority to a node with smaller t-level while some algorithms assign higher priority to a node with larger b-level. A priority table is designed for all the nodes in DAG.

IV. Classification of Bnp Scheduling Algorithms

BNP refers to Bounded Number of Processor (BNP) Scheduling Algorithms [Hagras and Janeek, 2003][Kaur et al, 2011]. These algorithms schedule the DAG to a bounded number of processors directly. The processors are assumed to be fully connected. BNP scheduling algorithms are based on the list scheduling technique in which nodes are assigned some priorities. To study these algorithms, homogeneous environment is considered in which processors having same configuration are used for execution. BNP class of algorithms is categorized into two categories:

Static Algorithms: These algorithms use list scheduling approach. Therefore in static algorithms once the task prioritization phase is finished then and only then the processor selection phase begins. Following are static scheduling algorithms.

Highest Level First with Estimated Times (HLFET) algorithm [Kwok and Ahmad, 1999]**:** It is one of the simplest list scheduling algorithms that uses static b-level as node priority and ignores the communication costs on the edges. Following steps describe the HLFET algorithm in detail:

1. Calculate the static b-level of each node.
2. Make a ready list in descending order of static b-level. The ready list contains only the entry nodes initially. Ties are broken randomly.

Repeat.
3. Schedule the first node in the ready list to a processor that allows the earliest execution, using the non-insertion approach.
4. Update the ready list by inserting the nodes that are now ready.

Until all nodes are scheduled.

Modified Critical Path (MCP) algorithm [Kwok and Ahmad, 1999]**:** This algorithm uses an attribute called ALAP time of a node as a priority. The ALAP time of a node is computed by first computing the length of CP and then subtracting the b-level of the node from it. Therefore, the ALAP times of the nodes on the CP are just their t-levels. Following steps describe the algorithm.

1. Compute the ALAP time of each node.
2. For each node, create a list which consists of the ALAP times of the node itself and all its children in a descending order.
3. Sort these lists in an ascending order. Create a node list according to this order.

Repeat.
4. Schedule the first node in the node list to a processor that allows the earliest execution, using the insertion approach.
5. Remove the node from the node list.

Until the node list is empty.

Dynamic Algorithms: These algorithms also use list scheduling approach. In Dynamic algorithms both the task prioritization phase and processor selection phase goes on side by side. Following are dynamic scheduling algorithms.

The Earliest Time First (ETF) algorithm [Kwok and Ahmad,1999]**:** It computes, at each step, the earliest start times for all ready nodes and then selects the one with the smallest start time, which is computed by examining the start time of the node on all processors exhaustively. The algorithm is described below.

1. Compute the static b-level of each node.
2. Initially, the pool of ready nodes include only the entry nodes.

Repeat.
3. Calculate the earliest start time on each processor for each node in the ready pool. Pick the node-processor pair that gives the earliest time using the non insertion approach. Ties are broken by selecting the node with a higher static b-level. Schedule the node to the corresponding processor.
4. Add the newly ready nodes to the ready node pool.

Until all nodes are scheduled.

Dynamic Level Scheduling (DLS) algorithm [Kwok and Ahmad, 1999]**:** This algorithm uses as node priority an attribute called dynamic level (DL) which is the difference between the static b-level of a node and its earliest start time on a processor. The stepwise description of the algorithm is given below.

1. Calculate the b-level of each node.
2. Initially, the ready node pool includes only the entry nodes.

Repeat.
3. Calculate the earliest start time for every node on each processor. Hence, compute the DL of every node processor pair by subtracting the earliest start time from the node's static b-level.
4. Select the node processor pair that gives the largest DL. Schedule the node to the corresponding processor.
5. Add the newly ready nodes to the ready pool.

Until all nodes are scheduled.

V. Performance Comparison and Results

The performance is the most important factor in every algorithm [Kaur et al, 2011] [Hagras and Janeek, 2003]. In this section, we present performance comparison of above discussed BNP scheduling algorithm. The performance comparison is based upon various comparison metrics discussed below.

Makespan: Makespan is defined as the completion time of the algorithm. It is calculated by measuring the finishing time of the exit task by the algorithm.

Speed Up: The Speed Up value is computed by dividing the sequential execution time by the parallel execution time.

Scheduled length ratio (SLR): It is defined as the ratio of the Makespan of the algorithm to Critical path values of the DAG.

Processor Utilization: It means that how processors are being utilized by different processes. It is good when maximum number processors are utilized.

Above metrices are compared for 10 nodes, 15 nodes, 20 nodes and 25 nodes in homogeneous environment and results are shown graphically.

Case 1 : In first case, results are shown for 10 nodes and 5 processors. Makespan and SLR is same for HLFET, MCP and ETF, but DLS algorithm shows highest makespan value and lowest speed up value. All processors are best utilized in case of HLFET and MCP.

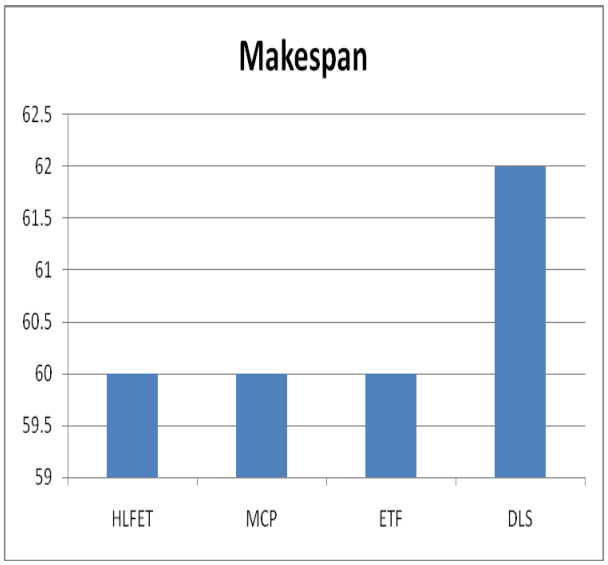


Figure 1: Makespan values for 10 nodes

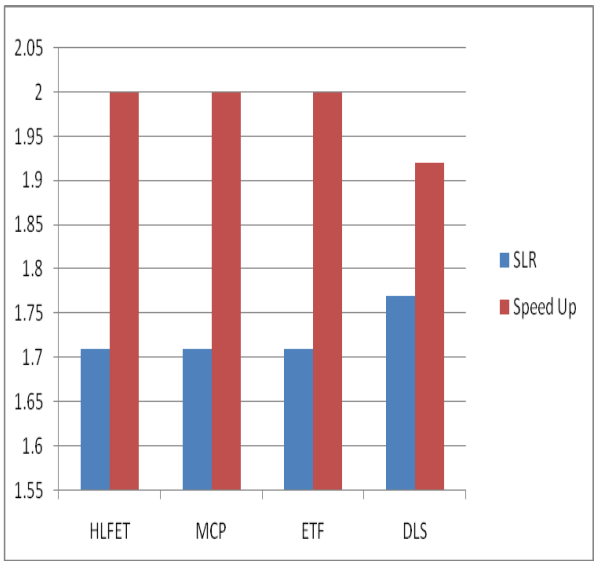


Figure 2 : SLR and SpeedUp for 10 nodes

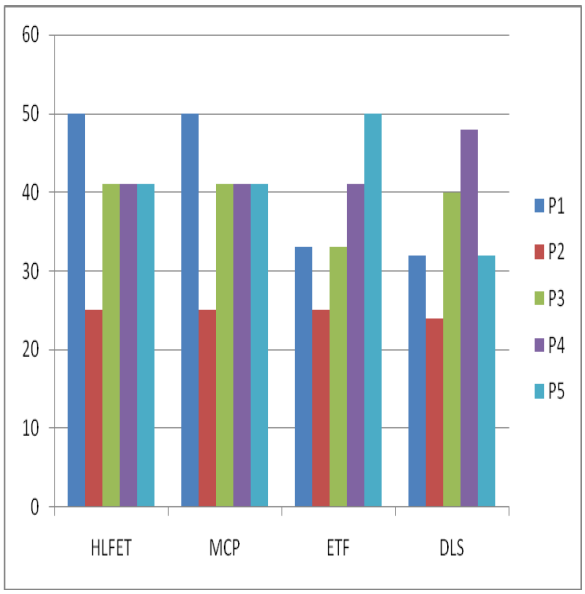


Figure 3 : Processor Utilization for 10 nodes

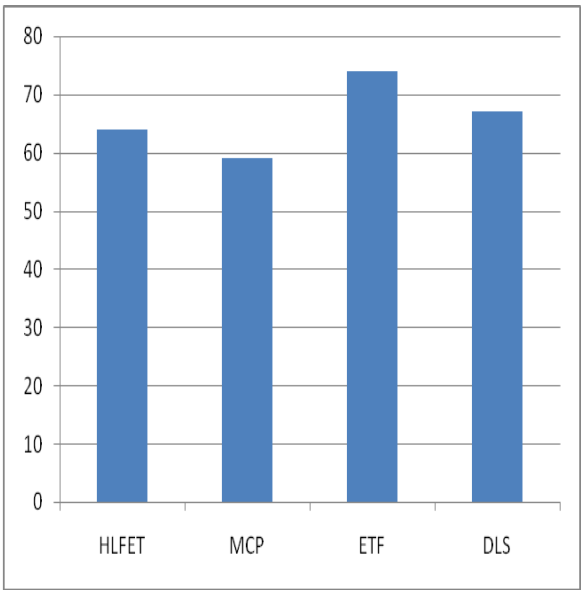


Figure 4 : Makespan for 15 nodes

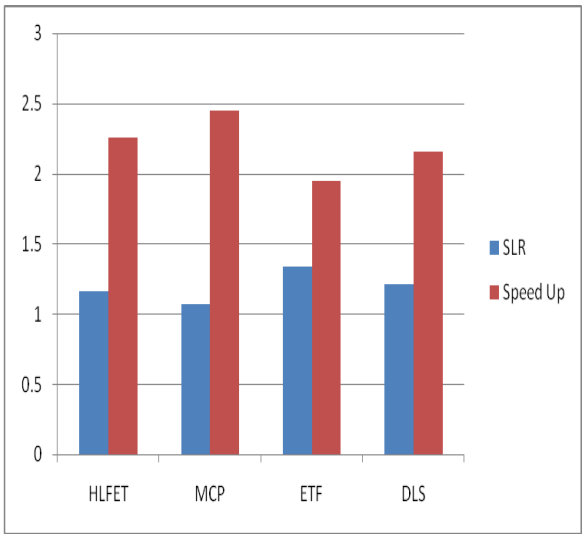


Figure 5 : SLR and SpeedUp for 15 nodes

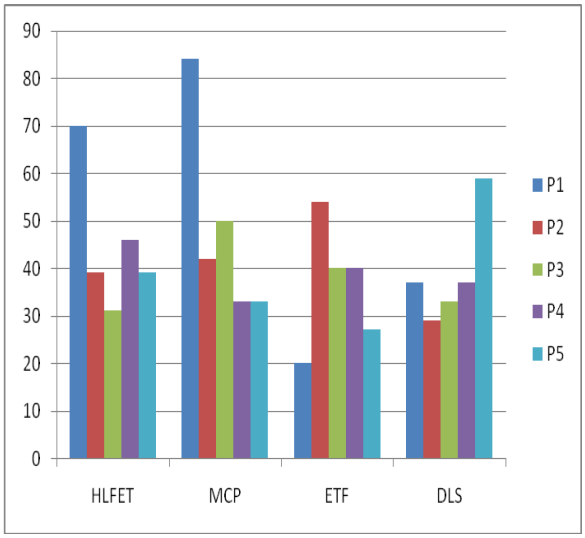


Figure 6 : Processor Utilization for 15 nodes

Case 2: In this case, results are compared for 15 nodes and 5 processors. Makespan is less for MCP and increases in order from HLFET, DLS and ETF. Same results are obtained for SLR values, but processor utilization is best for HLFET and ETF. Speedup is good in case of MCP and HLFET.

Case 3: Here 20 nodes are considered. Makespan time and SLR is less and processor utilization is good in case of DLS. HLFET and DLS shows higher value of Speedup.

