Online ISSN : 2249-4588
Print ISSN : 0975-5853

Global Journal

of Computer Science and Technology: H

Information & Technology

Highlights

- Enhanced Cooling of Laptop
- Improving E-Learning Performance
- Binary Tree based Approach
- Successfully Implement a Corporate

Discovering Thoughts, Inventing Future

VOLUME 15 ISSUE 5 VERSION 1.0

Global Journal of Computer Science and Technology: H
Information & Technology

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Information & Technology

Volume 15 Issue 5 (Ver. 1.0)

Open Association of Research Society

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License No.: 42125/022010/1186
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Employer Identification Number (EIN):
USA Tax ID: 98-0673427

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Contents of the Issue

Global Journal of Computer Science and Technology: H Information & Technology
Volume 15 Issue 5 Version 1.0 Year 2015
Type: Double Blind Peer Reviewed International Research Journal
Publisher: Global Journals Inc. (USA)
Online ISSN: 0975-4172 & Print ISSN: 0975-4350

Enhanced Cooling of Laptop Computer for Improvement of Processing Performance

By Mohammed A. Bou-Rabee, Shaharin A. Sulaiman & Wan M. S. W. Mazlan
University Teknologi Petronas, Kuwait

Abstract- A major problems in the operation of laptop computers is overheating since it can affect the performance and stability, sometimes leading to system crash and hardware fatality. The objective of this work was to study the thermal behavior inside a laptop computer and to test the effectiveness of aproposed cooling method to overcome overheating problem. The proposed cooling system contained a thermoelectric device that reduced the intake air temperature into the laptop internal cooling system. An external exhaust blower, located at the exhaust air outlet of the laptop, was mounted to ensure sufficient air flow rate delivered by the cooling system. To assess the effectiveness of the system, temperatures of critical components in the computer were measured. It was found from the study that, under extreme utilization situation, the temperature of the graphic processing unit could increase to 99°C. The proposed cooling system could bring down the temperature by up to 6°C.

Keywords: computer; power electronics; laptop; overheating; cooking; heat dissipation; thermoelectric.

GJCST-H Classification: B.5.2 B.7.1

Strictly as per the compliance and regulations of:

Enhanced Cooling of Laptop Computer for Improvement of Processing Performance

Mohammed A. Bou-Rabee [α], Shaharin A. Sulaiman [σ] & Wan M. S. W. Mazlan [ρ]

Abstract- A major problems in the operation of laptop computers is overheating since it can affect the performance and stability, sometimes leading to system crash and hardware fatality. The objective of this work was to study the thermal behavior inside a laptop computer and to test the effectiveness of aproposed cooling method to overcome overheating problem. The proposed cooling system contained a thermoelectric device that reduced the intake air temperature into the laptop internal cooling system. An external exhaust blower, located at the exhaust air outlet of the laptop, was mounted to ensure sufficient air flow rate delivered by the cooling system. To assess the effectiveness of the system, temperatures of critical components in the computer were measured. It was found from the study that, under extreme utilization situation, the temperature of the graphic processing unit could increase to 99°C. The proposed cooling system could bring down the temperature by up to 6°C.

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I. Introduction

Laptop computer technology, especially in hardware development such as in processors, graphic cards and storage media are developing fast. Various powerful laptops have been built in order to fulfill consumer demands. For instance, Intel launched the 5th Generation Intel® Core ™ i7 Processors. It was the latest Intel® microarchitecture to deliver significant performance advancement which included vastly improved graphics, battery life and security for a zero compromise computing experience [1]. However, fast and multi-functional laptop computers tend to consume high electrical power, and at the same time generate more heat while in operation.

There are three main contributors of heat source in a laptop computer system; they are central processing unit (CPU), graphic processing unit (GPU) and hard disk drive (HDD) [2]. There are few factors that lead to laptop overheating. Poor ventilation system and flow circulation could be one of them; this could be due to poor design or clogging as a result of accumulation of undesired solid, such as dust, on heat sink or other components, which cause reduction on the heat dissipation rate [3]. Overheating can also be caused by high ambient temperature, for which the intake air temperature would be significantly higher than the recommended level. Another factor that can lead to overheating is overloading of the processordue to operations of many large programs con-currently [4].

Overheating of laptop computers is common especially if operated in rooms or areas with high ambient temperatures. This can lead to disruptions and, even worse, it can cause data and system failure. In addition, such a problem may lead to costly repairs or replacements of major hardware components. Common related symptoms of over heatingare lagging and freezing in operation while performing computing tasks[5]. Although, by default, a laptop computer is equipped with an internal cooling mechanism, the system is often not capable in maintaining appropriate operating temperature.

This objective of this work was to understand study the thermal behavior inside laptop computers in relation to healthy operations. In addition, the potential of an alternative cooling system based on Peltier effect was studied preliminarily in order to overcome overheating problem.

II. Methodology

Two experiments were carried out in order to study the effect of laptop overheating on the performance of the existing products. The first one involved measurement of processing time under different operating conditions. The other test was done by measuring the temperature difference at specific locations of the laptop component under different conditions.

The purpose of the first experiment was to study the effect of laptop computer overheating to its processing performance by comparing the times taken to complete an identified task under idle and busy operating conditions. The assigned task was for the computer to count and display prime numbers in between 0 and 5000 by using a java script program, which was originally written by Nicholson [6]. The tests were conducted under two conditions: (1) the computer was left idle for 30 minutes prior to test, and (2) the computer was loaded with high resources consuming software and applications for 30 minutes to cause overheating. For the second condition, all the applications then were turned off just before the tests were performed in order to avoid lack of resources

Author α : PAAET, Department of Electrical Engineering, College of Technological Studies Kuwait City, Kuwait.
e-mail: m.rabee@paaet.edu.kw
Author σ ρ : Department of Mechanical Engineering, Universiti Teknologi Petronas 31750 Tronoh, Perak, Malaysia.
e-mail: shaharin@petronas.com.my

which would consequently affect the processing time. For each condition, the test was repeated five times.

The purpose of the second experiment was to study the capability and weakness of the conventional laptop cooler by measuring temperatures at specific locations around the laptop components, with and without the presence of an external laptop cooler in three different room conditions. The temperature was measured by using third-party temperature measurement software, Speed Fan 4.33, to access the digital built-in temperature sensors of each component [7]. The built-in sensors were the silicon band-gap-type temperature sensors [8], which utilized the silicon voltage band gap (1.12 V at room temperature).

The proposed alternative cooling system based on Peltier effect [9] was designed with the setting shown in Figure 2. The cool air feeder was intended to function as supplier of cool air for the laptop ventilation system. It has a cooler which was built by using a thermoelectric device.

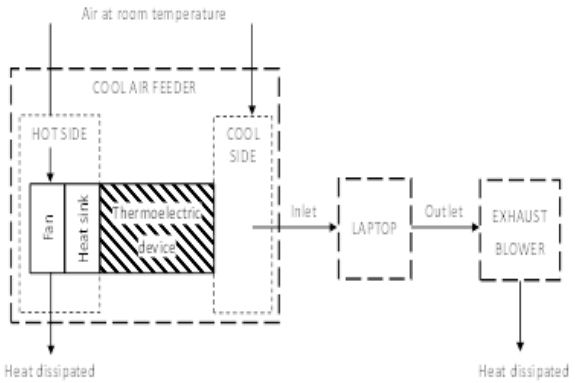

Figure 2 : Basic operation flow of the cooling system

The design concept of the cool air feeder is as illustrated in Figure 3, in which the thermoelectric device is shown located at the middle of the two different thermal zones (hot and cold zones).The exhaust blower was intended to extract the heat from the underside of the laptop. A blower fan was mounted to the end of the casing to discharge hot air from the laptop computer.

The cooling capacity of the thermoelectric device was determined based on the total heat generated by the main heat sources from the system components. The calculated total electric power was 44.6W based on four major components; i.e. computer processing unit (CPU, 33W), graphic processing unit (GPU, 7.5 W), hard disk drive (HDD, 2.1W) and random access memory (RAM, 2.0W). For simplicity, a thermoelectric device with cooling capacity of 45.6 W was chosen. It must be noted that the heat generated was expected to be lower than 44.6W. Furthermore, some of the heat may be dissipated through the keyboard area. The desired maximum temperature was set to 50°C, as recommended by Hand by [10].

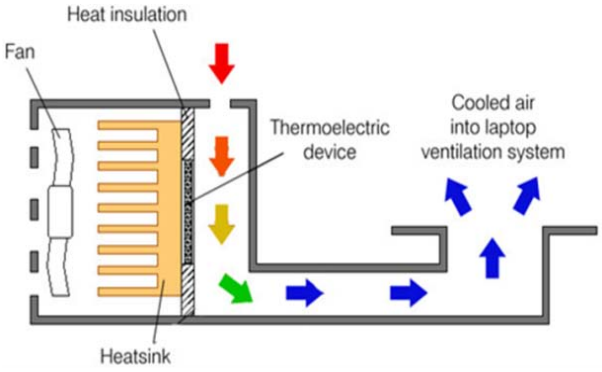

Figure 3 : Design concept of the cool air feeder

The heat sink mounted on the hot side of the thermoelectric device was an active-type heat sink, which was also used with Intel Processor 478-socket for personal computers. The unit was capable to dissipate 50 W of heat. The air flow for exhaust blower fan was determined using the simplified steady flow thermal energy equation and Newton's law of cooling. For the desired maximum temperature, the fan's flow rate must be larger than 700 liter per minute, with the consideration that the thermoelectric device temperature on the cold side was 10°C.

The proposed system was tested by measuring the temperature on both sides (hot and cold) of the thermoelectric device when the electrical current flowed through it. The test was carried out to assess the performance of the proposed prototype in comparison to traditional cooling devices. In this work, four sets of tests were conducted using different cooling methods.

The first set of test was a reference, which was intended to determine the maximum temperature that can be reached by the GPU under the manufacturer's design setting. The second set was for temperature measurement under passive cooling system, in which the laptop was tilted by 30° from the horizontal surface. The third set was different than the first one only by using a normal cooler pad. The last set was conducted by using the Peltier-effect cooling system proposed in this work.

III. Result and Discussion

Shown in Table 1 are the time taken for the laptop computer to perform the counting and displaying tasks under idle and busy operating conditions. The average and standard deviation for each condition as a result of five repeated measurements are also shown in Table 1.It is shown that the time taken for the task under overheated condition is significantly longer (by 36.6%) than that under idle condition. The small standard deviation indicates good repeatability of the measurements. This result clearly implies that in real processing conditions the laptop will take longer time to perform a process when it is overheated and thus this

can lead to reduction in performance and dissatisfaction among users.

Table 1: Processing time under different conditions

Condition	Measurement (s)					Avg.	σ
	1	2	3	4	5		
Idle	8.45	8.78	8.58	8.64	8.67	8.63	0.10
Overheated	11.76	11.81	11.80	11.77	11.77	11.78	0.02

Table 2 shows the results of the temperature measurements at identified locations with in the laptop computer. Each of the temperatures displayed is an average value determined from five readings. Ventilation condition A was a condition, in which there was nearly no air movement and no mean of heat dissipation in the room (windows and doors were shut). Ventilation condition B had air movement in the room through operation of a ceiling fan and openings of windows and doors. Ventilation condition C was when the room was air-conditioned. For each reading, the laptop was left for 30 minutes under either idle or loaded condition. The highest temperature rise, as a result of loading, is shown for the HDD (at 8°C) under ventilation condition A.

It is clearly shown in Table 2 that at idling condition, the temperature differences due the different ventilating conditions are small with typical difference of 2°C; the highest difference of 3°C only occurred for the GPU. As anticipated, the temperature differences due to the different ventilating condition sare slightly higher when loaded (as compared to idling), with a maximum temperature of 4°C.

Table 2 : Measured temperatures of different components of laptop computer under different room ventilation conditions and different computer cooling systems

Cooling System	Sensor Location	Average Measurement (°C)					
		Idle Condition			Loaded Condition		
		A	B	C	A	B	C
Internal	HDD	52	52	50	60	57	56
	RAM	52	52	51	57	55	54
	Motherboard	55	55	55	58	58	57
	Processor	65	65	64	72	70	69
	GPU	97	96	94	99	99	97
Internal + External	HDD	51	50	49	55	55	53
	RAM	51	51	50	53	53	51
	Motherboard	54	54	54	57	57	56
	Processor	63	63	62	69	69	68
	GPU	97	95	94	99	98	97

The GPU is shown to experience the highest temperature (94°C to 99°C), while the HDD and RAM had the relatively lowest temperatures (49°C to 60°C). The measured temperatures for the GPU are shown in Figure 4. The black bars represent GPU temperatures when using internal cooling system for all room conditions; the white ones represent those using external cooling system. Overall histogram indicates that external cooling results in very small change in the GPU temperature. In short, the results in Table 2 and Figure 4 show that the room ventilation system within this study did not have significant effect in bringing down the temperature of laptop components, and thus introduction of a new cooling system would be justified.

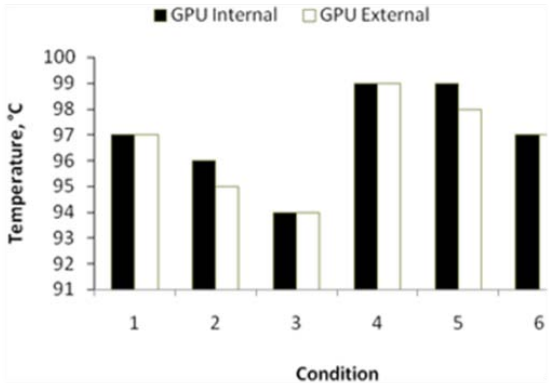

Figure 4 : Measured temperatures of the GPU

The proposed cooling system was tested out to assess its performance in comparison to or inary cooling devices. Measurements were made on the temperatures on both sides of the thermoelectric device during operation. Shown in Figure 5 is the variation of temperature with time from start of experiment. The red line represents temperature on the hot side, while the blue line represents that on the cold side.

The test was conducted for 60 seconds, during which the rate of change in temperature was approximately zero. It is shown that the minimum temperature on the cold side is 0°C and the maximum temperature at the hot side is 45°C. It was claimed by the manufacturer that the difference between the hot and cold sides could reach 69°C under ideal working condition. However, in this study, the difference was only about 65% of that claimed by the manufacturer.

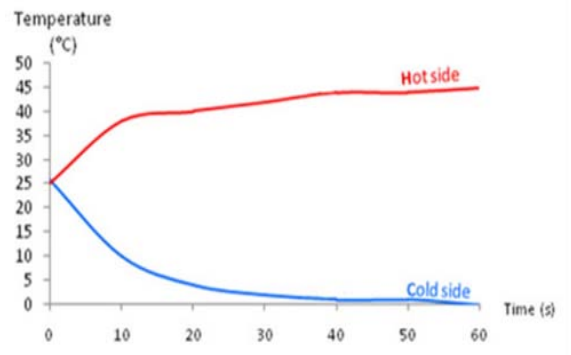

Figure 5 : Temporal variation of temperatures measured on surfaces of the thermoelectric device

The proposed prototype was tested for its feasibility. The result of the experiment for graphic processor unit (GPU) is shown in Figure 6, which displays histogram of the GPU temperatures under different cooling mechanisms. Obviously, the figure shows that reduction in GPU temperature as a result of installing the prototype was insignificant, that is only 4°C lower than the reference setup and 3°C lower than that with active cooling. Since the cool air was transferred through enclosed ducting into the laptop, it was suspected that there could be large pressure loss and thus resulting in poor air flow and heat convection. Further study would be made in order to improve the cooling.

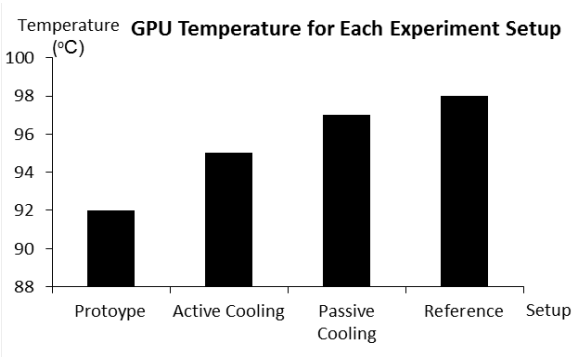

Figure 6 : Temperatures of GPU for different cooling mechanisms

IV. Conclusions

From the results, the prototype was failed to provide cooling solution at satisfactory rate. Although the experiment result was out of expectation, a series of future modification and recommendation have been suggested for the continuous development of the system.