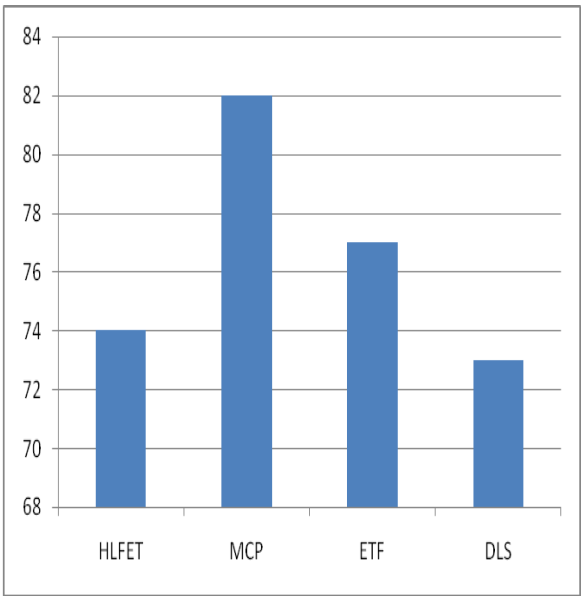


Figure 7 : Makespan for 20 nodes

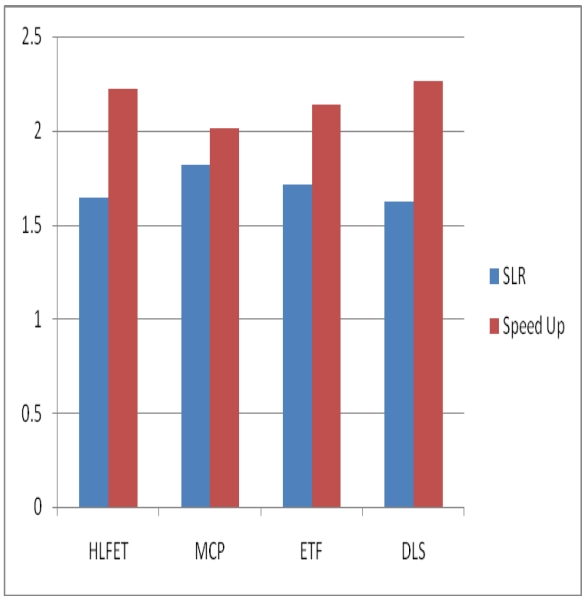


Figure 8 : SLR and SpeedUp for 20 nodes

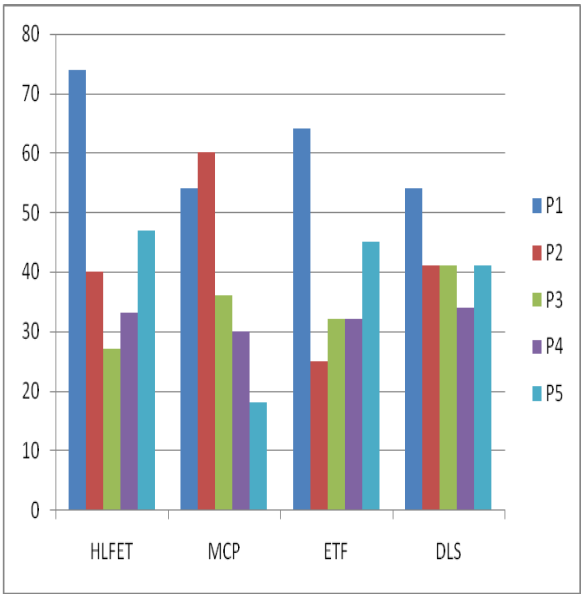


Figure 9 : Processor Utilization for 20 nodes

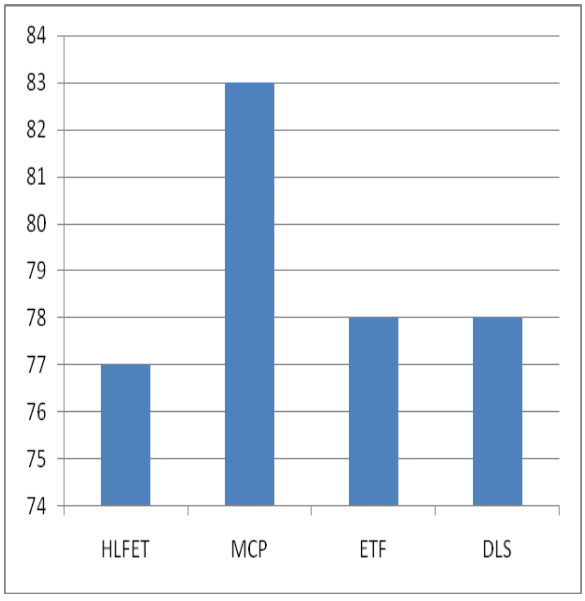


Figure 10 : Makespan for 25 nodes

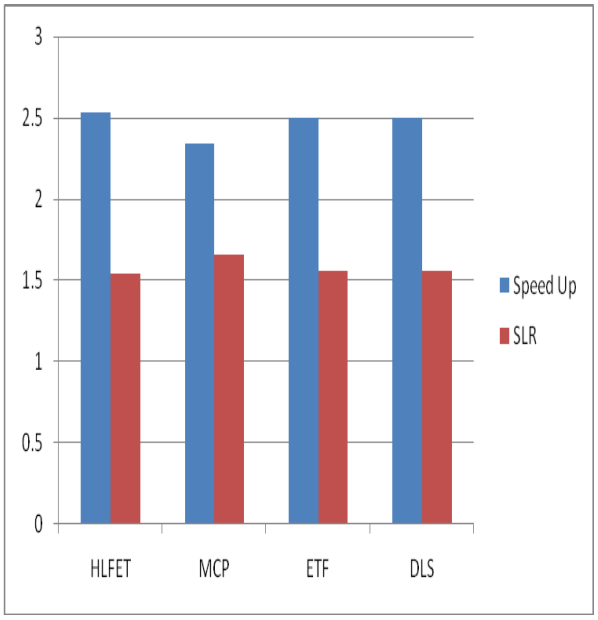


Figure 11: SLR and SpeedUp for 25 nodes

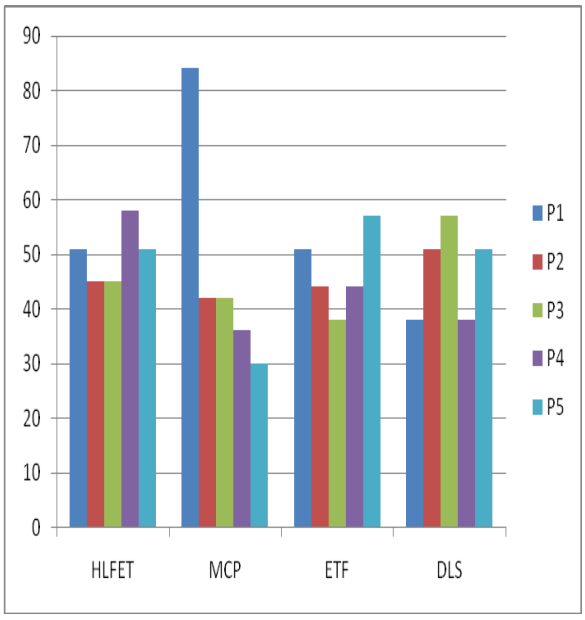


Figure 12 : Processor Utilization for 25 nodes

Case 4: In case of 25 nodes, Makespan time is less for HLFET, same applies for SLR. Processor utilization and Speedup is best in case of HLFET algorithm.

VI. Conclusion and Future Scope

Makespan of MCP and ETF showed large increase in value while increasing the tasks from 20 to 25 compared to other algorithms. The average processor utilization remained same for HLFET and MCP algorithms with 10 tasks. MCP utilized processor efficiently than HLFET with 15 tasks. With 20 and 25 tasks, HLFET proved to be better than other algorithms. The SLR remained almost the same for HLFET, MCP and ETF with 10 tasks. It is maximum in case of DLS for 10 tasks. With 15 tasks MCP shows the lowest value. As the tasks are increased HLFET shows the lesser value in case of 20 and 25 tasks. Same is the case with Speed Up. With 10 tasks speedup of HLFET, MCP and DLS algorithms is same. As the tasks increase from 20 to 25, Speed Up value of HLFET hikes. It can be concluded from the above results, that HLFET is one of the efficient algorithms, considering the data gathered using the scenarios and the performance calculated from them.

The thesis has vast future scope. A lot of work can be done considering more case scenarios. Heterogeneous environment can be considered, in which multiple processors having different configuration are used. The comparison of these algorithms can be done for any number of processors in different environments.

References Références Referencias

1. Parneet Kaur, Dheerendra Singh, Gurvinder Singh and Navneet Singh "Analysis, Comparison and Performance Evaluation of BNP Scheduling Algorithms in Parallel Processing" International Journal of Information Technology and Knowledge Management, Volume 4, No. 1, pp. 279-284, January-June 2011
2. Ishfaq Ahmad, Yu-Kwong Kwok "Performance Comparison of Algorithm for Static Scheduling of DAG to multiprocessor" citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.42.8979...pdf.
3. Ishfaq Ahmad, Yu-Kwong Kwok "Benchmarking and comparison of the Task Graph Scheduling algorithms" pp1063-7133,IEEE 1998.
4. Ishfaq Ahmad and Min-You Wu "Analysis, Evaluation and Comparison Of algorithm for Scheduling Task Graph on Parallel Processor" pp 1087-4087, IEEE 1996.
5. T.Hagras, J.Janeek "Static Vs. Dynamic List-scheduling Performance Comparison" Acta Polytechnica Vol. 43 No. 6/2003.
6. Dror G. Feitelson and Larry Rudolph "Parallel Job Scheduling: Issues and Approaches" www.cse. Hcmut.edu.vn/~ptvu/ppds/ParallelJobScheduling.pdf
7. Min You Wu "On parallelization of Static Scheduling Algorithm" IEEE, vol 23, pp 517 – 528, Aug 1997.
8. Shyiyuan Jin, Guy Schiavone, Damla Turgut "A performance study of multiprocessor task scheduling algorithm" vol 43, Page 77-97, Issue1 (Jan -2008).
9. Thomas L. Casavant "A taxonomy of Scheduling in General-Purpose Distributed Computing Systems" IEEE Transactions on Software Engineering, vol. 14, no. 2, February 1988.
10. T.L Adam, K.Chandy and J. Dickson " A Comparison of List scheduling for Parallel Processing Systems" Communications of the ACM, Vol. 17, no.12, pp 685-690, Dec 1974.

11. Yu-Kwong Kwok and Isfaq Ahmad "Static Scheduling Algorithms for Allocating Directed Task Graphs to Multiprocessors" ACM Computing Surveys, Vol.31, No.4, December 1999
12. Eryk Laskowski "Fast Scheduling and Partitioning algorithm in the multiprocessor system with Redundant Communication Resources" www.springerlink.com/content/0np00wu1r0c7te8m/fulltext.pdf.
13. Igor Grudenic "Scheduling Algorithm and Support Tools for parallel System" www.fer.hr/_download/repository/Grudenickvalifikacijski.pdf
14. S.V Sudha and K.Tjanushkodi "An Approach for parallel job Scheduling Using supple Algorithm" Asian Journal of Information Technology, Volume: 7, Issue: 9, Page No.: 403-407, 2008.
15. Jing-Chiou Liou, Micheal A.Palis "A Comparison of General Approaches to Multiprocessor Scheduling" IEEE, pp 152 – 156,15 April 1997.

This page is intentionally left blank

Global Journal of Computer Science and Technology
Volume 12 Issue 8 Version 1.0 April 2012
Type: Double Blind Peer Reviewed International Research Journal
Publisher: Global Journals Inc. (USA)
Online ISSN: 0975-4172 & Print ISSN: 0975-4350

Optimal Rules Identification for a Random Number Generator Using Cellular Learning Automata

By Atefeh Ghalambor Dezfuly, Saeed Setayeshi, Mohammad Mosleh & Mohammad Kheyrandish
Islamic Azad University, Dezful, Iran

Abstract - The cryptography is known as one of most essential ways for protecting information against threats. Among all encryption algorithms, stream ciphering can be indicated as a sample of swift ways for this purpose, in which, a generator is applied to produce a sequence of bits as the key stream. Although this sequence is seems to be random, severely, it contains a pattern that repeats periodically. Linear Feedback Shift Registers and cellular automata have been used as pseudo-random number generator. Some challenges such as error propagation and pattern dependability have motivated the designers to use CA for this purpose. The most important issue in using cellular automata includes determining an optimal set of rules for cells. This paper focuses on selecting optimal rules set for such this generator with using an open cellular learning automata, which is a cellular automata with learning capability and interacts with local and global environments.

Keywords : *Cryptography; Symmetric encryption; stream ciphering; Learning Cellular Automata; local environment; global environment.*

GJCST Classification: *F.1.1*

Strictly as per the compliance and regulations of:

Optimal Rules Identification for a Random Number Generator Using Cellular Learning Automata

Atefeh Ghalambor Dezfuly [α], Saeed Setayeshi [σ], Mohammad Mosleh [ρ] & Mohammad Kheyrandish [ω]

Abstract - The cryptography is known as one of most essential ways for protecting information against threats. Among all encryption algorithms, stream ciphering can be indicated as a sample of swift ways for this purpose, in which, a generator is applied to produce a sequence of bits as the key stream. Although this sequence is seems to be random, severely, it contains a pattern that repeats periodically. Linear Feedback Shift Registers and cellular automata have been used as pseudo-random number generator. Some challenges such as error propagation and pattern dependability have motivated the designers to use CA for this purpose. The most important issue in using cellular automata includes determining an optimal set of rules for cells. This paper focuses on selecting optimal rules set for such this generator with using an open cellular learning automata, which is a cellular automata with learning capability and interacts with local and global environments.

Keywords : Cryptography; Symmetric encryption; stream ciphering; Learning Cellular Automata; local environment; global environment.

I. Introduction

Based on applications, such as data storing, transferring and processing, the information can be threatened in several way. In each threat, dependent to the threat agent, the information may be changed and lose their credibility, or be stolen and lose their confidentiality, only. The cryptography has been considered as an approach to protecting information, in both cases, and in different conditions, can help to preserving data credibility and confidentiality. Generally, this approach includes transforming a plain-text into a ciphered-text. In this way, a determined function and a specific key are used, and the common purpose is establishing a secure communication between a sender A and a receiver B over an insecure communication channel [1]. Regarding key type viewpoint, the encryption algorithms are divided into two broad classes: symmetric and asymmetric algorithms. In the first class, both a communication parties use a common secret key for both encryption and decryption process; whereas in second ones, each of communication parties has its private secret key and also a public key. Asymmetric-key algorithms provide stronger securities compared to symmetric ones; however, because of massive numeral computation for increasing the security of these algorithms, they have lower speeds compared to the first class algorithms [2].

The symmetric algorithms are divided into Block ciphering and Stream ciphering algorithms, themselves. In both ones, using an efficient tool for adding the randomness in the key or ciphered text is considered, as a basis. So, the Cellular Automata (CA) as a complex parallel processing model has been used in both these mentioned algorithms. The CA can be used for increasing encryption and decryption security and speed, via its parallel operation nature and its pseudo-random output [3,4]. However, the main problem in using CA for cryptography includes selecting a rule set for cells that provides security requirements, optimally. In this paper, using a Learning Cellular Automata (LCA), as an extended model of CA, has been considered for selecting an optimal rule set for a key generator based on CA that can be used in stream ciphering.

For the purpose of this paper, it has been organized as follows: section 2 introduces stream ciphering. In section 3, key generating will be focused and after introducing CA as a common key generator, using it for this purpose will be reviewed. Also, the Learning Cellular Automata (LCA) as the basis of proposed model will be introduced. Then, section 4 presents the proposed model for identifying optimal rules that must be used in CA-based random number generator. Section 5 has been designated for reporting experiments results and finally, section 6 includes conclusion.

II. Stream Ciphering

In a block ciphering system, the plain text is divided into several blocks with a specific size, and each block is transformed to a ciphered block, independently. However, the stream ciphering process transforms each plain text bit to a cipher bit, per a time instance [5]. A

Author α : Computer Engineering Department, Dezful Branch, Islamic Azad University, Dezful, Iran. E-mail : at_ghalambor@yahoo.com
Author σ : Medical Radiation Department, Amirkabir University of Technology, Tehran ,Iran. E-mail : Setayesh@aut.ac.ir
Author ρ : Computer Engineering Department, Dezful Branch, Islamic Azad University, Dezful, Iran. E-mail : Mosleh@iaud.ac.ir
Author ω : Computer Engineering Department, Dezful Branch, Islamic Azad University, Dezful, Iran. E-mail : kheyrandish@iaud.ac.ir

stream ciphering system includes a pseudo random bit sequence generator and a function box. The generator produces a bit stream that is considered as a key sequence and is combined with the plain text in a bitwise manner, and generates a cipher bit. This combination is done by a function box which often is an XOR-operator.

The performance of an encryption system depends on randomness degree of key stream, used in encryption. So the key generator plays an important role in this way. Among different key generators, the random number generators based on Linear Feedback Shift Register (LFSR) and Cellular Automata (CA) have been known as prevalent ones.

An LFSR includes a shift register together with a set of XOR operators which combine the feedbacks extracted from the register cells. This model is defined by an n-degree polynomial which specifies the operators and feedbacks arrangements [2]. A sample of these generators has been shown in fig.1.