In this work, the thermal behavior inside laptop computers was investigated. In addition, the potential of anewcooling system based on Peltier-effect was also tested. From the study, the following conclusions could be made:

1. The time taken for computation test under overheated condition was found to be significantly longer (by over 35%) than that under idle condition.
2. The commercial external computer ventilation system was demonstrated to be not significantly effective in reducing the components' temperatures especially when performing heavy loads.
3. The room ventilation system was found to not have significant effect in bringing down the temperature of laptop components.
4. The proposed Peltier-effect cooling system was found to be able to reduce the GPU's temperature by only 1°C relative to the commercial external ventilation system. It was suggested that this was due to poor air flow within the compartment of the prototype.

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Global Journal of Computer Science and Technology: H Information & Technology
Volume 15 Issue 5 Version 1.0 Year 2015
Type: Double Blind Peer Reviewed International Research Journal
Publisher: Global Journals Inc. (USA)
Online ISSN: 0975-4172 & Print ISSN: 0975-4350

A Binary Tree based Approach for Time based Page Ranking in Search Engines

By Kashfia Sailunaz, Sabiha firdaus & Ahmed Shoeb Al Hasan
Bangladesh University of Business and Technology, Bangladesh

Abstract- Search engines rank web pages according to different conditions. Some of them use publication time, some use last time of update, some checks the currency of the content of the web page. In this paper, a new algorithm is proposed which will work on the time of the web page, temporal information of the content and forms a binary tree to rank among web pages.

GJCST-H Classification: *H.2.8 H.3.3*

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A Binary Tree based Approach for Time based Page Ranking in Search Engines

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Abstract- Search engines rank web pages according to different conditions. Some of them use publication time, some use last time of update, some checks the currency of the content of the web page. In this paper, a new algorithm is proposed which will work on the time of the web page, temporal information of the content and forms a binary tree to rank among web pages.

I. Introduction

Temporal information of web pages is normally collected from the Meta data or publication date of the web page. Sometimes they are extracted from the contents of the web page. Our idea is to find the temporal information from a webpage (from both publication date and its content) and use them to create a page ranking approach for search engines. The ranking of the web pages will be based on the temporal information of the web pages related to the query. The web pages containing the oldest information about the query topic should be on the top k-results.

II. State of the Arts

As per Alonso [1], Temporal information are well-defined. They can be normalized and organized hierarchically. The temporal information can be any Date (e.g. January), Time (e.g. 3 p.m.), Duration (e.g. 3 years) or Set (e.g. twice a week). Temporal expressions of a query or web page can be Explicit (e.g. January 25, 2010), Implicit (e.g. New year's day 2009) or Relative(e.g. yesterday, next week etc.). At first, all temporal expressions must be tagged. The goals of so-called temporal taggers are the extraction of temporal expressions and the normalization of these expressions to some standard format as TIMEX 2 (consists of value, modifiers, normalized value of anchoring date or time, direction, set and comment) or TIMEX 3 (consists of offset, type and value). There are rule-based and machine learning-based approaches for the extraction of temporal expressions. But the normalization is done in a rule-based way. The research areas or trends of temporal information retrieval are Exploratory Search, Micro-blogging and Real-time Search, Temporal Summaries, Temporal Clustering, Temporal Querying, Temporal Question Answering, Temporal Similarity, Timelines and User Interfaces, Searching in Time, Web Archiving and Spatio-temporal Information Exploration.

The issue of P-time (Publication Time) detection and its application for page rank is addressed in [2]. An approach to extract P-time for a page with explicit P-time displayed on its body is proposed and then a method to infer P-time for a page without P-time is presented. Finally, a temporal sensitive page rank model using P-time is discussed. Experiments demonstrate that these methods outperform the baseline methods significantly. If a page has explicit P-time in its HTML body then a domain and language independent machine learning method to extract the P-time is presented here. General linguistic and format information (Linguistic information, Position information, Format information, Tag information) are used to create 88 binary features for the machine learning model of Support Vector Machine (SVM) to identify the P-time. If a page does not have explicit P-time in its HTML body then it is inferred by the span of its P-time according to the link relation with its neighbors and then its exact P-time is inferred in terms of the text similarity between its content and those neighbors content who's P-time belongs to the span. An approach to rank pages considering their text content, temporal information (i.e. P-time in this paper), and page importance is proposed here. The hypothesis is that the text similarity of a page to a query does not change over time, while its importance changes over time.

The objective of [3] is to develop a retrieval system which can anticipate a user's likely temporal intent, considering recent or ongoing real-world events. Such a system should not only provide recent news when relevant, but also higher rank noontime stamped or even older documents which are temporally pertinent as they cover aspects related to recent event topics. Key challenges to be addressed in this work include: a suitable source and method for event detection and tracking, an intent-aware ranking approach and an evaluation methodology. For each intent, during ranking a measure of temporal intent pertinence is computed, thus higher ranking intents that refer to aspects related to recent events. Using Topic Detection and Tracking (TDT) techniques, Wikipedia article revision history and viewing counts can be mined for event-driven signals for

Author α : Military Institute of Science and Technology (MIST). e-mail: kashfia_sailunaz@yahoo.com
Author σ : Bangladesh University of Business and Technology (BUBT). e-mail: sabiha_firdaus@yahoo.com
Author ρ: Bangladesh University of Business and Technology (BUBT). e-mail: shoeb.al.hasan@gmail.com

many real-life topics, allowing the measurement of various temporal characteristics. An evaluation methodology based on query-log mining and crowd sourcing for on-going relevance assessment is proposed. Four research questions were proposed to investigate: Can search topics with recent event-related temporal intent be detected? Can the temporal sensitivity of a query topic (or, intent) be computed using historic and recent Wikipedia article revision history, and page view statistics? Given the temporal sensitivity of a query topic, can intent ranking be improved by incorporating temporal intent pertinence? If a query topic itself is not temporally sensitive, yet, an aspect is related to a recent event, can intent ranking be improved by incorporating temporal intent pertinence?

[4] is based on explicit temporal query. Time-aware retrieval models exploit one of two time dimensions, namely, publication time or content time (temporal expressions mentioned in documents). The effectiveness for a temporal query (e.g. Illinois earthquake,1968) depends significantly on which time dimension is factored into ranking results. A machine learning approach is proposed to select the most suitable time-aware retrieval model for a given temporal query. This method uses three classes of features(Temporal KL-divergence, Clarity score, Retrieval scores) obtained from analyzing distributions over two time dimensions, a distribution over terms, and retrieval scores within top-k result documents. Temporal KL-divergence measures the difference between the distribution of publication time within a set of top-k result documents and their distribution in the overall document collection. The clarity score measures the KL-divergence between the distribution of terms within top-k results and their distribution in the overall document collection. Retrieval scores are measured by analyzing different features. It is demonstrated that selecting the right time-aware retrieval model can have a significant impact on the retrieval effectiveness of temporal queries. The novel machine learning approach is proposed here to do so automatically and demonstrated its effectiveness through extensive experiments.

In [5] the authors tried to develop a language-independent model that tackles the temporal dimensions of a query and identifies its most relevant time periods. For this purpose, a temporal similarity measure capable of associating a relevant date(s) to a given query and filtering out irrelevant ones is proposed. This approach is based on the exploitation of temporal information from web content, particularly within the set of k-top retrieved web snippets returned in response to a query. It particularly focus on extracting years, which are a kind of temporal information that often appears in this type of collection. The methodology is evaluated using a set of real-world text temporal queries, which are clear concepts (i.e. queries which are nonambiguous in concept and temporal in their purpose). Experiments show that when compared to baseline methods, determining the most relevant dates relating to any given implicit temporal query can be improved with a new temporal similarity measure. This work presents a novel approach that aims to correctly tag the temporal expressions found in the documents, based on their relevance to the query and to properly tag implicit temporal queries with relevant years. This method is not based on metadata or query-logs, but on the exploitation of temporal information from the text itself. The proposal of this paper is : proposing a novel second-order similarity measure to assess the temporal similarity between a query and a date based on a content-based language-independent approach; exhaustively evaluating this measure on a real-world dataset and demonstrate extensive improvements when compared to state-of-the-art techniques; publicly providing a set of queries and ground-truth results to the research community.