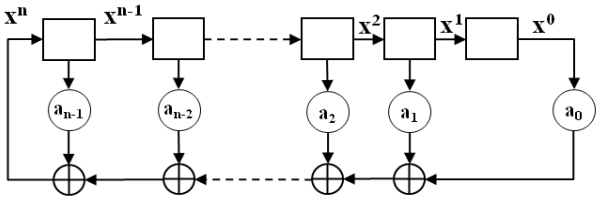


Fig. 1: A typical sample of LFSR

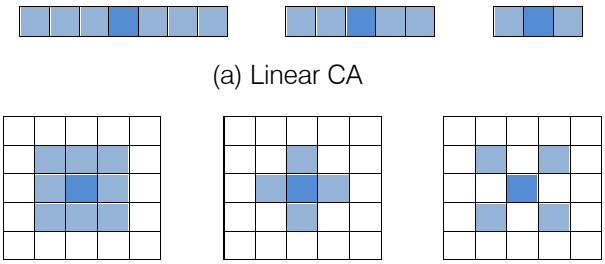
In some systems, a combination of LFSRs has been utilized for increasing the randomness of generated sequence. This requires applying nonlinear combination functions. The researches have indicated that utilizing linear CA provides an operation similar to LFSR [15,16,17,18]. In the other word, CA structures can be used in key producing, as a replacement for LFSR. Some experiments results have shown that CA is proper for producing random features in digital circuits and automatic control systems [17]. A desirable facet of CAs refers to independency between the sequence of generated bits and the states of neighbor cells. In this case, CA can be preferred compared to LFSR for stream ciphering. On the other hand, the main advantage of CA is that several generators designed as nonlinear combinations of LFSRs, when designing with CA, preserve linearity [20].

These mentioned advantages have been considered as the reasons to applying the CA as a Pseudo-Random sequence generator (PRSG). Really, the CA has an outstanding role in this area and is considered as an important tool for generating random sequences [3,6,7,8].

III. Key Generation

a) *Cellular Automata (CA)*

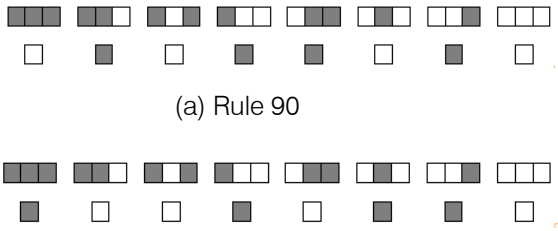
The concept of CA was introduced by Von Neumann and Ulam at 1950s, for the first time, and was considered by Wolfram, more extensively. The simple structure of CA has attracted the researchers in several different areas, such as implementing the computing tools and modeling the natural systems [9]. Each CA includes a set of simple elements called cells that each has a finite set of states, and interacts with its adjacent cells (neighborhood), locally. The next state of each specific cell is determined with a rule that is a function of current states of that cell and its neighbors. Fig. 2 shows some samples of neighborhood patterns [10]. Regarding a k-cell neighborhood, P=2k neighborhood patterns and thus 2P possible rules can be defined. Fig. 3 shows schematic diagrams for some possible rules operations, assuming k=3.



(a) Linear CA

(b) 2-Dim CA

Fig. 2: Some common neighborhood patterns for linear and 2-dim CA



(a) Rule 90

(b) Rule 150

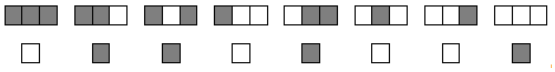
Fig. 3: Two common possible rules by considering neighborhood size k=3

b) *Pseudo-Random Sequence Generator (PRSG)*

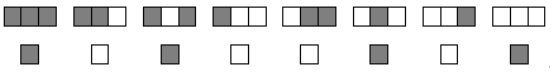
What is important in applying CA as a PRSG is selecting the rule set governing the cells such that the generated sequence provides a desirable level of randomness. Wolfram, for the first time, applied an uniform CA with k=3 neighborhood for encryption, at 1986. He used Rule 30 for all cells. His proposed model operated as a pseudo-random key stream generator for using in stream ciphering [18,21]. Afterward, other researchers showed that when using non-uniform CA, a higher level randomness is provided. For example, Habutsu et al. and Gutowitz and Nandi et al. used non-uniform CA with Rule 90 and Rule 150 for mentioned purpose and indicated that their generated key stream have a better quality than Wolfram's one [22,23].

Tomassini and Perrenoud proposed a linear CA with k=3 and the rule set {90,105,150,165} [24].

Schematic forms for Rule 105 and Rule 165 have been shown in fig.4.



(a) Rule 105



(b) Rule 165

Fig. 4: Schematic diagram for Rule 105 and Rule 165 for k=3

They used an evolutionary method called cell programming for searching optimal rules. This method is an evolutionary computational approach similar to diffusion model in parallel genetic algorithms. The entropy of generated sequence was used as a quality criterion for rules [24].

This paper has focused on using the learning capability of a Learning Cellular Automata for selecting a set of optimal rules for using in a CA-based PRSG.

c) Learning Cellular Automata (LCA)

The Learning Automata (LA) as another model of automata includes a finite automata which interacts with an environment. The automata have a finite set of actions that each can be selected with a specific selection probability. Such this model operates in two phases: Training phase and Testing phase. In the first one, some probabilities are assigned to automata actions, such that all of them sum to one. Then, in each step, the automata select an action randomly and based on probabilities. The environment receives the selected action and responses to it with a desirability or undesirability of selected action, by sending back a response to it. Then, by considering the received response, the automata reward the selected action or penalize it. Rewarding an action implies an increase in action selection probability for next steps and penalizing it includes decreasing this probability. The training phase continues until the probability of a special action approaches to one and thus is determined as optimal action [12,13]. A sample of LA interacting with an environment has been shown in fig. 5 [14].

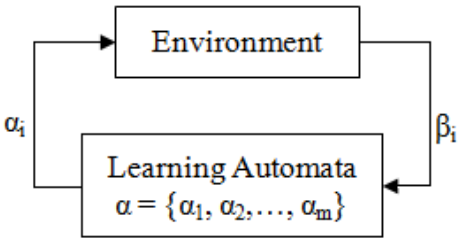


Fig. 5: An LA interacting with an environment

A set of LAs that in addition to interacting with the environment, have local interactions between themselves, form a Learning Cellular Automata (LCA). In such this structure, the desirability of selected action by each learning cell, is determined based on the states or selected actions by that cell and its neighbors. Updating all LAs is performed simultaneously; thus, the LCA has a parallel nature. A sample LCA has been shown in fig. 6, in which, each cell LAi selects an action denoted by Ai and the corresponding environment return a response denoted by Bi.

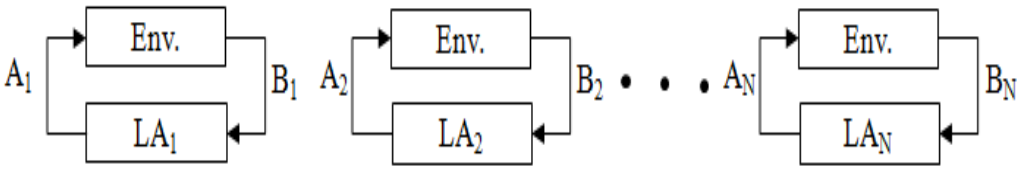


Fig. 6: The block diagram of an LCA

IV. The Proposed Model

The proposed method in this paper focuses on finding a configuration of rules governing on the cells of a CA that operates as a PRSG. In this way, an LCA with two types of environment has been considered.

Each cell of LCA interacts with a local environment and all cells have interactions with a global environment, simultaneously.

The proposed method can be explained in two stages. In the first one, by considering a uniform CA with k-cell neighborhood, selecting M best rules among all possible rules is regarded. In order to do this, two empty vectors named best_rules and best_cnt are defined to hold the best rules indices and their correspond statistics. Then M different configurations are imposed to the CA, one by one. By imposing each configuration ci, as the initial state of the CA, during 2P stages (P=2K, in which, K is the size of neighborhood), all possible rules are assigned to the CA cells, one after another. By assigning each rule Rj to all cells of the CA, N sequences with the length l, are generated during the CA operation. Then, the entropy values are calculated for all sequences, using the method described in [11] and based on Eq. (4).

$$E = -\sum_{i=0}^{n-1} p_i \log_2^{p_i} \quad (4)$$

The max, min and average entropy values for each rule assigned to CA are stored in three vectors, separately. When the entropy values for all rules were calculated, the rules with maximum values in three mentioned vectors are selected. If these three rules are same, and not be found in best_rules vector, the rule is added to the mentioned vector and its correspond counter is set to one in best_cnt. If the rule exists in the best_rules, already, its counter is increased by one.

This process is performed for M times and finally two mentioned vectors will contain best rules and the counters which indicate the number of times that each rule has been identified as the best rule. Among all best_rules members, m ones with top counter values are selected to be used for the next stage. This process has been shown in fig. 7 by a flowchart.

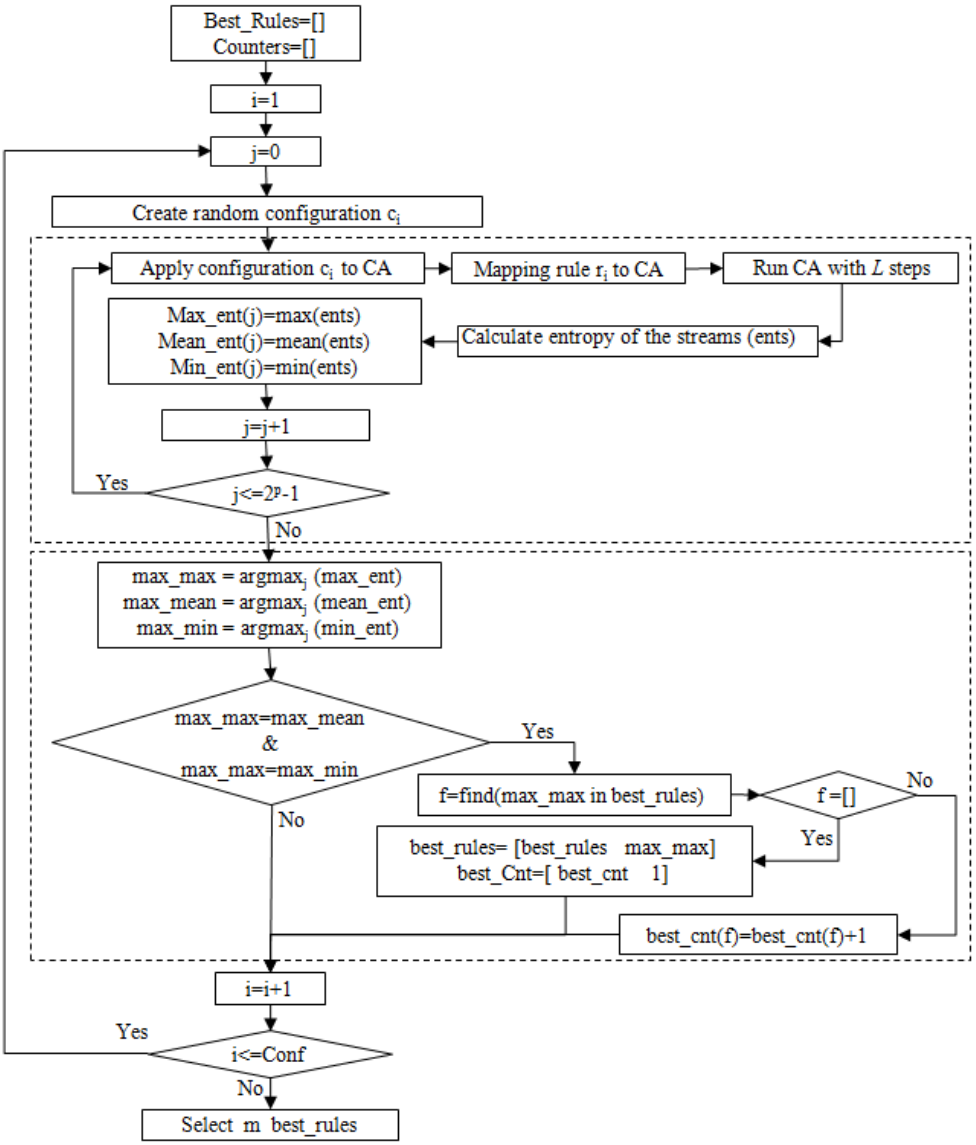


Fig. 7: The flowchart for selecting m best rules

In the second stage, the main part of proposed model is considered. This is an LCA that each of its cells can select an action among m different actions. Each action corresponds to a rule in best rules set which has been obtained in previous stage. Each cell interacts with a local environment which receives sequences from the current cell, and its neighbor cells, and returns a response to the cell. Also, a global environment interacts with all cells and returns a response based on the sequences generated by all LCA cells.

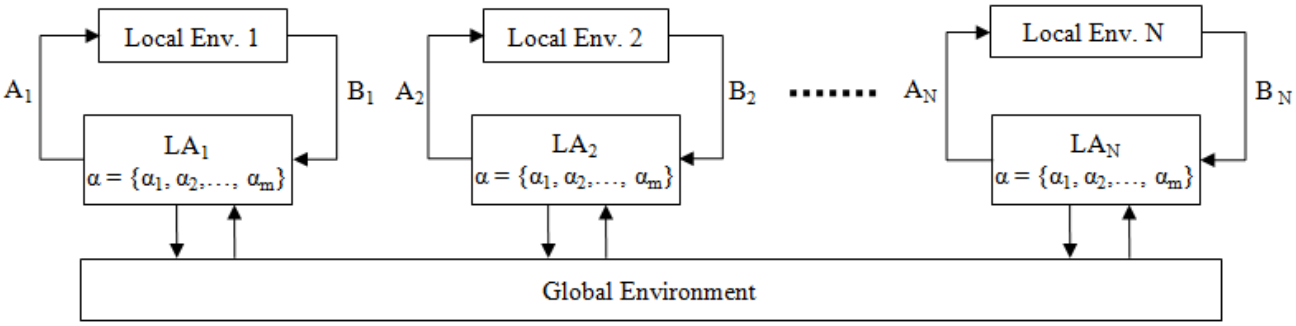


Fig. 8: The schematic diagram of proposed model

This stage includes an initial phase in which a probability value is assigned to each action, initially. Then, in the training phase, all cells of LCA select actions, simultaneously. The selected action by each cell is considered as its rule, and all cells will generate l-length sequences with using that rules and through l operation step. The generated sequences by each cell and its neighbor cells (its r-1 left and right cells) are passed to the local environment and the entropy values will be calculated for these sequences. Then, by considering an r-cell neighborhood for evaluating the quality of generated sequences, each local environment compares the calculated entropy values and if this entropy is maximum value among all r entropy values, returns a response as zero or returns one, otherwise.