[6] is based on implicitly year qualified query. Rather than solving the general problem of automatically determining user intent, this paper focuses on queries that have a temporally dependent intent. Temporally dependent queries are queries for which the best search results change with time. The search results for these queries should reflect the freshest, most current results. The algorithm relies only on having access to a query log with frequency information. It mines temporal patterns directly from query logs and do not make use of query frequency information or document timestamps. The foundations of the mining algorithm are built upon the assumptions: implicitly year qualified queries are strongly associated with several different years, and implicitly year qualified queries are associated with years more than they are associated with non-years. The mining algorithm takes a query as implicitly year qualified if it is qualified by at least two unique years. Even though a query is identified as implicitly year qualified does not necessarily mean that the query should always be treated as temporal in nature. This algorithm also finds these temporal ambiguities and checks if a query is always qualified with a year or not.

Freshness of web links is important to link-based ranking algorithms. Old pages have more time to attract in-links, but may contain stale information. A single web snapshot is unable to detect sudden changes which might indicate link spam and further smooth or neutralize the undesirable influence automatically. In [7], an probabilistic algorithm is proposed to estimate web page authority by considering two temporal aspects. First, to avoid old pages from dominating the authority scores, to keep track of web freshness over time from two perspectives: how fresh the page content is, referred to as page freshness; and

how much other pages care about the target page, referred as in-link freshness. To achieve this, web authors' maintenance activities on page content are mined. Each activity is associated with the time at which it occurs and temporal profiles for both pages and links are built. A random walk model is exploited to estimate the two predefined freshness measures. Multiple web snapshots at distinct time points are used, instead of a single snapshot. To make the link graph more stable, multiple web snapshots are connected by propagating authority flows among them, and so smooth the impact of sudden changes to particular snapshots on web page authority estimation. Several proximity-based density kernel functions are exploited to model such propagation. Combining web freshness measures, a semi- Markov process is utilized to model a web surfer's behavior in selecting and browsing web pages. The contributions of this work are : Quantify web freshness from authors' maintenance activities on web content over time, from the perspectives of page freshness and in-link freshness; Incorporate web freshness into authority propagation to favor fresh pages; Explore a series of proximity-based density kernel functions to model authority propagation among web snapshots; Conduct experiments on a real-world archival web data set and show the superiority of our approach on ranking performance in terms of both relevance and freshness.

III. Proposed Algorithm

a) Definitions

Explicit publication time of a web page refers to the time mentioned in the HTML body of a web page.

Inlink means the reference or link to the web page from other web pages.

Outlink refers to the reference or link from the web page to other web pages.

b) Algorithm

Step 1. Find publication time
Using exact / explicit publication time or
Time span detected from inlink and outlink and verified by matching.

Step 2. Extract the temporal concentration of the content and match it with publication time to make sure that the publication time is relevant or correct.
Step 3. Find the time span using all the documents retrieved.

Step 4. Build a binary tree using that time span.

Step 5. Show nodes from leaf to root.

IV. Conclusion and Future Work

In the existing papers, we can see that some works are done for explicit temporal queries and some are done for implicit temporal queries. The works done for explicit temporal queries use both publication time and content time. They are easy to implement because the temporal information is given by the user as a part of the query. For implicit temporal query, the main challenge is to find out that the query indicates a specific time period. After finding out which queries have temporal intent, the rest of the work is done like explicit temporal query.

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Global Journal of Computer Science and Technology: H Information & Technology
Volume 15 Issue 5 Version 1.0 Year 2015
Type: Double Blind Peer Reviewed International Research Journal
Publisher: Global Journals Inc. (USA)
Online ISSN: 0975-4172 & Print ISSN: 0975-4350

How to Successfully Implement a Corporate Taxonomy

By Kelly Wibbenmeyer
North central University, United States

Abstract- *Purpose:* The purpose of this paper is to develop a methodology to follow while implementing a corporate taxonomy.

Design/methodology/approach: The presented results are grounded in both academic literature on taxonomy and qualitative data from two departments within the same organization that implemented separate taxonomy structures.

Findings: The study identifies ten factors to consider when implementing a corporate taxonomy as well as a defined nine step process to implement when implementing a successful corporate taxonomy.

Research limitations/implications: The scope of the literature review and the case study were both limited as finding multiple taxonomy experts in one organization is rare, the account of the research is not considered exhaustive. The paper can assist practioners in a high level approach to implementing a corporate taxonomy as well as things to invoke to increase the chances of a successful implementation.

Keywords: *corporate taxonomy, enterprise content management (ECM), knowledge management, ontology.*

GJCST-H Classification: *J.4 K.4.2*

Strictly as per the compliance and regulations of:

How to Successfully Implement a Corporate Taxonomy

Kelly Wibbenmeyer

Abstract- Purpose: The purpose of this paper is to develop a methodology to follow while implementing a corporate taxonomy.
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Findings : The study identifies ten factors to consider when implementing a corporate taxonomy as well as a defined nine step process to implement when implementing a successful corporate taxonomy.
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Practical implications: Practioners are provided with an overview of the concepts that are instrumental in achieving a successful corporate taxonomy. The grounded knowledge within the context of this paper is also graphically displayed in a chart that provides detailed information on the importance of all enterprise content management (ECM) constructs which require a taxonomy structure for data retrieval capabilities.
Originality/value : This study is important due to data becoming increasingly important in organizations and a method for extracting as well as finding the right data when it is required is of vital importance within organizations.
Keywords: corporate taxonomy, enterprise content management (ECM), knowledge management, ontology.

I. Introduction

IN our fast paced world, data growth is swifter than ever before. Corporations are struggling to keep up with data security while implementing new technologies to stay competitive (Gallagher, 2002). Also, more regulations force organizations to implement data retention practices, which involve more time and resources (Beal & Griffin, 2012). Technology is increasing at a rapid rate which makes it difficult for organizations to retain employees that are not constantly receiving training on new technologies as organizational needs transform as customer demand changes (Moore, 2000). This constant churn in technology is causing employee burnout in IT departments (Moore, 2000). Also, customer demand is changing at a quicker rate, and the expectation for IT modifications is the greatest it has ever been (Moore, 2000). The rationale for the increase of technology innovation is due to the world becoming more technically savvy. IT departments have to find a way to keep up with customer demand while their infrastructure needs, such as updating security patches and ensuring data is available for upper management, increase in demand.

An influx of technology produces an increase of data (JCN Newswire, 2013). Large amounts of data allow organizations to use the information for analysis and analytics that assist in corporate strategy and decision making (JCN Newswire, 2013). An increase in data can also cause issues for organizations (JCN Newswire, 2013). The more data an organization has, the more expensive it is to store and manage the data. Also, data is available in various different formats that it is nearly impossible to place the data in specific classifications for comparative analysis (JCN Newswire, 2013). Data can also be structured (documents, data from databases) or non-structured (website or e-mail), which also adds to the complexity of organizational data ("IDBS transforms ELN," 2015).

Technology innovations and an increase in customer demand for IT services are causing organizations to rethink their past IT strategies. Organizations that have mass amounts of IT customizations throughout the various systems have unintentionally decentralized their data (Gallagher, 2002). Organizations that were known to implement technology customizations in the past are seeking ways to reduce customization and move towards the vendor base strategies to decrease turnaround time for upgrades to meet increasing technology advancements while meeting customer needs (Gallagher, 2002).

II. Enterprise Content Management

Regulations are a primary reason organizations standardize and streamline processes (Beal & Griffin, 2012). The management of data, such as the retention and disposal of data within certain time periods occurs via organizational content management practices (Beal & Griffin, 2012). Content management practices consider all types of media, like audio, visual, and text (Votsch, 2001). Votsch (2001) defined content management as any method for capturing, storing, and retrieving data for usability. The central point of a content management system is the standardization that

Author: PhD in Business Administration with an emphasis in Management Information Systems at North central University.
e-mail: kellyjason682002@yahoo.com

occurs with the management of the data to ensure easy retrieval and enhance the usability of the data (Votsch, 2001).

Organizations are seeking ways to organize data within enterprise content management (ECM) systems which can handle both structured and unstructured data (Vom Brocke, Simons, & Cleven, 2011). Maican and Lixandroiu (2014) stated that an ECM system comprises the methods to manage and deliver data, both content, and documents, that relate to organizational processes. There are multiple benefits of ECM systems within organizations (Vom Brocke, Simons, & Cleven, 2011). Some of the benefits are the ability to find data quicker and more efficiently as well as being able to manage records management practices in an electronic means, thereby reducing paper processing and storage of hard copy documents (Vom Brocke, Simons, & Cleven, 2011). Additional benefits of ECM systems are improvements in collaboration for both internal and external sources, as well as standardizing work management practices throughout the system (Hullavarad, O'Hare, Russell & Roy, 2015).

ECM systems have multiple features to ensure they work efficiently, such as a corporate taxonomy or content lifecycle aspects (Munkvold, Paivarinta, Hodne, Stangeland, 2006). A corporate taxonomy is a data standard that the organization, as a whole, uses to classify data (Brocke, Simons, Herbst, Derungs, Novotny, 2011). Developing a corporate taxonomy tends to be a large obstacle for organizations as the file systems within various departments are different which causes more data challenges (Brocke et al., 2011). A corporate taxonomy is a vital step in content searchability throughout the organization, which assists in the retrieval of data consistently across the organization (Brocke et al., 2011).

An ECM comprises multiple components. The ECM system manages all of the organizational data. Therefore, multiple systems integrate to present all of the enterprise-wide data. According to Gilbert, Shegda, Chin, Tay, and, Koehler-Kruener, H. (2013), the major aspects of an ECM system are document management, image-processing applications, workflow management, records management, web content management, social content management, and extended components management. All of these applications within systems are imperative in organizational data processing that results in efficient data management.

III. The Importance of Change Management And Standardization

Per Malek & Yazdanifard (2011) change management is the ability to plan and coordinate organizational modifications to every employee impacted by the change. During change management processing there is a shift from problem identification to a potential future state. An integral aspect of managing the change is to ensure employees are ready to accept the modification by presenting benefits as well as ensuring the employee has an active role in the modification, like being a champion for the prospective change.

Change management is vastly important to the acceptance of new system implementations, especially one that encapsulates the entire organization (Munkvold et al., 2006). One of the major components of ECM implementation is change management (Munkvold et al., 2006). Change management is vital to ensuring the implementation of ECM system and for the ongoing maintenance and support of the ECM system (Munkvold et al., 2006). If the resources are not willing to accept the changes, there is little likelihood that data entry will be standardized and the ECM system will be of no use (Munkvold et al., 2006). Standardization is a key aspect of the implementation of the ECM system (Munkvold et al., 2006). If there is no consistent standard for data, the data will not be reliable for reporting and other needs (Munkvold et al., 2006). Therefore, ensuring a common taxonomy is understood and is implemented throughout the organization is an important aspect of an ECM system.

IV. Corporate Taxonomy

All of the ECM system components are important pieces of the entire corporate taxonomy standard. An enterprise taxonomy standard ensures that no data silos are present (Gilbert et al., 2013). Data management is a complicated process and a workable solution that allows the appropriate users to access the appropriate data at the right time is vital to system viability within the organization (Gilbert et al., 2013). Businesses not only have to worry about how to manage new data but also how to manage legacy data within legacy systems (Gilbert et al., 2013). Determining how to handle legacy system data is an important aspect of building the corporate taxonomy as well. The development of a corporate taxonomy standard allows both new and legacy systems to interact (Gilbert et al., 2013). Data integrations allow the movement of data to interact across both new and legacy systems (Gilbert et al., 2013). Workflows represent the business processes within an organization (Vom Brocke, 2013). Work management processes may need to undergo a redesign to comply with the new corporate taxonomy standards to ensure standardization across the enterprise (Maican & Lixandroiu, 2014).

There are multiple issues when organizations do not implement a standard taxonomy (Munkvold et al., 2006). Some of the issues are data inconsistencies and therefore, reporting and analytics do not present accurate data and therefore, data integration is more difficult as data does not have a consistent naming

scheme (Munkvold et al., 2006). There are multiple reasons why the creation of data naming standards is beneficial to the organization. Data analytics are more timely and accurate when data is in a federated format and users have a better chance of finding information throughout the organization if the entire enterprise uses the same terminology (Munkvold et al., 2006).

There are multiple references from previously published works stating a consistent taxonomy is the only way to ensure standardization, but the previous studies do not address the method for the taxonomy creation (Barrera, Duran-Limon, Medina-Ramirez, Rodriguez-Rocha, 2012; Munkvold et al., 2006). The primary problem in organizational data standardization is that there is no specific methodology for developing a corporate taxonomy. Some organizations believe that every organization is different and departments within organizations have different needs, therefore it is very challenging, if not impossible to have a corporate taxonomy standard (Eden, 2005; Munkvold et al., 2006). Other articles state that a corporate taxonomy is the best way to manage enterprise data needs (Alexander, 2012; Woods, 2004). Regardless of difficulty, standard corporate taxonomy allows organizations the ability to manage data more efficiently and allows for maximization of information flow due to quick and accurate data availability (Alexander, 2012).

There are multiple things to consider when planning the corporate taxonomy, such as the data the organization uses, compromising strategies between departments on data standards, and ensuring one single unbiased person manages the project to ensure all parties are taken into consideration (Alexander, 2012). Regardless of the methodology, there are steps to take to ensure the various system and user needs are met. The prospective taxonomy implementation plan will not compromise data standardization, but will reduce organizational customization, and increase change management adoption. The primary purpose of the paper is to develop a specific methodology to follow while implementing the corporate taxonomy.

A previous study stated that certain aspects of current work processes will change to accommodate the software package (Votsch, 2001). There are other previous studies that state the taxonomy should be based on national standards to ensure organizational buy-in (Amado-Salvatierra, Hernández, & Hilera, 2012; Hlava, 2014). There is no existing literature regarding a specific process to follow to ensure the taxonomy will fit the needs of the entire organization. The primary goal of this study is to develop a corporate taxonomy implementation plan that any organization can deploy regardless of the software vendor or national standards. Therefore, this article, which is a qualitative grounded theory study addresses the current gap in the existing literature with the following research question:

RQ1: How does the organization ensure the corporate taxonomy will be used by all users of the system?

The research question relates directly to the study, as organizations are unique, and certain questions influence how to shape the organizational data needs such as understanding the current data formats within the organization. Also ensuring the change management and educational aspects of the corporate taxonomy are understood and implemented are important aspects to ensuring the taxonomy adoption occurs throughout the organization. Change management is an important aspect to take into consideration while attempting to adopt a new change throughout the organization.

V. Materials /Methods

There are multiple definitions to comprehend to ensure a total understanding of the important concepts that relate to building a corporate taxonomy. Previous works present different definitions for the major taxonomy components of knowledge management, ECM, ontology, taxonomy, and metadata which adds to the difficulties in comprehension of these terms. Therefore, prior to discussing these concepts any further, the next step is to define these terms and explain how they relate to each other.

Knowledge management is the process of giving the right data to the right people at the right time (Rahman & Somayyeh, 2013). Kotarba (2011) described knowledge management as a system of interconnected processes. The primary processes within knowledge management are resource identification, understanding the data usage within the organization, analysis of organizational needs, and understanding, acquiring, processing, and usage of knowledgeable resources (Kotarba, 2011).