Each learning cell rewards its selected action, if receive a zero as the local environment response; otherwise, it penalizes the selected action. After imposing rewards or penalties by all cells, all generated sequences are passed to the global environment.

This environment calculates all entropy values and the max, min and mean values for them. These values are compared with their previous values and if an improvement is detected, a response as 0 will be passed back to each LA.

In this case, each cell will impose a reward to its selected action. The training phase will be continue as described, until the actions probabilities in all cells reach a steady state. A flowchart describing each LA operation interacting with environments has been shown in fig. 9.

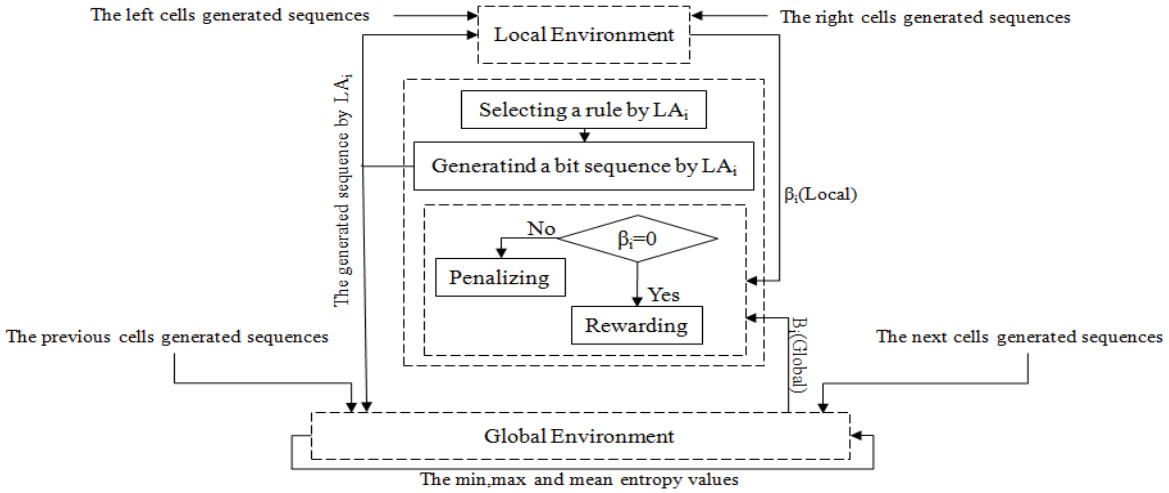


Fig. 9: The schematic diagram of each LCA cell interacting with local and global environments

V. Experiments Results

For evaluating the proposed model, a CA with the size N=50 and a neighborhood size, k=3, was considered and by applying 100 different initial configurations, m=10 top rules among 256 possible rules were selected (based on l=100 bits length sequences). A bar diagram for best rules found during these 100 configuration imposing has been shown in fig. 10.

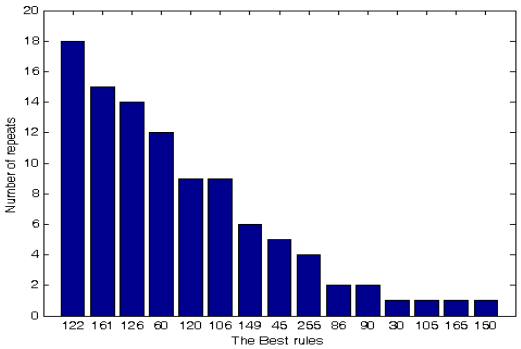


Fig. 10: The bar diagram for best rules repetitions

The 10 selected rules were assigned as the actions of each cells in a LCA with N=32 cells and initial probability values as 0.1 were considered for them. The initial configuration of LCA states was determined by a N=32 bits vector. Also, the neighborhood size considered for next state calculation in each cell was selected as k=3. Afterward, multiple experiments were done.

In the first one, the effect of learning neighborhood on the entropy values has been considered. For this purpose, after entering the training phase, each cell selects an action randomly and based on exist probabilities and then, all cells start generating pseudo-random sequences. The local environments, by considering r as the neighborhood size in evaluating each cell performance, calculates entropy values and produces a response as zero or one for each cell. Then the global environment, regarding all entropy values returns a response. This experiment was performed for r=3 and r=5 and its results have been reported in table(1).

Table 1: The effect of Learning Neighborhood on entropy values

Neighborhood	Entropy		
	Mean	Min	Max
r=3	3.8487	3.6998	3.9205
r=5	3.9899	3.9889	3.9902

In the second experiment, the effect of learning neighborhood on the number of required train steps has been regarded.

In order to this, the above experiment has been repeated for 10 different initial configurations and for r=3 and r=5. The results have been reported in Table (2).

Table 2: The effect of Learning Neighborhood on training steps number

Neighborhood	1	2	3	4	5	6	7	8	9	10
r=3	137	168	133	126	145	87	124	130	153	137
r=5	132	15	177	108	136	199	138	178	172	137

The FIPS-140-2 experiments include statistics tests defined by National Institute of Standard and Technology (NIST) in USA for evaluating encryption processes and random number generators. These include 4 parts: Frequency (Monobit) Test, Poker Test, Runs Test and Long Runs Test. So, in other experiment, mentioned tests have been applied for evaluating the key streams generated by Non-uniform LCA model presented in this paper. The results for 20000 bits key stream and for neighborhood sizes r=3 and r=5 have been reported in Table (3).

Table 3: The results for FIPS-140-2 Tests on generated key streams by proposed model

Test	r=3	r=5	Permitted Values
	Result	Result	
Monobit	Ok	Ok	9725<X<10275
Poker	Ok	Ok	2.16 < X<46.17
Runs	Ok	Ok	Refer to Table (2)
Long runs	Ok	Ok	a run length ≥26

Table 4: Standard values for Runs Test

Required Interval	Length of Run
2,343 – 2,657	1
1,135 – 1,365	2
542 – 708	3
251 – 373	4
111 – 201	5
111 – 201	6

Table 5: The results of proposed model compared with previous models

Model	Proposed Model	Szaban Model	Tomassini Model	Wolfram model
Max Entropy	3.9902	3.9903	3.9902	3.9905
Min Entropy	3.9889	3.9888	3.9885	3.9882
Mean Entropy	3.9899	3.9894	3.9894	3.9894
Monobit Test	Ok	Ok	Ok	Ok
Poker Test	Ok	Ok	Ok	Ok
Runs Test	Ok	Ok	Ok	Ok
Long Runs Test	Ok	Ok	Ok	Ok

VI. Conclusion

The proposed model in this paper, has considered a LCA for determining optimal rules used by a pseudo-random key stream generator based on CA. On this way, parallel operation by LCA cells has a significant effect on optimal rules determination speed. Also, the number of training steps, considerably, affects the convergence ratio in cells. For evaluating the key stream generated by proposed model, a set of standard tests (FIPS-140-2) have been applied that evaluate its randomness property. A 20000-bit stream produced by proposed model has passed all tests defined in mentioned standard. Also, the obtained results for proposed model, in compare with previous models have been summarized in table (5).

References Références Referencias

1. Schneier, B., (1996), Applied cryptography, Second Edition, John Wiley and sons.
2. Lai, C. & Saskatchewan, R., (Aug 2000), High-Speed Cellular Automata based block cipher and fault tolerant public key cryptosystems, Thesis, computer science ,Regina ,Canada.
3. Seredynski, F. & Bouvry, P. & Zomaya, A. & (2004), Cellular automata computations and secret key cryptography, Published by Elsevier B.V.
4. Golomb, S., (1982), Shift- Register Sequences (revised edition), Aegean Press.
5. F´uster-Sabater, A. & Caballero-Gil, P., (Sept 2006), On the Use of Cellular Automata in Symmetric Cryptography, Volume 93, Numbers 1-3, pp. 215-236, Springer.
6. Bardell, P. H., (1990), Analysis of Cellular Automata used as Pseudo-Random Pattern Generators, In International Test Conference, pages 762-768.
7. Kari, J., (2005), Theory of cellular automata: A survey, Theoretical Computer Science, Vol. 334, No. 3, pp. 3 - 33.
8. Fúster-Sabater, A. & Caballero-Gil P., (2009), Synthesis of Cryptographic Interleaved Sequences by Means of Linear Cellular Automata, Applied Mathematics Letters, Vol. 22, No. 10, pp. 1518-1524.
9. Neumann, J. V., (1966), The Theory of Self Reproducing Automata, A. W. Burks (ed), Univ. of Illinois Press, Urbana and London.
10. Ganguly, N. & Sikdar, B. & Deutsch, A. & Canright, G., & Chaudhuri, P. ,(2003), A Survey on Cellular Automata, Centre for High Performance Computing, Dresden University of Technology, Dresden, Germany.
11. Szaban, M. & Seredynski, F. & Bouvry ,P., (2006), Evolving Collective Behavior of Cellular Automata for Cryptography, IEEE MELECON May 16-19, Benalmadena (Malaga), Spain.
12. Beigy, H.& Meybodi, M. R., (2004), A Mathematical Framework for Cellular Learning Automata, Advanced in Complex Systems,to Appear,vol 7,pp.295-319.
13. Narendra, K. S. & Thathachar, M. A. L., (1989), Learning Automata: An Introduction, Prentice Hall.
14. Kumpati S.& Narendra K. S. & Thathachar M. A. L., (July 1974), Learning Automata A Survey, IEEE Transactions on Systems, Man, And Cybernetics ,Vol. Smc-4, No. 4.
15. Bao, F., (2003), Crytanalysis of a New Cellular Automata Cryptosystem, 8th Australasian Conference on Information Security and Privacy-ACISP, Lecture Notes in Computer Science, Springer Verlag 2727 .416- 427.
16. Blackburn, S.& Merphy, S.& Paterson, K., (1997), Theory and Applications of Cellular Automata in Cryptography, IEEE Transactions on Computers 46, 637- 638.
17. Nandi, S.& Kar, B.K.& Chaudhuri, P.P., (1994), Theory and Applications of Cellular Automata in Cryptography, IEEE Transactions on Computers 43,1346- 1357.
18. Wolfram, S., (1994), Cryptography with Cellular Automata, Advances in Cryptology-CRYPTO'85. Lecture Notes in Computer Science, Springer Verlag 218 , 22- 39.
19. Cho, S.& Un-Sook C.& Yoon- Hee, H., (2004), Computing Phase Shifts of Maximum-Length 90/150 Cellular Automata Sequences, Proc. of ACRI 2004. Lecture Notes on Computer Science, Springer Verlag, 3305, 31- 39.
20. Serra, M. & Slater, T., Muzio J. ,Miller, D.M., (1990), The Analysis of One dimensional Linear Cellular Automata and Their Aliasing Properties, IEEE Transactions on Computer- Aided Design of Integrated Circuits and Systems 9 (7),767- 778.
21. Wolfram, S., (2002), A new kind of science, Champaign, IL: Wolfram Media,pp.29-30,52,59,317 and p.871.
22. Diaz Len, R.& Hernandez Encinas, A.& Hernandez Encinas, L.& Hoya White, S. & Martin Del Rey, A. & Rodriguez, G.& Visus Ruiz, I., (2001), Wolfram Cellular Automata And Their Cryptographic Use As Pseudorandom Bits Generators, Memoria Samuel Solorzano Barruso Foundation (Spain) and Ministerio de Ciencia y Tecnologia (Spain) under grant TIC2001-0586.
23. Habutsu, T. et al., (1991), A Secret Key Cryptography By Iterating Chaotic Map, Proc. of Eurocrypt_91, pp. 127-140.
24. Tomassini, M.& Perrenoud, M. , (2000), Stream Cipher With One And Two Dimensional Cellular Automata, in M. Schoenauer et al. Eds.) Parallel Problem Solving from Nature - PPSN VI, LNCS 1917, Springer, pp. 722-731.

This page is intentionally left blank

Global Journal of Computer Science and Technology
Volume 12 Issue 8 Version 1.0 April 2012
Type: Double Blind Peer Reviewed International Research Journal
Publisher: Global Journals Inc. (USA)
Online ISSN: 0975-4172 & Print ISSN: 0975-4350

Curvelets with New Quantizer for Image Compression

By G.Jagadeeswar Reddy, T.Jayachandraprasad, M.N.Giriprasad, M. Madhavi Latha & T. Satya Savithri
EVMCET, Narasaraopet Guntur, AP, INDIA

Abstract - This paper emphasizes on designing of a novice quantizer that is more suitable for compressing images through curvelet transform. This compression algorithm is tested on various images like plain, textured and building images. The results are compared with the existing techniques like curvelet with existing quatizer, wavelet with existing quantizer and wavelet with proposed quantzer. The proposed algorithm "curvelets with proposed quantizer" outperforms the existing techniques. The performance is evaluated through visual clarity , Peak Signal to Noise Ratio (PSNR) and compression metrics such as Compression ratio and Bit-rate.

Keywords : *Quantizer, Compression ratio, Bit-rate, curvelet, wavelet.*

GJCST Classification: *I.4.2*

Strictly as per the compliance and regulations of:

Curvelets with New Quantizer for Image Compression

G.Jagadeeswar Reddy [α], T.Jayachandraprasad [σ], M.N.Giriprasad [ρ], M. Madhavi Latha [ω] & T. Satya Savithri[¥]

Abstract - This paper emphasizes on designing of a novice quantizer that is more suitable for compressing images through curvelet transform. This compression algorithm is tested on various images like plain, textured and building images. The results are compared with the existing techniques like curvelet with existing quatizer, wavelet with existing quantizer and wavelet with proposed quantzer. The proposed algorithm "curvelets with proposed quantizer" outperforms the existing techniques. The performance is evaluated through visual clarity , Peak Signal to Noise Ratio (PSNR) and compression metrics such as Compression ratio and Bit-rate.

Keywords: Quantizer, Compression ratio, Bit-rate, curvelet, wavelet.

I. Introduction

Past few years have produced abundant results in compression techniques for images because they are being used widely in internet technologies etc. So far wavelet based compression of digital signals and images is a topic of interest. Throughout the scientific and engineering disciplines many hundreds of papers published [1-8] in journals, in which a wide range of tools and ideas have been proposed and studied. The major drawback associated with wavelet based techniques are their inability to capture geometry of two dimensional edges, though they have proven their worth in number of fields. Hence, the field of image processing requiers a true 2-dimensional transform that can efficiently handle the intrinsic geometrical structure which is the key in visual information.

Candes and Donoho [9] developed a new multi-scale transform which is called as the curvelet transform . It was the first proposed in the context of objects $f(x_1 ; x_2)$ defined on the continuum plane $(x_1,x_2)\hat{I}R_2$, which is Motivated by the needs of image analysis. The new transform is believed to capture image information more efficiently than the wavelet transform by giving basis elements in addition to having the qualities of wavelet. Basis functions in curvelets are with variety of elongated shapes with different aspect ratios and are oriented at variety of directions. In particular, it has been designed for representing edges and other singularities along curves efficiently compared to traditional transforms, i.e. using very few coefficients for a given accuracy of reconstruction. Approximately for representing an edge to squared error 1/N requires 1/N wavelets and only about $1/\sqrt{N}$ curvelets.

In this paper practical implementations of proposed compression method is focused. The next section discusses the quantizer design for proposed compression method, section 3 demonstrates the algorithm of new compression technique and section 4 explains the simulation results. Finally, the superiority of proposed technique over existing methods is demonstrated using PSNR and compression metrics.

II. Quantizer Design and Coding

The uniform quantizer is the most commonly used scalar quantizer for transform based image compression due to its simplicity. It is also known as a linear quantizer since its staircase input-output response lies along a straight line(with a unit slope). Two commonly used linear staircase quantizers are the midtread and the midrise quantizers.

a) Existing Quantizer

From MATLAB tool box, it is observed that the quantizer is defined as:

y=Q _T(x)

where: Q _T(x) = 0 , if |x|<T

Q _T(x) = sgn(x) * [x/T], otherwise (1)

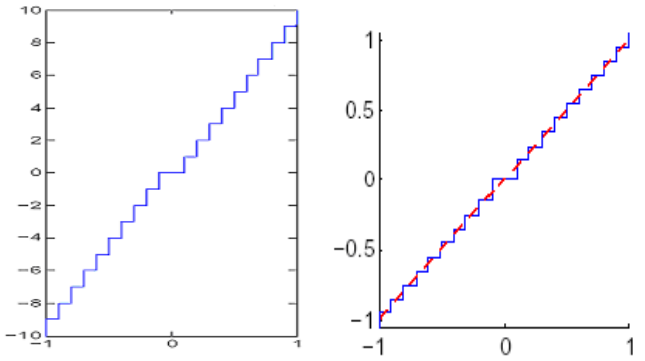
The input values for quantizer are created with evenly spacing and bin size(T) is assumed as 0.1. The quantization curve is as shown in Fig. 1(a). From the quantization curve, it can be said that the above quantizer is midtread.

For decompression, de-quantized values are computed using the following equation.

$$Dq=sgn(Q) * (abs(Q)+0.5)*T \quad (2)$$

Where Q are quantizer output values and Dq are de-quantized values. In the above equation 0.5 is chosen to get the de-quantized values at the mid-point of each quantization bin. De-quantized real values are shown in Fig. 1(b).

Author α : Ece Dept., Evmcet, Narasaraopet-522601, Guntur, Ap, India. Email: Jagsuni@Yahoo.Com
Author σ : Ece Dept., Rgmcet, Nandyal-518502, Kurnool, Ap, India. Email:Jp.Talari@Gmail.Com
Author ρ : Ece Dept., Jntuce, Pulivendula-515002, Ap, India. Email:Mahendran_Gp@Rediffmail.Com
Author ω : Ece Dept., Jntuh, Hyderabad- 500085, A.P, India. Email: Mlmakkena@Yahoo.Com
Author ¥ : Ece Dept., Jntuh, Hyderabad- 500085, A.P, India. Email: Tirumalasatya@Rediff.Com



(a) (b)

Fig. 1: Existing Quantizer (a) Quantization curve (b) De-quantized values

It is known that the subinterval size of the midtread quantizer is larger than the midrise quantizer. Hence for the uniformly distributed input, the average quantization error of the midtread quantizer is larger than that of midrise quantizer.

b) Proposed Quantizer

The two constraints to be considered while designing quantizer are as follows:

1. Quantizer must have average quantization error as low as possible.
2. De-quantized values must be exactly at the mid-point of each quantization bin.

Since the source considered for compression application is uniformly distributed, midrise quantizer is preferred, which satisfies the first constraint.

To obtain the midrise quatizer and to satisfy second constraint, the midtread quantizer equations are restructured as:

y=Q _T(x)
where: Q _T(x) = 0 , if |x|<T
Q _T(x) = sgn(x) * ([x/T]+K)*T, otherwise (3)

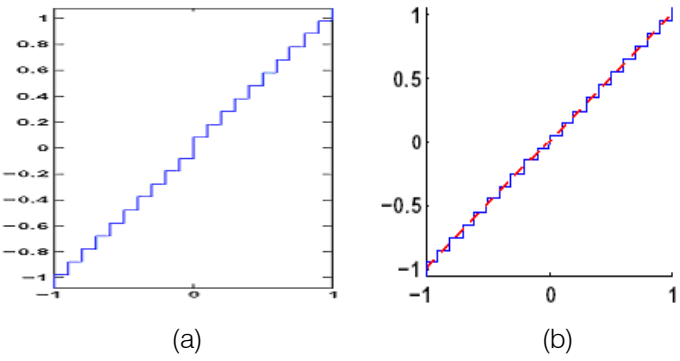
The input values for quantizer are created with evenly spacing and bin size(T) is assumed as 0.1.
Here K is a constant.

For decompression, de-quantized equation is modified as:

$$Dq=sgn(Q) * ([abs(Q)/T]-M)*T \quad (4)$$

Where Q are quantizer output values, Dq are de-quantized values and M is a constant.

The above equations are tested for different values of K and M. Finally for K=0.8 and M=0.3 the quantization and de-quantizion curves are efficient and the de-quantized values are exactly at the mid-point of each quantization bin as shown in Fig. 2.



(a) (b)

Fig. 2: Proposed Quantizer with K=0.8 and M=0.3 (a) Quantization curve (b) De-quantized values

The quantization curve resembles midrise quantizer. Hence the proposed quantizer suits for the assumed uniformly distributed source, whose quantization equation becomes as:

y=Q _T(x)
Q _T(x) = 0, if |x|<T
Q _T(x) = sgn(x) * ([x/T]+0.8)*T, otherwise (5)

and the de-quantization equation as:

$$Dq=sgn(Q) * ([abs(Q)/T]-0.3)*T \quad (6)$$

Where Q are quantizer output values and Dq are de-quantized values.

The purpose of an entropy encoder (symbol encoder) is to reduce the number of bits required to represent each symbol at the quantizer output. For simplicity one of the entropy encoding technique i.e. an arithmetic coding, which is an integral part of MATLAB tool box has been used to serve the purpose.

III. The Algorithm

The following steps are involved in the compression algorithm of Curvelet Transform.

1. Read input image *f*.
2. Apply the 2D FFT and obtain Fourier samples $\hat{f}[n_1,n_2], -n/2 \le n_1,n_2 < n/2$.
3. For each scale j and angle l, form the product, $\tilde{U}_{j,l}[n_1,n_2]\hat{f}[n_1,n_2]$
4. Wrap this product around the origin and obtain, $\tilde{f}_{j,l}[n_1,n_2] = W(\tilde{U}_{j,l}\hat{f})[n_1,n_2]$, where the range for n_1 and n_2 is now $0 \le n_1 < L_{1,j}$ and $0 \le n_2 < L_{2,j}$ (for θ in the range $(-\pi/4, \pi/4)$)
5. Apply the inverse 2D FFT to each $\tilde{f}_{j,l}$, hence collecting the discrete coefficients $c^D(j,l,k)$.
6. Quantize the coefficients with the proposed quantizer.
7. Entropy code the quantizer outputs.
8. Apply inverse operations to the result of step 7.

Based on the algorithm stated above, a compression technique has been developed for images of different sizes, which is tested using Curvlab[10] and MATLAB tools. The algorithm developed is working to a satisfaction and results are encouraging in case of curvelets. The performance of the algorithm is evaluated using the following metrics and index

$$Compression \quad ratio(\%) = \frac{Output \quad file \quad size(bytes)}{Input \quad file \quad size(bytes)} \tag{7}$$

$$Rate(bpp) \quad = \frac{8*(Output \quad file \quad size(bytes))}{Input \quad file \quad size(bytes)} \tag{8}$$

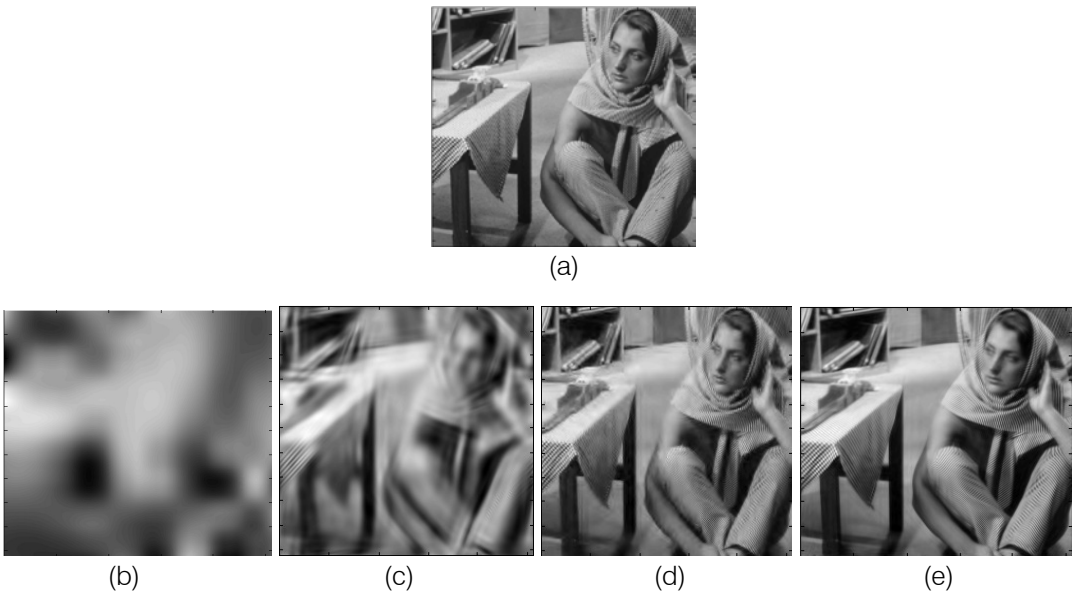
$$psnr = 10\log 10 \frac{M_1 \times M_2 \times \max(f(i,j))^2}{\sum_{i=1}^{M_1}\sum_{j=1}^{M_2}[f(i,j) - f'(i,j)]^2} dB \tag{9}$$

where M_1 and M_2 are the size of the image. $f(i, j)$ is the original image, $f(i, j)$ is the decompressed image.

IV. Results and Discussion

In the simulation, the proposed algorithm is tested on various images like plain (Barbara), Building and Textured images. The results are presented in Figs. 3 to 5 and in Table 1. The results indicate that there exists a qualitative difference between the methods considered for compression and reconstruction of image under test. The following observations are made from the results.

1. The curvelet with proposed quantizer algorithm enjoys superior compression ratio over wavelet with existing quantizer, curvelet with existing and wavelet with proposedquantizer algorithms. The performance is judged mainly through visual clarity and through PSNR.
2. The curvelet with proposed quantizer reconstruction displays higher sensitivity even at higher compression ratios.
3. In case of plain (Barbara) image the curvelet with proposed quantizer performs better at all compression ratios compared to other algorithms. When it is tested on Building and Textured images at low compression ratios curvelet with existing quantizer performs better compared to other algorithms, but at higher compression ratios curvelet with proposed quantizer outperforms the other algorithms irrespective of image.



(a) (b) (c) (d) (e)

Fig. 3: Barbara image for compression ratio of 1:20 (a) Original image (b) Wavelet with existing quantizer (c) Curvelet with existing quantizer (d) Wavelet with proposed quantizer (e) Curvelet with proposed quantizer

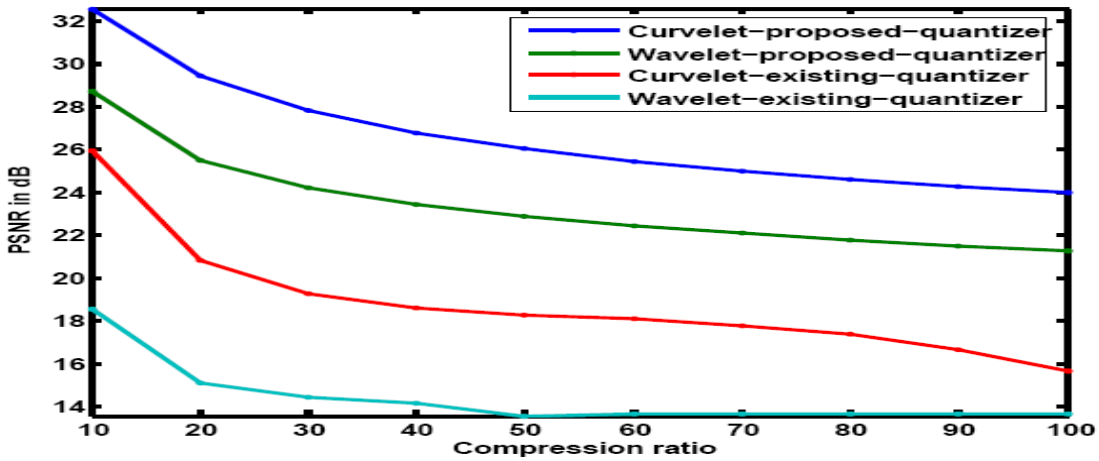


Fig. 4: PSNR Vs Compression ratio corresponding to Wavelet with existing quantizer, Curvelet with existing quantizer, Wavelet with proposed quantizer and Curvelet with proposed quantizer for Barbara image

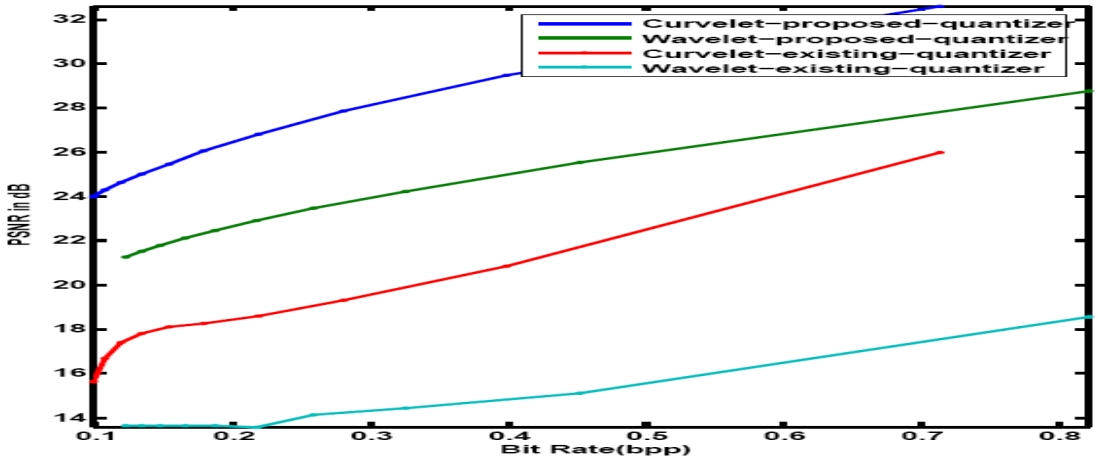


Fig. 5: Bit rate Vs PSNR corresponding to Wavelet with existing quantizer, Curvelet with existing quantizer, Wavelet with proposed quantizer and Curvelet with proposed quantizer for Barbara image

Table 1: PSNR Vs Compression ratio for various algorithms w.r.t. Barbara image

S.No	Compression ratio	PSNR in dB(Barbara image)			
		Wavelet With existing quantizer	Curvelet With existing quantizer	Wavelet With proposed quanizer	Curvelet With proposed quantizer
1	10	18.5611	25.9800	28.7499	32.6106
2	20	15.0924	20.8571	25.5371	29.4896
3	30	14.4269	19.2967	24.2425	27.8719
4	40	14.1493	18.6013	23.4729	26.8112
5	50	13.5877	18.2636	22.9075	26.0476
6	60	13.6517	18.1034	22.4776	25.4763
7	70	13.6520	17.8048	22.1051	25.0048
8	80	13.6514	17.4066	21.7726	24.6282
9	90	13.6510	16.6934	21.5213	24.2929
10	100	13.6500	15.6489	21.2750	24.0100

V. Conclusion

In this paper practical implementations of proposed compression method is focused, tested on various types of images and it is proved that curvelet with proposed compression algorithm outperforms the existing techniques even at higher compression ratios.