An ECM is a compilation of processes and skills to manage information assets over the entire life cycle (Hullavarad, O'Hare, Russell & Roy, 2015). The primary goal of an ECM system is to streamline tasks by implementing automation that reduces workload, allows for version control, reduces data duplication, and improves search capabilities by presenting one version of the document in one managed location (Hullavarad et al., 2015). ECM systems allow organizations to manage content across the enterprise (Grahlmann, Helms, Hilhorst, Brinkkemper, & van Amerongen, 2012). To comply with regulations, organizations must manage content which in turn fosters a collaborative environment (Grahlmann et al., 2012). When organizational data mapping occurs via an ECM strategy, the organization is more likely to comply with big data standards and also be in compliance with regulations (Hullavarad et al., 2015). The ECM must be complete, generic enough to compare and search, and should always take the future possibilities of the data into consideration (Grahlmann et

al., 2012). Within the Hullavarad et al. (2015) paper, a process to implement an ECM is discussed. The implementation path offered in the Hullavarad et al. (2015) paper is to conduct a strategic roadmap, develop the ECM, deploy the ECM, and implement a support structure to ensure the continual support of the ECM. The high-level process of implementing an ECM is the same fundamental concepts in implementing a knowledge management system within the Kotarba (2011) paper. Therefore, it is vital that the fundamental notions of strategy development, developing the process, deploying the process, governance, and implementing a maintenance plan are vital to implementing both ECM and knowledge management processes.

An ontology uses relationships among attributes and employs rules regarding how the relationships interact (Byrne, 2004). Ontologies are the concepts of how knowledge interacts with a system (Byrne, 2004). The ontology contains the business rules within the organization and is the basis for the taxonomy within the organization (Kotarba, 2011). Ontology practices within organizations provide consistent information regarding roles and duties as well as overall organizational processes (Castillo-Barrera, Duran-Limon, Medina-Ramirez, & Rodriguez-Rocha, 2013). Organizational rules will form the basis for the relationships between various objects within the system as well as constitute the basis for the integrations between systems (Kotarba, 2011). As the ontology undergoes development, consistent data structures, or data class generation occurs, this is known as the taxonomy (Castillo-Barrera et al., 2013). Taxonomy is a standard set of terms that can be hierarchical and represent the organizational content requirements (Byrne, 2004). Metadata or attributes describe the data throughout the lifecycle of the data (Sheriff, Bouchlaghem, El-Hamalawi, Yeomans, 2011).

Document management systems (DMSs) use ontologies and taxonomies to manage structured data within organizations (Castillo-Barrera et al., 2013). DMSs reduce costs as printing and physical file storage are no longer issues as electronic retrieval is available (Castillo-Barrera et al., 2013). Full-text searching and indexing are other features available within a DMS, which reduces time to find documentation (Castillo-Barrera et al., 2013). The taxonomy assists with document retrieval and alleviates parsing through mass quantities of data to find required information. For example, a file management system allows for searching, but the schema for searching retrieves all data with the search term listed, which can take a long time to parse through.

Knowledge management systems influence the financial decisions made within the organization as data extrapolation occurs to make business decisions (Kotarba, 2011). The data that resides in the ECM feeds the knowledge management system to ensure data is available at the appropriate times. The ontology is found within the ECM as it comprises the rules for the data within the ECM. The ontology is the theoretical aspect of the ECM as it represents all of the data models and how they interact (Byrne, 2004). The taxonomy works within the constructs of the ontology and is the system vocabulary of definitions (Byrne, 2004).

Castillo-Barrera et al., (2013) defined an ontology as a method to define terms that represent a particular area of knowledge. The ontology outlines the relationships and theories that describe the organizational data structure (Castillo-Barrera et al., 2013). The knowledge management system takes the information from the ontology and optimizes the data to increase organizational competitiveness (Castillo-Barrera et al., 2013). Therefore, ontologies are foundational to knowledge management systems (Castillo-Barrera et al., 2013).

Knowledge management and ECM coexist in different facets of the organization. Nordhiem and Paivarinta (2006) and Paivarinta and Munkvold (2005) state that ECM is a subcomponent of knowledge management as ECM systems manage data within the knowledge management system. Munkvold et al. (2006) as well as Paivarinta and Munkvold (2005) argue that the fields in an ECM are much broader than what is in the knowledge management systems, such as how scanning occurs within organizations. Other authors state that even though ECM systems support knowledge management functions, both systems are different with some overlapping features (Herschel & Jones, 2005; Kuechler & Vaishnavi, 2006). ECM systems are much broader than knowledge management systems as ECM systems manage both informational and digital information that do not belong to the knowledge management system (Vom Brocke, Simons, & Cleven, 2011). Therefore, the ECM framework and knowledge management functionality represent two different but coinciding systems of thought.

ECM systems also integrate document management, content management (via the web), and record management technologies (Vom Brocke, Simons, & Cleven, 2011). The integrated content concept for an ECM stems from the notion that the management of all organizational data occurs within the ECM (Vom Brocke, Simons, & Cleven, 2011). Besides managing all content within an organization, the ECM must also control versioning of data, searchability of data, and storage of data (Vom Brocke, Simons, & Cleven, 2011). A graphical depiction of the relationship between knowledge management, ECM, ontology, and taxonomy is below in Figure 1.

Understanding the basic concepts of how knowledge management, ECM, ontology, and taxonomy integrate is an important aspect of the research. The

purpose of this article is to propose a specific methodology for composing a corporate taxonomy, but it is vital that the reader understands how all of the concepts relate to each other as that relationship is an important aspect of the creation of the taxonomy proposal.

VI. The Importance of Corporate Taxonomy

A corporate taxonomy allows data to be searchable (Vom Brocke, Simons, & Cleven, 2011). If the data contains searchability issues, then the system users will have difficulty using the system and user adoption issues will occur (Vom Brocke, Simons, & Cleven, 2011). A corporate taxonomy organizes the data within the system by normalizing data throughout the organization (Vom Brocke, Simons, & Cleven, 2011). Access control of data is of great importance as a poorly designed system can lead to data theft or unintentional data access (Vom Brocke, Simons, & Cleven, 2011). Organizations should understand the access control restrictions and not make the system too restrictive else, it will impede end user usage of the system (Vom Brocke, Simons, & Cleven, 2011). Cybersecurity and big data requirements should also be taken into consideration when dealing with system access and security features (Vom Brocke, Simons, & Cleven, 2011). Access control and other security mandates are important aspects of understanding prior to devising the corporate taxonomy standard for an organization.

Another important concept to understand when creating a corporate taxonomy is the difference between structured versus unstructured data. Structured data is formally defined data usually kept in a database or numerical data (Markham, Kowolenko, & Michaelis, 2015). Structured data uses a classification system via the use of metadata or attributes (Gardner, 2014). Metadata is information that describes the data (Payne, 2013). Some examples of metadata fields are the audience for the data, the language the data is in, and the source of the data. Attributes are specific data fields from a common set of values (Payne, 2013). An example of an attribute field is color, and a set of responses for the attribute would be red, green, blue, and orange. Unstructured data comprises notes, text, and other data that lacks metadata (Gardner, 2014). Structured data uses a standard taxonomy classification system, which value rich metadata and tagging that is inherent in the taxonomy ("Semantic content enrichment", 2011). There are multiple tools on the market which add metadata tags to add value and structure to unstructured data ("Semantic content enrichment," 2011). The addition of metadata tags to unstructured data allows for data management within the data analytics tool ("Semantic content enrichment," 2011). The data analytics tools within organizations provide valuable data to end users and is part of the knowledge management process. Therefore, both structured and unstructured data is of great importance to the implementation of a corporate taxonomy.

Data and workflow management are challenging when attempting to merge systems with structured and unstructured data (Grahlmann et al., 2012). Therefore, interfacing technology is a vital aspect when managing all organizational data (Grahlmann et al., 2012). The ECM system, with the use of the ontology rules and taxonomy, deals with the management of unstructured data (Vom Brocke, Simons, & Cleven, 2011). Multiple other studies state ECM systems combine both structured and unstructured data, which occurs through the integration of applications that contain structured and unstructured data (Chu, Chen, & Chen, 2009; Nordheim & Paivarinta, 2006). Therefore, all data, both structured and unstructured, is centrally located in the ECM system which enables enterprise workflow management to occur.