References Références Referencias

1. F.G.Meyer and R.R. Coifman. "Brushlets: a tool for directional image analysis and image compression," Applied and Computational Harmonic Analysis, pp.147-187;1997.
2. Colm Mulcahy, Ph.D., "Image compression using the Haar wavelet transform" Spelman Science and Math journal, pp:22-31.
3. J. Rissanen, "Stochastic Complexity in Statistical Inquiry," World Scientific, 189.
4. G.J. Sullivan, "Efficient Scalar Quantization of Exponential and Laplacian Random Variables," IEEE Trans. On Information theory, vol.42, no.5, pp.1365-1374; Sept 1996.
5. M.N.Do and M.Vetterli, "Orthonormal finite ridgelet transform for image compression," in proc.IEEE Int. Conf. Image Processing (ICIP); sept.2000.
6. Pat Yip, "The Transform and Data Compression Handbook", CRC Press ; sept. 2000.
7. M.L.Hilton "Compressing still and Moving Images with wavelets", Multimedia systems, vol2,no3;1994.
8. Anil K. Jain, "Fundamentals of Digital Image Processing", Prentice Hall; 2000.
9. E.J. Candes and D.L. Donoho, "Curvelets." Manuscript. http: //www.stat.stanford.edu/~ donoho/ Reports/1998/curvelets.zip; 1999.
10. Candes, E., Demanet, L.,Donoho, D. and Ying, L. "Fast Discrete Curvelet Transforms," Applied and Comp.Math., Caltech; July 2005.

Global Journals Inc. (US) Guidelines Handbook 2012

www.GlobalJournals.org

FELLOW OF ASSOCIATION OF RESEARCH SOCIETY IN COMPUTING (FARSC)

- 'FARSC' title will be awarded to the person after approval of Editor-in-Chief and Editorial Board. The title 'FARSC" can be added to name in the following manner. eg. **Dr. John E. Hall, Ph.D., FARSC or William Walldroff Ph. D., M.S., FARSC**
- Being FARSC is a respectful honor. It authenticates your research activities. After becoming FARSC, you can use 'FARSC' title as you use your degree in suffix of your name. This will definitely will enhance and add up your name. You can use it on your Career Counseling Materials/CV/Resume/Visiting Card/Name Plate etc.
- 60% Discount will be provided to FARSC members for publishing research papers in Global Journals Inc., if our Editorial Board and Peer Reviewers accept the paper. For the life time, if you are author/co-author of any paper bill sent to you will automatically be discounted one by 60%
- FARSC will be given a renowned, secure, free professional email address with 100 GB of space eg.johnhall@globaljournals.org. You will be facilitated with Webmail, Spam Assassin, Email Forwarders, Auto-Responders, Email Delivery Route tracing, etc.
- FARSC member is eligible to become paid peer reviewer at Global Journals Inc. to earn up to 15% of realized author charges taken from author of respective paper. After reviewing 5 or more papers you can request to transfer the amount to your bank account or to your PayPal account.
- Eg. If we had taken 420 USD from author, we can send 63 USD to your account.
- FARSC member can apply for free approval, grading and certification of some of their Educational and Institutional Degrees from Global Journals Inc. (US) and Open Association of Research, Society U.S.A.
- After you are FARSC. You can send us scanned copy of all of your documents. We will verify, grade and certify them within a month. It will be based on your academic records, quality of research papers published by you, and 50 more criteria. This is beneficial for your job interviews as recruiting organization need not just rely on you for authenticity and your unknown qualities, you would have authentic ranks of all of your documents. Our scale is unique worldwide.
- FARSC member can proceed to get benefits of free research podcasting in Global Research Radio with their research documents, slides and online movies.
- After your publication anywhere in the world, you can upload you research paper with your recorded voice or you can use our professional RJs to record your paper their voice. We can also stream your conference videos and display your slides online.
- FARSC will be eligible for free application of Standardization of their Researches by Open Scientific Standards. Standardization is next step and level after publishing in a journal. A team of research and professional will work with you to take your research to its next level, which is worldwide open standardization.

- FARSC is eligible to earn from their researches: While publishing his paper with Global Journals Inc. (US), FARSC can decide whether he/she would like to publish his/her research in closed manner. When readers will buy that individual research paper for reading, 80% of its earning by Global Journals Inc. (US) will be transferred to FARSC member's bank account after certain threshold balance. There is no time limit for collection. FARSC member can decide its price and we can help in decision.

MEMBER OF ASSOCIATION OF RESEARCH SOCIETY IN COMPUTING (MARSC)

- 'MARSC' title will be awarded to the person after approval of Editor-in-Chief and Editorial Board. The title 'MARSC" can be added to name in the following manner. eg. Dr. John E. Hall, Ph.D., MARSC or William Walldroff Ph. D., M.S., MARSC
- Being MARSC is a respectful honor. It authenticates your research activities. After becoming MARSC, you can use 'MARSC' title as you use your degree in suffix of your name. This will definitely will enhance and add up your name. You can use it on your Career Counseling Materials/CV/Resume/Visiting Card/Name Plate etc.
- 40% Discount will be provided to MARSC members for publishing research papers in Global Journals Inc., if our Editorial Board and Peer Reviewers accept the paper. For the life time, if you are author/co-author of any paper bill sent to you will automatically be discounted one by 60%
- MARSC will be given a renowned, secure, free professional email address with 30 GB of space eg.johnhall@globaljournals.org. You will be facilitated with Webmail, Spam Assassin, Email Forwarders, Auto-Responders, Email Delivery Route tracing, etc.
- MARSC member is eligible to become paid peer reviewer at Global Journals Inc. to earn up to 10% of realized author charges taken from author of respective paper. After reviewing 5 or more papers you can request to transfer the amount to your bank account or to your PayPal account.
- MARSC member can apply for free approval, grading and certification of some of their Educational and Institutional Degrees from Global Journals Inc. (US) and Open Association of Research, Society U.S.A.
- MARSC is eligible to earn from their researches: While publishing his paper with Global Journals Inc. (US), MARSC can decide whether he/she would like to publish his/her research in closed manner. When readers will buy that individual research paper for reading, 40% of its earning by Global Journals Inc. (US) will be transferred to MARSC member's bank account after certain threshold balance. There is no time limit for collection. MARSC member can decide its price and we can help in decision.

AUXILIARY MEMBERSHIPS

ANNUAL MEMBER

- Annual Member will be authorized to receive e-Journal GJMBR for one year (subscription for one year).
- The member will be allotted free 1 GB Web-space along with subDomain to contribute and participate in our activities.
- A professional email address will be allotted free 500 MB email space.

PAPER PUBLICATION

- The members can publish paper once. The paper will be sent to two-peer reviewer. The paper will be published after the acceptance of peer reviewers and Editorial Board.

Process of submission of Research Paper

The Area or field of specialization may or may not be of any category as mentioned in 'Scope of Journal' menu of the GlobalJournals.org website. There are 37 Research Journal categorized with Six parental Journals GJCST, GJMR, GJRE, GJMBR, GJSFR, GJHSS. For Authors should prefer the mentioned categories. There are three widely used systems UDC, DDC and LCC. The details are available as 'Knowledge Abstract' at Home page. The major advantage of this coding is that, the research work will be exposed to and shared with all over the world as we are being abstracted and indexed worldwide.

The paper should be in proper format. The format can be downloaded from first page of 'Author Guideline' Menu. The Author is expected to follow the general rules as mentioned in this menu. The paper should be written in MS-Word Format (*.DOC,*.DOCX).

The Author can submit the paper either online or offline. The authors should prefer online submission.Online Submission: There are three ways to submit your paper:

(A) (I) First, register yourself using top right corner of Home page then Login. If you are already registered, then login using your username and password.

(II) Choose corresponding Journal.

(III) Click 'Submit Manuscript'. Fill required information and Upload the paper.

(B) If you are using Internet Explorer, then Direct Submission through Homepage is also available.

(C) If these two are not convenient, and then email the paper directly to dean@globaljournals.org.

Offline Submission: Author can send the typed form of paper by Post. However, online submission should be preferred.

Preferred Author Guidelines

MANUSCRIPT STYLE INSTRUCTION (Must be strictly followed)

Page Size: 8.27" X 11'"

- Left Margin: 0.65
- Right Margin: 0.65
- Top Margin: 0.75
- Bottom Margin: 0.75
- Font type of all text should be Swis 721 Lt BT.
- Paper Title should be of Font Size 24 with one Column section.
- Author Name in Font Size of 11 with one column as of Title.
- Abstract Font size of 9 Bold, "Abstract" word in Italic Bold.
- Main Text: Font size 10 with justified two columns section
- Two Column with Equal Column with of 3.38 and Gaping of .2
- First Character must be three lines Drop capped.
- Paragraph before Spacing of 1 pt and After of 0 pt.
- Line Spacing of 1 pt
- Large Images must be in One Column
- Numbering of First Main Headings (Heading 1) must be in Roman Letters, Capital Letter, and Font Size of 10.
- Numbering of Second Main Headings (Heading 2) must be in Alphabets, Italic, and Font Size of 10.

You can use your own standard format also.
Author Guidelines:

1. General,

2. Ethical Guidelines,

3. Submission of Manuscripts,

4. Manuscript's Category,

5. Structure and Format of Manuscript,

6. After Acceptance.

1. GENERAL

Before submitting your research paper, one is advised to go through the details as mentioned in following heads. It will be beneficial, while peer reviewer justify your paper for publication.

Scope

The Global Journals Inc. (US) welcome the submission of original paper, review paper, survey article relevant to the all the streams of Philosophy and knowledge. The Global Journals Inc. (US) is parental platform for Global Journal of Computer Science and Technology, Researches in Engineering, Medical Research, Science Frontier Research, Human Social Science, Management, and Business organization. The choice of specific field can be done otherwise as following in Abstracting and Indexing Page on this Website. As the all Global

Journals Inc. (US) are being abstracted and indexed (in process) by most of the reputed organizations. Topics of only narrow interest will not be accepted unless they have wider potential or consequences.

2. ETHICAL GUIDELINES

Authors should follow the ethical guidelines as mentioned below for publication of research paper and research activities.

Papers are accepted on strict understanding that the material in whole or in part has not been, nor is being, considered for publication elsewhere. If the paper once accepted by Global Journals Inc. (US) and Editorial Board, will become the copyright of the Global Journals Inc. (US).

Authorship: The authors and coauthors should have active contribution to conception design, analysis and interpretation of findings. They should critically review the contents and drafting of the paper. All should approve the final version of the paper before submission

The Global Journals Inc. (US) follows the definition of authorship set up by the Global Academy of Research and Development. According to the Global Academy of R&D authorship, criteria must be based on:

1) Substantial contributions to conception and acquisition of data, analysis and interpretation of the findings.

2) Drafting the paper and revising it critically regarding important academic content.

3) Final approval of the version of the paper to be published.

All authors should have been credited according to their appropriate contribution in research activity and preparing paper. Contributors who do not match the criteria as authors may be mentioned under Acknowledgement.

Acknowledgements: Contributors to the research other than authors credited should be mentioned under acknowledgement. The specifications of the source of funding for the research if appropriate can be included. Suppliers of resources may be mentioned along with address.

Appeal of Decision: The Editorial Board's decision on publication of the paper is final and cannot be appealed elsewhere.

Permissions: It is the author's responsibility to have prior permission if all or parts of earlier published illustrations are used in this paper.

Please mention proper reference and appropriate acknowledgements wherever expected.

If all or parts of previously published illustrations are used, permission must be taken from the copyright holder concerned. It is the author's responsibility to take these in writing.

Approval for reproduction/modification of any information (including figures and tables) published elsewhere must be obtained by the authors/copyright holders before submission of the manuscript. Contributors (Authors) are responsible for any copyright fee involved.

3. SUBMISSION OF MANUSCRIPTS

Manuscripts should be uploaded via this online submission page. The online submission is most efficient method for submission of papers, as it enables rapid distribution of manuscripts and consequently speeds up the review procedure. It also enables authors to know the status of their own manuscripts by emailing us. Complete instructions for submitting a paper is available below.

Manuscript submission is a systematic procedure and little preparation is required beyond having all parts of your manuscript in a given format and a computer with an Internet connection and a Web browser. Full help and instructions are provided on-screen. As an author, you will be prompted for login and manuscript details as Field of Paper and then to upload your manuscript file(s) according to the instructions.

To avoid postal delays, all transaction is preferred by e-mail. A finished manuscript submission is confirmed by e-mail immediately and your paper enters the editorial process with no postal delays. When a conclusion is made about the publication of your paper by our Editorial Board, revisions can be submitted online with the same procedure, with an occasion to view and respond to all comments.

Complete support for both authors and co-author is provided.

4. MANUSCRIPT'S CATEGORY

Based on potential and nature, the manuscript can be categorized under the following heads:

Original research paper: Such papers are reports of high-level significant original research work.

Review papers: These are concise, significant but helpful and decisive topics for young researchers.

Research articles: These are handled with small investigation and applications

Research letters: The letters are small and concise comments on previously published matters.

5.STRUCTURE AND FORMAT OF MANUSCRIPT

The recommended size of original research paper is less than seven thousand words, review papers fewer than seven thousands words also.Preparation of research paper or how to write research paper, are major hurdle, while writing manuscript. The research articles and research letters should be fewer than three thousand words, the structure original research paper; sometime review paper should be as follows:

Papers: These are reports of significant research (typically less than 7000 words equivalent, including tables, figures, references), and comprise:

(a)Title should be relevant and commensurate with the theme of the paper.

(b) A brief Summary, "Abstract" (less than 150 words) containing the major results and conclusions.

(c) Up to ten keywords, that precisely identifies the paper's subject, purpose, and focus.

(d) An Introduction, giving necessary background excluding subheadings; objectives must be clearly declared.

(e) Resources and techniques with sufficient complete experimental details (wherever possible by reference) to permit repetition; sources of information must be given and numerical methods must be specified by reference, unless non-standard.

(f) Results should be presented concisely, by well-designed tables and/or figures; the same data may not be used in both; suitable statistical data should be given. All data must be obtained with attention to numerical detail in the planning stage. As reproduced design has been recognized to be important to experiments for a considerable time, the Editor has decided that any paper that appears not to have adequate numerical treatments of the data will be returned un-refereed;

(g) Discussion should cover the implications and consequences, not just recapitulating the results; conclusions should be summarizing.

(h) Brief Acknowledgements.

(i) References in the proper form.

Authors should very cautiously consider the preparation of papers to ensure that they communicate efficiently. Papers are much more likely to be accepted, if they are cautiously designed and laid out, contain few or no errors, are summarizing, and be conventional to the approach and instructions. They will in addition, be published with much less delays than those that require much technical and editorial correction.

The Editorial Board reserves the right to make literary corrections and to make suggestions to improve briefness.

It is vital, that authors take care in submitting a manuscript that is written in simple language and adheres to published guidelines.

Format

Language: The language of publication is UK English. Authors, for whom English is a second language, must have their manuscript efficiently edited by an English-speaking person before submission to make sure that, the English is of high excellence. It is preferable, that manuscripts should be professionally edited.

Standard Usage, Abbreviations, and Units: Spelling and hyphenation should be conventional to The Concise Oxford English Dictionary. Statistics and measurements should at all times be given in figures, e.g. 16 min, except for when the number begins a sentence. When the number does not refer to a unit of measurement it should be spelt in full unless, it is 160 or greater.

Abbreviations supposed to be used carefully. The abbreviated name or expression is supposed to be cited in full at first usage, followed by the conventional abbreviation in parentheses.

Metric SI units are supposed to generally be used excluding where they conflict with current practice or are confusing. For illustration, 1.4 l rather than 1.4 × 10-3 m3, or 4 mm somewhat than 4 × 10-3 m. Chemical formula and solutions must identify the form used, e.g. anhydrous or hydrated, and the concentration must be in clearly defined units. Common species names should be followed by underlines at the first mention. For following use the generic name should be constricted to a single letter, if it is clear.

Structure

All manuscripts submitted to Global Journals Inc. (US), ought to include:

Title: The title page must carry an instructive title that reflects the content, a running title (less than 45 characters together with spaces), names of the authors and co-authors, and the place(s) wherever the work was carried out. The full postal address in addition with the e-mail address of related author must be given. Up to eleven keywords or very brief phrases have to be given to help data retrieval, mining and indexing.

Abstract, used in Original Papers and Reviews:

Optimizing Abstract for Search Engines

Many researchers searching for information online will use search engines such as Google, Yahoo or similar. By optimizing your paper for search engines, you will amplify the chance of someone finding it. This in turn will make it more likely to be viewed and/or cited in a further work. Global Journals Inc. (US) have compiled these guidelines to facilitate you to maximize the web-friendliness of the most public part of your paper.

Key Words

A major linchpin in research work for the writing research paper is the keyword search, which one will employ to find both library and Internet resources.

One must be persistent and creative in using keywords. An effective keyword search requires a strategy and planning a list of possible keywords and phrases to try.

Search engines for most searches, use Boolean searching, which is somewhat different from Internet searches. The Boolean search uses "operators," words (and, or, not, and near) that enable you to expand or narrow your affords. Tips for research paper while preparing research paper are very helpful guideline of research paper.

Choice of key words is first tool of tips to write research paper. Research paper writing is an art.A few tips for deciding as strategically as possible about keyword search:

- One should start brainstorming lists of possible keywords before even begin searching. Think about the most important concepts related to research work. Ask, "What words would a source have to include to be truly valuable in research paper?" Then consider synonyms for the important words.
- It may take the discovery of only one relevant paper to let steer in the right keyword direction because in most databases, the keywords under which a research paper is abstracted are listed with the paper.
- One should avoid outdated words.

Keywords are the key that opens a door to research work sources. Keyword searching is an art in which researcher's skills are bound to improve with experience and time.

Numerical Methods: Numerical methods used should be clear and, where appropriate, supported by references.

Acknowledgements: Please make these as concise as possible.

References

References follow the Harvard scheme of referencing. References in the text should cite the authors' names followed by the time of their publication, unless there are three or more authors when simply the first author's name is quoted followed by et al. unpublished work has to only be cited where necessary, and only in the text. Copies of references in press in other journals have to be supplied with submitted typescripts. It is necessary that all citations and references be carefully checked before submission, as mistakes or omissions will cause delays.

References to information on the World Wide Web can be given, but only if the information is available without charge to readers on an official site. Wikipedia and Similar websites are not allowed where anyone can change the information. Authors will be asked to make available electronic copies of the cited information for inclusion on the Global Journals Inc. (US) homepage at the judgment of the Editorial Board.

The Editorial Board and Global Journals Inc. (US) recommend that, citation of online-published papers and other material should be done via a DOI (digital object identifier). If an author cites anything, which does not have a DOI, they run the risk of the cited material not being noticeable.

The Editorial Board and Global Journals Inc. (US) recommend the use of a tool such as Reference Manager for reference management and formatting.

Tables, Figures and Figure Legends

Tables: Tables should be few in number, cautiously designed, uncrowned, and include only essential data. Each must have an Arabic number, e.g. Table 4, a self-explanatory caption and be on a separate sheet. Vertical lines should not be used.

Figures: Figures are supposed to be submitted as separate files. Always take in a citation in the text for each figure using Arabic numbers, e.g. Fig. 4. Artwork must be submitted online in electronic form by e-mailing them.

Preparation of Electronic Figures for Publication

Even though low quality images are sufficient for review purposes, print publication requires high quality images to prevent the final product being blurred or fuzzy. Submit (or e-mail) EPS (line art) or TIFF (halftone/photographs) files only. MS PowerPoint and Word Graphics are unsuitable for printed pictures. Do not use pixel-oriented software. Scans (TIFF only) should have a resolution of at least 350 dpi (halftone) or 700 to 1100 dpi (line drawings) in relation to the imitation size. Please give the data for figures in black and white or submit a Color Work Agreement Form. EPS files must be saved with fonts embedded (and with a TIFF preview, if possible).

For scanned images, the scanning resolution (at final image size) ought to be as follows to ensure good reproduction: line art: >650 dpi; halftones (including gel photographs) : >350 dpi; figures containing both halftone and line images: >650 dpi.

Color Charges: It is the rule of the Global Journals Inc. (US) for authors to pay the full cost for the reproduction of their color artwork. Hence, please note that, if there is color artwork in your manuscript when it is accepted for publication, we would require you to complete and return a color work agreement form before your paper can be published.

Figure Legends: Self-explanatory legends of all figures should be incorporated separately under the heading 'Legends to Figures'. In the full-text online edition of the journal, figure legends may possibly be truncated in abbreviated links to the full screen version. Therefore, the first 100 characters of any legend should notify the reader, about the key aspects of the figure.

6. AFTER ACCEPTANCE

Upon approval of a paper for publication, the manuscript will be forwarded to the dean, who is responsible for the publication of the Global Journals Inc. (US).

6.1 Proof Corrections

The corresponding author will receive an e-mail alert containing a link to a website or will be attached. A working e-mail address must therefore be provided for the related author.

Acrobat Reader will be required in order to read this file. This software can be downloaded

(Free of charge) from the following website:

www.adobe.com/products/acrobat/readstep2.html. This will facilitate the file to be opened, read on screen, and printed out in order for any corrections to be added. Further instructions will be sent with the proof.

Proofs must be returned to the dean at dean@globaljournals.org within three days of receipt.

As changes to proofs are costly, we inquire that you only correct typesetting errors. All illustrations are retained by the publisher. Please note that the authors are responsible for all statements made in their work, including changes made by the copy editor.

6.2 Early View of Global Journals Inc. (US) (Publication Prior to Print)

The Global Journals Inc. (US) are enclosed by our publishing's Early View service. Early View articles are complete full-text articles sent in advance of their publication. Early View articles are absolute and final. They have been completely reviewed, revised and edited for publication, and the authors' final corrections have been incorporated. Because they are in final form, no changes can be made after sending them. The nature of Early View articles means that they do not yet have volume, issue or page numbers, so Early View articles cannot be cited in the conventional way.

6.3 Author Services

Online production tracking is available for your article through Author Services. Author Services enables authors to track their article - once it has been accepted - through the production process to publication online and in print. Authors can check the status of their articles online and choose to receive automated e-mails at key stages of production. The authors will receive an e-mail with a unique link that enables them to register and have their article automatically added to the system. Please ensure that a complete e-mail address is provided when submitting the manuscript.

6.4 Author Material Archive Policy

Please note that if not specifically requested, publisher will dispose off hardcopy & electronic information submitted, after the two months of publication. If you require the return of any information submitted, please inform the Editorial Board or dean as soon as possible.

6.5 Offprint and Extra Copies

A PDF offprint of the online-published article will be provided free of charge to the related author, and may be distributed according to the Publisher's terms and conditions. Additional paper offprint may be ordered by emailing us at: editor@globaljournals.org .

the search? Will I be able to find all information in this field area? If the answer of these types of questions will be "Yes" then you can choose that topic. In most of the cases, you may have to conduct the surveys and have to visit several places because this field is related to Computer Science and Information Technology. Also, you may have to do a lot of work to find all rise and falls regarding the various data of that subject. Sometimes, detailed information plays a vital role, instead of short information.

2. Evaluators are human: First thing to remember that evaluators are also human being. They are not only meant for rejecting a paper. They are here to evaluate your paper. So, present your Best.

3. Think Like Evaluators: If you are in a confusion or getting demotivated that your paper will be accepted by evaluators or not, then think and try to evaluate your paper like an Evaluator. Try to understand that what an evaluator wants in your research paper and automatically you will have your answer.

4. Make blueprints of paper: The outline is the plan or framework that will help you to arrange your thoughts. It will make your paper logical. But remember that all points of your outline must be related to the topic you have chosen.

5. Ask your Guides: If you are having any difficulty in your research, then do not hesitate to share your difficulty to your guide (if you have any). They will surely help you out and resolve your doubts. If you can't clarify what exactly you require for your work then ask the supervisor to help you with the alternative. He might also provide you the list of essential readings.

6. Use of computer is recommended: As you are doing research in the field of Computer Science, then this point is quite obvious.

7. Use right software: Always use good quality software packages. If you are not capable to judge good software then you can lose quality of your paper unknowingly. There are various software programs available to help you, which you can get through Internet.

8. Use the Internet for help: An excellent start for your paper can be by using the Google. It is an excellent search engine, where you can have your doubts resolved. You may also read some answers for the frequent question how to write my research paper or find model research paper. From the internet library you can download books. If you have all required books make important reading selecting and analyzing the specified information. Then put together research paper sketch out.

9. Use and get big pictures: Always use encyclopedias, Wikipedia to get pictures so that you can go into the depth.

10. Bookmarks are useful: When you read any book or magazine, you generally use bookmarks, right! It is a good habit, which helps to not to lose your continuity. You should always use bookmarks while searching on Internet also, which will make your search easier.

11. Revise what you wrote: When you write anything, always read it, summarize it and then finalize it.

12. Make all efforts: Make all efforts to mention what you are going to write in your paper. That means always have a good start. Try to mention everything in introduction, that what is the need of a particular research paper. Polish your work by good skill of writing and always give an evaluator, what he wants.

13. Have backups: When you are going to do any important thing like making research paper, you should always have backup copies of it either in your computer or in paper. This will help you to not to lose any of your important.

14. Produce good diagrams of your own: Always try to include good charts or diagrams in your paper to improve quality. Using several and unnecessary diagrams will degrade the quality of your paper by creating "hotchpotch." So always, try to make and include those diagrams, which are made by your own to improve readability and understandability of your paper.

15. Use of direct quotes: When you do research relevant to literature, history or current affairs then use of quotes become essential but if study is relevant to science then use of quotes is not preferable.

16. Use proper verb tense: Use proper verb tenses in your paper. Use past tense, to present those events that happened. Use present tense to indicate events that are going on. Use future tense to indicate future happening events. Use of improper and wrong tenses will confuse the evaluator. Avoid the sentences that are incomplete.

17. Never use online paper: If you are getting any paper on Internet, then never use it as your research paper because it might be possible that evaluator has already seen it or maybe it is outdated version.

18. **Pick a good study spot:** To do your research studies always try to pick a spot, which is quiet. Every spot is not for studies. Spot that suits you choose it and proceed further.

19. Know what you know: Always try to know, what you know by making objectives. Else, you will be confused and cannot achieve your target.

20. Use good quality grammar: Always use a good quality grammar and use words that will throw positive impact on evaluator. Use of good quality grammar does not mean to use tough words, that for each word the evaluator has to go through dictionary. Do not start sentence with a conjunction. Do not fragment sentences. Eliminate one-word sentences. Ignore passive voice. Do not ever use a big word when a diminutive one would suffice. Verbs have to be in agreement with their subjects. Prepositions are not expressions to finish sentences with. It is incorrect to ever divide an infinitive. Avoid clichés like the disease. Also, always shun irritating alliteration. Use language that is simple and straight forward. put together a neat summary.

21. Arrangement of information: Each section of the main body should start with an opening sentence and there should be a changeover at the end of the section. Give only valid and powerful arguments to your topic. You may also maintain your arguments with records.

22. Never start in last minute: Always start at right time and give enough time to research work. Leaving everything to the last minute will degrade your paper and spoil your work.

23. Multitasking in research is not good: Doing several things at the same time proves bad habit in case of research activity. Research is an area, where everything has a particular time slot. Divide your research work in parts and do particular part in particular time slot.

24. Never copy others' work: Never copy others' work and give it your name because if evaluator has seen it anywhere you will be in trouble.

25. Take proper rest and food: No matter how many hours you spend for your research activity, if you are not taking care of your health then all your efforts will be in vain. For a quality research, study is must, and this can be done by taking proper rest and food.

26. Go for seminars: Attend seminars if the topic is relevant to your research area. Utilize all your resources.

27. Refresh your mind after intervals: Try to give rest to your mind by listening to soft music or by sleeping in intervals. This will also improve your memory.