VII. Theoretical Perspective

There is one major theory and one concept that relate to the implementation of a corporate taxonomy; Lewin's change management theory and the theory of Martec's Law. The goal of Lewin's change management research was to understand why change occurs, generalize change practices, and improve the planning of change throughout society (Johnson, 2014). Change management is very popular in today's society due to a rapid pace of technology which promotes constant organizational change (Johnson, 2014). If organizational resources do not embrace change, failure is imminent (Jaffar & Weistroffer, 2012). Developing a corporate taxonomy will require buy-in from all aspects of the organization as well as senior management support to ensure all levels of the organization are implementing a consistent taxonomy across the organization (Jaffar & Weistroffer, 2012). If various departments choose to opt out of the taxonomy, then the data consistency factor is not complete. The rationale for a corporate taxonomy is to streamline structured data for consistency across the organization. Data consistency leads to dependable data, and organizational knowledge becomes more dependable (Munkvold et al., 2006). Therefore, corporate taxonomy is the best way to standardize data across the organization and enhances data analytical output.

Technology is changing at such great rates that organizations will be unable to keep up with the increasing demands (Brinker, 2013). Organizations are reducing complexity to create data standardization and to be able to keep up with customer demand (Wadhwa & Harper, 2014). Therefore, organizations must be

strategic in what organizational changes to implement (Brinker, 2013). Martec's Law states that organizational change occurs steadily, whereas technology changes occur at an increasingly rapid rate (Brinker, 2013). This concept is another important rationale supporting the creation of a corporate taxonomy. As long as corporate data remains unstructured and has no ontology rules to formalize the data, analytics will not be accurate as data will not have any consistency. A corporate taxonomy adds data consistency to the overall organization and allows for a method for finding and classifying data (Jan, Simons, Herbst, Derungs, & Novotny, 2011).

VIII. Study Overview

The study involves a large U.S. electric utility organization that uses the same electronic document management system in two separate departments that has two separate taxonomy implementations. The qualitative grounded theory design allows the system administrators and end users to present their rationale for the different implementations of two different taxonomy systems that presents the differences and similarities within the taxonomies, and their thoughts on the idea of structuring a corporate taxonomy. Within a grounded theory study, data collection and analysis occurs until a theory emerges (Glaser & Strauss, 1967). Coding of common themes emerge and an extensive literature review occurs to determine if there are similarities in existing data (Glaser & Strauss, 1967). The goal of grounded theory research is to discover basic patterns that evolve into theory generation (Glaser & Strauss, 1967). The theories that evolve from grounded theory research change until all observation is complete (Glaser & Strauss, 1967). Grounded theory studies are useful when trying to develop new theories that are based on existing research (Glaser & Strauss, 1967).

The study involves an organization that has resident taxonomy experts, which deployed two separate taxonomy structures. There are only two departments within the larger organization that currently place their documents into a system that incorporates a taxonomy structure. The rest of the organization is actively looking for ways to structure data to account for the increasing need to provide data analytics and overall enterprise data management. Therefore, a grounded theory approach works well to extrapolate the data from the taxonomy experts to determine the best method for deployment of a corporate taxonomy structure within the organization.

Interviews are the main data collection method. Secondary sources of data were found in documentation and follow up calls to validate the responses. The first organizational business segment implemented their taxonomy in the 1990s, this organizational unit, is classified as department A throughout the rest of the paper. The second organizational segment, which is classified as department B throughout the rest of the paper, reviewed department A's lessons learned and came up with a preferential method of taxonomy deployment in the late 2000s. A taxonomy specialist was brought in to assist with data collection to enhance the change management principles for department B's implementation. The organization is a suitable organization to use for the grounded theory study as multiple employees have a thorough understanding of taxonomy benefits and challenges. The selection of study participants was based on users that were well-known taxonomy experts within the organization, end users of the taxonomy system, as well as IT system administrators who manage the data within the system.

The qualitative question is in direct alignment with the primary purpose of the paper, which is to develop a specific method to implement a corporate taxonomy. A total of five people (two from department A and three from department B) were interviewed, with an average length of 60 minutes. The interviews were manually documented during and reviewed after the interview. The interviews focused primarily on the following areas:

1. document management taxonomy current practices and challenges;
2. difficulties implementing taxonomy within the department or organizational segment; and
3. implementing a corporate taxonomy and the perceived challenges and benefits.

IX. Study Results

Prior to discussing the results of the study, a general overview of the two separate departments is an important aspect of the study. The departments are vastly different in the methodologies used to implement the taxonomy. After the overview, the discussion continues with the major themes of the study.

Department A, had a very flat taxonomy (over 1,000 classes), due to the limited timeframe to place all of the documentation in the system. Department A decided to migrate the class structure from the mainframe system to the new document management system. The implementation occurred in the early 1990s, and there was no resident taxonomy expert present during the taxonomy implementation. The flat taxonomy made it very difficult to find anything in the system. Department A had approximately 100 data entry clerks who handled data entry in the document management system. Allowing specifically trained groups of users to take responsibility for data entry ensures that the data entry process is consistent, which aids in users searching and finding their documentation. End users were able to find data in the system since the data was consistent, but not without initial challenges.

The data clerks provided assistance to end users who could not find their data, this aided in taxonomy adoption as the experts were on site and easily accessible. After ten years of experts performing data entry, end users were able to quickly add documentation to the system as they understood how to classify the data after ten years of searching within the system.

Department B implemented a high-level class structure, with only 12 classes. The reduction of classes increases the likelihood that end users find their files. Also, finding data was easier and more efficient than ever before. Department B reviewed the lessons learned from department A and spent time interviewing the users of the current document management system of the current issues within the system. There was no existing taxonomy within department B's document management system and end users were having an extremely difficult time retrieving documents from the system due to the lack of taxonomy. During the implementation of department B's taxonomy, end users required more efficient and easier access to documents and therefore, end users were more hands on in the implementation. There were controls and workflows put in place to allow end users to create documents, but the documents were not approved until data review occurs with the data taxonomy specialists. This method allows the flexibility to add documents and the controls needed to ensure documents are in the system correctly for later searchability.

The two separate implementations of the taxonomy had some large differences as well as some similarities. Department A, implemented a flat taxonomy due to incorporating the taxonomy structure from legacy mainframe systems whereas department B, implemented a brand new taxonomy from users insights and a migration path to enter legacy data into the new system. Both departments were successful with the taxonomy implementation due to the use of a set of super users who handled data entry and validation.

There were multiple major themes that emerged from the study to ensure a successful taxonomy implementation within an organization. Every study participant discussed two vital aspects to consider while implementing, namely end user concerns and workflow.

Therefore, these items will be discussed first. After the end user concerns, workflow, and taxonomy governance discussion, this article changes direction and a discussion of benefits of a taxonomy, issues that occur when implementing the taxonomy, and finally how to guarantee a successful taxonomy implementation is present.

a) End User Concerns

The taxonomy specialist within both departments spoke about the end user needs. End users want to find their data, but do not want to spend the time placing their data in the system accurately to find later. Pincher (2010) states that if organizations want to be successful, all users must understand your content. End users have great difficulty understanding the taxonomy at first. Therefore, the usage of specialist for data entry is a huge plus, if the organization can allocate resources for data validation practices. Pincher (2010) states that content managers and owners are imperative to ensuring content is correct. Content managers approve and edit content and content owners publish content and apply appropriate metadata (Pincher, 2010). Allowing the end users to use the system as a search tool shows the end users how useful the system can be regarding finding their documents quickly. Therefore, when the organization decides to allow end user data entry, the end users will be more cognizant regarding taxonomy to ensure searchability and retrieval ease when finding their documentation.

b) Workflow

Workflow is an important aspect of taxonomy implementation as it determines who is performing what tasks in the organization to ensure data creation and storage is correct. If workflow is not used regularly then it will have a difficult time being accepted by the end users. Minimizing clicks and simplicity is a requirement when dealing with the workflow. Pincher (2010) states that ease of use and user adoption run parallel to each other. Workflow flexibility is a key aspect of workability and user adoption (Pincher, 2010). In department B, the workflow is used one to five times a year and failed because of no consistent usage. The end users did not want to spend the time learning and understanding workflow as they felt it was bothersome. They preferred to work outside the system on the infrequent tasks. In department A, the workflow is in use constantly, and department A has had great success implementing workflow in the organization.