28. Make colleagues: Always try to make colleagues. No matter how sharper or intelligent you are, if you make colleagues you can have several ideas, which will be helpful for your research.

29. **Think technically:** Always think technically. If anything happens, then search its reasons, its benefits, and demerits.

30. Think and then print: When you will go to print your paper, notice that tables are not be split, headings are not detached from their descriptions, and page sequence is maintained.

31. Adding unnecessary information: Do not add unnecessary information, like, I have used MS Excel to draw graph. Do not add irrelevant and inappropriate material. These all will create superfluous. Foreign terminology and phrases are not apropos. One should NEVER take a broad view. Analogy in script is like feathers on a snake. Not at all use a large word when a very small one would be

sufficient. Use words properly, regardless of how others use them. Remove quotations. Puns are for kids, not grunt readers. Amplification is a billion times of inferior quality than sarcasm.

32. Never oversimplify everything: To add material in your research paper, never go for oversimplification. This will definitely irritate the evaluator. Be more or less specific. Also too, by no means, ever use rhythmic redundancies. Contractions aren't essential and shouldn't be there used. Comparisons are as terrible as clichés. Give up ampersands and abbreviations, and so on. Remove commas, that are, not necessary. Parenthetical words however should be together with this in commas. Understatement is all the time the complete best way to put onward earth-shaking thoughts. Give a detailed literary review.

33. Report concluded results: Use concluded results. From raw data, filter the results and then conclude your studies based on measurements and observations taken. Significant figures and appropriate number of decimal places should be used. Parenthetical remarks are prohibitive. Proofread carefully at final stage. In the end give outline to your arguments. Spot out perspectives of further study of this subject. Justify your conclusion by at the bottom of them with sufficient justifications and examples.

34. After conclusion: Once you have concluded your research, the next most important step is to present your findings. Presentation is extremely important as it is the definite medium though which your research is going to be in print to the rest of the crowd. Care should be taken to categorize your thoughts well and present them in a logical and neat manner. A good quality research paper format is essential because it serves to highlight your research paper and bring to light all necessary aspects in your research.

Informal Guidelines of Research Paper Writing

Key points to remember:

- Submit all work in its final form.
- Write your paper in the form, which is presented in the guidelines using the template.
- Please note the criterion for grading the final paper by peer-reviewers.

Final Points:

A purpose of organizing a research paper is to let people to interpret your effort selectively. The journal requires the following sections, submitted in the order listed, each section to start on a new page.

The introduction will be compiled from reference matter and will reflect the design processes or outline of basis that direct you to make study. As you will carry out the process of study, the method and process section will be constructed as like that. The result segment will show related statistics in nearly sequential order and will direct the reviewers next to the similar intellectual paths throughout the data that you took to carry out your study. The discussion section will provide understanding of the data and projections as to the implication of the results. The use of good quality references all through the paper will give the effort trustworthiness by representing an alertness of prior workings.

Writing a research paper is not an easy job no matter how trouble-free the actual research or concept. Practice, excellent preparation, and controlled record keeping are the only means to make straightforward the progression.

General style:

Specific editorial column necessities for compliance of a manuscript will always take over from directions in these general guidelines.

To make a paper clear

· Adhere to recommended page limits

Mistakes to evade

- Insertion a title at the foot of a page with the subsequent text on the next page

- Separating a table/chart or figure - impound each figure/table to a single page
- Submitting a manuscript with pages out of sequence

In every sections of your document

· Use standard writing style including articles ("a", "the," etc.)

· Keep on paying attention on the research topic of the paper

· Use paragraphs to split each significant point (excluding for the abstract)

· Align the primary line of each section

· Present your points in sound order

· Use present tense to report well accepted

· Use past tense to describe specific results

· Shun familiar wording, don't address the reviewer directly, and don't use slang, slang language, or superlatives

· Shun use of extra pictures - include only those figures essential to presenting results

Title Page:

Choose a revealing title. It should be short. It should not have non-standard acronyms or abbreviations. It should not exceed two printed lines. It should include the name(s) and address (es) of all authors.

Abstract:

The summary should be two hundred words or less. It should briefly and clearly explain the key findings reported in the manuscript--must have precise statistics. It should not have abnormal acronyms or abbreviations. It should be logical in itself. Shun citing references at this point.

An abstract is a brief distinct paragraph summary of finished work or work in development. In a minute or less a reviewer can be taught the foundation behind the study, common approach to the problem, relevant results, and significant conclusions or new questions.

Write your summary when your paper is completed because how can you write the summary of anything which is not yet written? Wealth of terminology is very essential in abstract. Yet, use comprehensive sentences and do not let go readability for briefness. You can maintain it succinct by phrasing sentences so that they provide more than lone rationale. The author can at this moment go straight to

shortening the outcome. Sum up the study, with the subsequent elements in any summary. Try to maintain the initial two items to no more than one ruling each.

- Reason of the study - theory, overall issue, purpose
- Fundamental goal
- To the point depiction of the research
- Consequences, including definite statistics - if the consequences are quantitative in nature, account quantitative data; results of any numerical analysis should be reported
- Significant conclusions or questions that track from the research(es)

Approach:

- Single section, and succinct
- As a outline of job done, it is always written in past tense
- A conceptual should situate on its own, and not submit to any other part of the paper such as a form or table
- Center on shortening results - bound background information to a verdict or two, if completely necessary
- What you account in an conceptual must be regular with what you reported in the manuscript
- Exact spelling, clearness of sentences and phrases, and appropriate reporting of quantities (proper units, important statistics) are just as significant in an abstract as they are anywhere else

Introduction:

The **Introduction** should "introduce" the manuscript. The reviewer should be presented with sufficient background information to be capable to comprehend and calculate the purpose of your study without having to submit to other works. The basis for the study should be offered. Give most important references but shun difficult to make a comprehensive appraisal of the topic. In the introduction, describe the problem visibly. If the problem is not acknowledged in a logical, reasonable way, the reviewer will have no attention in your result. Speak in common terms about techniques used to explain the problem, if needed, but do not present any particulars about the protocols here. Following approach can create a valuable beginning:

- Explain the value (significance) of the study
- Shield the model - why did you employ this particular system or method? What is its compensation? You strength remark on its appropriateness from a abstract point of vision as well as point out sensible reasons for using it.
- Present a justification. Status your particular theory (es) or aim(s), and describe the logic that led you to choose them.
- Very for a short time explain the tentative propose and how it skilled the declared objectives.

Approach:

- Use past tense except for when referring to recognized facts. After all, the manuscript will be submitted after the entire job is done.
- Sort out your thoughts; manufacture one key point with every section. If you make the four points listed above, you will need a least of four paragraphs.
- Present surroundings information only as desirable in order hold up a situation. The reviewer does not desire to read the whole thing you know about a topic.
- Shape the theory/purpose specifically - do not take a broad view.
- As always, give awareness to spelling, simplicity and correctness of sentences and phrases.

Procedures (Methods and Materials):

This part is supposed to be the easiest to carve if you have good skills. A sound written Procedures segment allows a capable scientist to replacement your results. Present precise information about your supplies. The suppliers and clarity of reagents can be helpful bits of information. Present methods in sequential order but linked methodologies can be grouped as a segment. Be concise when relating the protocols. Attempt for the least amount of information that would permit another capable scientist to spare your outcome but be cautious that vital information is integrated. The use of subheadings is suggested and ought to be synchronized with the results section. When a technique is used that has been well described in another object, mention the specific item describing a way but draw the basic

principle while stating the situation. The purpose is to text all particular resources and broad procedures, so that another person may use some or all of the methods in one more study or referee the scientific value of your work. It is not to be a step by step report of the whole thing you did, nor is a methods section a set of orders.

Materials:

- Explain materials individually only if the study is so complex that it saves liberty this way.
- Embrace particular materials, and any tools or provisions that are not frequently found in laboratories.
- Do not take in frequently found.
- If use of a definite type of tools.
- Materials may be reported in a part section or else they may be recognized along with your measures.

Methods:

- Report the method (not particulars of each process that engaged the same methodology)
- Describe the method entirely
- To be succinct, present methods under headings dedicated to specific dealings or groups of measures
- Simplify - details how procedures were completed not how they were exclusively performed on a particular day.
- If well known procedures were used, account the procedure by name, possibly with reference, and that's all.

Approach:

- It is embarrassed or not possible to use vigorous voice when documenting methods with no using first person, which would focus the reviewer's interest on the researcher rather than the job. As a result when script up the methods most authors use third person passive voice.
- Use standard style in this and in every other part of the paper - avoid familiar lists, and use full sentences.

What to keep away from

- Resources and methods are not a set of information.
- Skip all descriptive information and surroundings - save it for the argument.
- Leave out information that is immaterial to a third party.

Results:

The principle of a results segment is to present and demonstrate your conclusion. Create this part a entirely objective details of the outcome, and save all understanding for the discussion.

The page length of this segment is set by the sum and types of data to be reported. Carry on to be to the point, by means of statistics and tables, if suitable, to present consequences most efficiently.You must obviously differentiate material that would usually be incorporated in a study editorial from any unprocessed data or additional appendix matter that would not be available. In fact, such matter should not be submitted at all except requested by the instructor.

Content

- Sum up your conclusion in text and demonstrate them, if suitable, with figures and tables.
- In manuscript, explain each of your consequences, point the reader to remarks that are most appropriate.
- Present a background, such as by describing the question that was addressed by creation an exacting study.
- Explain results of control experiments and comprise remarks that are not accessible in a prescribed figure or table, if appropriate.
- Examine your data, then prepare the analyzed (transformed) data in the form of a figure (graph), table, or in manuscript form.

What to stay away from

- Do not discuss or infer your outcome, report surroundings information, or try to explain anything.
- Not at all, take in raw data or intermediate calculations in a research manuscript.

- Do not present the similar data more than once.
- Manuscript should complement any figures or tables, not duplicate the identical information.
- Never confuse figures with tables - there is a difference.

Approach

- As forever, use past tense when you submit to your results, and put the whole thing in a reasonable order.
- Put figures and tables, appropriately numbered, in order at the end of the report
- If you desire, you may place your figures and tables properly within the text of your results part.

Figures and tables

- If you put figures and tables at the end of the details, make certain that they are visibly distinguished from any attach appendix materials, such as raw facts
- Despite of position, each figure must be numbered one after the other and complete with subtitle
- In spite of position, each table must be titled, numbered one after the other and complete with heading
- All figure and table must be adequately complete that it could situate on its own, divide from text

Discussion:

The Discussion is expected the trickiest segment to write and describe. A lot of papers submitted for journal are discarded based on problems with the Discussion. There is no head of state for how long a argument should be. Position your understanding of the outcome visibly to lead the reviewer through your conclusions, and then finish the paper with a summing up of the implication of the study. The purpose here is to offer an understanding of your results and hold up for all of your conclusions, using facts from your research and generally accepted information, if suitable. The implication of result should be visibly described. Infer your data in the conversation in suitable depth. This means that when you clarify an observable fact you must explain mechanisms that may account for the observation. If your results vary from your prospect, make clear why that may have happened. If your results agree, then explain the theory that the proof supported. It is never suitable to just state that the data approved with prospect, and let it drop at that.

- Make a decision if each premise is supported, discarded, or if you cannot make a conclusion with assurance. Do not just dismiss a study or part of a study as "uncertain."
- Research papers are not acknowledged if the work is imperfect. Draw what conclusions you can based upon the results that you have, and take care of the study as a finished work
- You may propose future guidelines, such as how the experiment might be personalized to accomplish a new idea.
- Give details all of your remarks as much as possible, focus on mechanisms.
- Make a decision if the tentative design sufficiently addressed the theory, and whether or not it was correctly restricted.
- Try to present substitute explanations if sensible alternatives be present.
- One research will not counter an overall question, so maintain the large picture in mind, where do you go next? The best studies unlock new avenues of study. What questions remain?
- Recommendations for detailed papers will offer supplementary suggestions.

Approach:

- When you refer to information, differentiate data generated by your own studies from available information
- Submit to work done by specific persons (including you) in past tense.
- Submit to generally acknowledged facts and main beliefs in present tense.

Administration Rules Listed Before Submitting Your Research Paper to Global Journals Inc. (US)

Please carefully note down following rules and regulation before submitting your Research Paper to Global Journals Inc. (US):

Segment Draft and Final Research Paper: You have to strictly follow the template of research paper. If it is not done your paper may get rejected.

- The **major constraint** is that you must independently make all content, tables, graphs, and facts that are offered in the paper. You must write each part of the paper wholly on your own. The Peer-reviewers need to identify your own perceptive of the concepts in your own terms. NEVER extract straight from any foundation, and never rephrase someone else's analysis.

- Do not give permission to anyone else to "PROOFREAD" your manuscript.

- Methods to avoid Plagiarism is applied by us on every paper, if found guilty, you will be blacklisted by all of our collaborated research groups, your institution will be informed for this and strict legal actions will be taken immediately.)
- To guard yourself and others from possible illegal use please do not permit anyone right to use to your paper and files.

Criterion for Grading a Research Paper (Compilation) by Global Journals Inc. (US)

Please note that following table is only a Grading of "Paper Compilation" and not on "Performed/Stated Research" whose grading solely depends on Individual Assigned Peer Reviewer and Editorial Board Member. These can be available only on request and after decision of Paper. This report will be the property of Global Journals Inc. (US).

Topics	Grades		
	A-B	**C-D**	**E-F**
Abstract	Clear and concise with appropriate content, Correct format. 200 words or below	Unclear summary and no specific data, Incorrect form Above 200 words	No specific data with ambiguous information Above 250 words
Introduction	Containing all background details with clear goal and appropriate details, flow specification, no grammar and spelling mistake, well organized sentence and paragraph, reference cited	Unclear and confusing data, appropriate format, grammar and spelling errors with unorganized matter	Out of place depth and content, hazy format
Methods and Procedures	Clear and to the point with well arranged paragraph, precision and accuracy of facts and figures, well organized subheads	Difficult to comprehend with embarrassed text, too much explanation but completed	Incorrect and unorganized structure with hazy meaning
Result	Well organized, Clear and specific, Correct units with precision, correct data, well structuring of paragraph, no grammar and spelling mistake	Complete and embarrassed text, difficult to comprehend	Irregular format with wrong facts and figures
Discussion	Well organized, meaningful specification, sound conclusion, logical and concise explanation, highly structured paragraph reference cited	Wordy, unclear conclusion, spurious	Conclusion is not cited, unorganized, difficult to comprehend
References	Complete and correct format, well organized	Beside the point, Incomplete	Wrong format and structuring

Index

N

O

P

Q

R

S

T

U

V

W

Z

save our planet

Global Journal of Computer Science and Technology

Visit us on the Web at www.GlobalJournals.org | www.ComputerResearch.org
or email us at helpdesk@globaljournals.org

ISSN 9754350