c) Benefits of a Taxonomy

The benefits of implementing a taxonomy were consistent across all interviews. Creating a taxonomy allows for less paper and shipping expenses, as the documents are all in one location, and end users print out their documents. Finding documents is easy and is a huge time saver throughout the organization. Document organization and searchability are two key aspects of any taxonomy (Pincher, 2010). All documentation is in one system, and there are multiple ways to search and find data. Therefore, documents that were once lost can now be found easily. All of the documents are consistent across the organization, therefore if a user changes departments or locations, their rules and standards are the same.

d) Issues with Taxonomy Implementation

There were issues with the taxonomy implementation. Department A implemented a flat

taxonomy with many (over 1200) classes, and users are constantly asking for more classes to add to the system. The rationale for adding more classes is that there is already 1200, what's one more? Everyone wants their specific rules in the system. Pincher (2010) states it is vital to clean out old data prior to implementing a taxonomy to ensure success. Department B did not have this problem after the taxonomy was implemented, but during the initial conversations it was difficult to achieve consensus. Multiple organizational silos with multiple data systems make it challenging to find consensus. If the taxonomy is not correct on the outset, it is difficult to modify later on. Department A wishes they had time to clean up data prior to implementing the system, but they did not and they have been struggling with taxonomy issues ever since they went live. Therefore, it is imperative to determine what to do with legacy data prior to implementation. Legacy data must be migrated or integrated into the new system. End users were very confused with the initial system rollout and did not see a huge benefit at first. The rollout was a big change and change management practices are imperative to obtain buy-in from all parties.

X. How to Guarantee Success When Implementing a Corporate Taxonomy

The participants spent the majority of the time discussing their current department taxonomy implementation. The taxonomy experts gave their advice regarding things to do to ensure success when implementing a corporate taxonomy. Although many topics were present in the research, the items below were consistently present in the interviews with participants.

a) Good Change Management Practices

Good change management is imperative to taxonomy success. If the organization does not educate and train all members regarding why the taxonomy is important, it will fail. The system will fail if end users do not understand the benefits of the system. Therefore, change management is imperative to the implementation of a corporate taxonomy. A good change management practice not only has backing from senior management for the implementation but to ensure the user community is ready to accept the change (Decker, Durand, Mayfield, McCormack, Skinner, & Perdue, 2012). The implementation should remove as much complexity as possible to ensure a good change management perspective (Decker et al., 2012).

b) Senior Management Support

Senior management support is crucial to the implementation of a corporate taxonomy. If the senior leaders do not fully support a corporate taxonomy, the implementation will fail. Senior management support should drive the effort, ensure appropriate resources are available to support the effort, and ensure other resource requirements are available for input. Without senior management support, the taxonomy effort will not be successful as the only way to get all members of the organization consistent focus is via senior management support (Janvrin & No, 2012).

c) One Person to Manage the Effort

A specific person should handle the corporate taxonomy effort. Having one overall point of contact ensures the data and software silos have one person as a focal point of contact. Having one person that is not specifically tied to any one of the department silos also ensures there is no favoritism during the implementation of the taxonomy. This person should have an excellent understanding of taxonomy and the other corporate regulations that must be met after the taxonomy is in place. De Koning, de Mast, Does, Vermaat, and Simons (2008), state that when implementing any project, one main person should be responsible for the roll-up of the entire plan as this person has an understanding of the total effort and can influence other aspects of the project when necessary. Some of the specific regulations or corporate policies that should be considered are data security compliance, data classification standards, and records management practices. The taxonomy must be driven by the tools used within the departments, which means the taxonomy is not driven by software but by organizational need within specific software implementations. The person responsible for the taxonomy effort should also ensure it is understood in every application how to deploy the taxonomy with the application, train users, and have guides and other support documentation to support the effort.

d) Limit the Taxonomy Structure to High-Level Classes

The biggest reason for taxonomy success within department B was due to limiting the number of classes. If the taxonomy sticks to a high-level class structure, a reduction in the amount of time to structure data in other non-taxonomic systems will occur as it is easier to classify data into groupings of 10 or 20 versus 100. Pincher (2010) states to limit the classes to six to twelve high-level classes to ensure success. The taxonomy should also only consist of two or three levels deep to continue the simplistic concept (Pincher, 2010). Also, training is easier throughout the organization with a reduction in classes. There are fewer disagreements in the data structure and classification when the taxonomy is limited. For example, one of department B's classes is policy. In another organization, policies were broken down into specific types of policy. Instead of adding an attribute stating the policy was a corporate policy versus a department policy, a class was added which led to confusion and disagreement. Therefore, implementing a high-level taxonomy and using metadata to add detail

to the documentation is the best route to ensure corporate taxonomy success.

e) Governance

One of the most important aspects of taxonomy administration is having a team of taxonomy experts decide on taxonomy modifications. Pincher (2010) states that a governance board should define the overall strategy and ensure appropriate content standards are being met. The taxonomy team should also ensure content entry is appropriate as well as developing standards for metadata (Pincher, 2010). The governance team should consist of a minimum of six and a maximum of 12 members (Pincher, 2010). The members in department B state that the number of members on the governance board should be representative of the organizational population, but to ensure there are not too many members else, no decisions will be made, due to lack of agreement. The members should be representative of the organization. Department B had a governance structure in place from the outset of the taxonomy implementation and made few changes to the structure. The taxonomy governance team is very stringent regarding what constitutes a new taxonomy class and what is added as an attribute or metadata. End users are consistently requesting new classes, and the governance team determines if it is a valid request, and if the request is valid, a thorough discussion regarding data integrity ensues. This team over a five year period has only added four new classes, and two of the four classes are system based classes.

f) Work on the Taxonomy First

The taxonomy is the most important aspect of the data classification system and, therefore, should be the primary focus before any data is put into a system. Pincher (2010) states that if corporations start with the taxonomy first, it builds a foundation for organizations to expand their designs. If the organization does not work on the taxonomy first, disorganization occurs and leads to lack of user adoption issues as well as system confusion (Pincher, 2010). The taxonomy structure should be complete prior to working on any other data aspects of the system, like security, records management, or data classification. The secondary aspects are important and can influence the taxonomy structure, but should not override the overall classification structure. For example, many departments within the organization are working towards records management initiatives and want the taxonomy to follow how the department classifies data. Each department can classify data retention differently and if the organization attempts to create the record management structure and hope that the taxonomy matches will fail greatly. The organizational goal is to have a corporate taxonomy and not a standard for managing records throughout the organization, this is important to remember when working on corporate data initiatives as users tend to be narrow focused when attempting to complete a specific task.

XI. Discussion

In summary, the grounded theory study presented multiple concepts to take into consideration when attempting to establish a corporate taxonomy. The results are summarized in Table 1 below.

Table 1: Things to Consider when Establishing a Corporate Taxonomy

Keep the taxonomy simple and at a high level
Senior management support is critical
Only use workflow if users are going to consistently use it
Think about legacy data and clean it up prior to placing into a new system
Have a group responsible for data entry (at least at first)
Continuously train organization
Have great change management practices
Have one person responsible for the overall effort especially in large organizations
Have a governance board in place to make decisions
Work on taxonomy before any other corporate data initiative to reduce rework

a) Unstructured Data

There were some concepts that were not present as the grounded study was specific to two instances of a document management system and did not involve unstructured data. Much of an organization's data is unstructured data due to the expansion of web pages and media. Participants from department B stated that content that was previously classified in the document management system would be linked to web pages but web pages themselves were not classified. Additionally, study participants noted that e-mail messages could contain important data, and if data was important enough to capture, then it was entered into the document management system manually. Pincher (2010) states that corporations need to determine what data they want to classify and what data does not require classification. Unstructured document management, such as the management of web pages is complicated. Traditional document clustering occurs in a manual form that is not conducive to the rapid rate at which web development occurs (Singh, Hsu & Moon, 2013). New advances in technology offer an on-the-fly assignment of data on web pages, some examples include Clusty (www.clusty.com) or Grokker (www.grokker.com) (Singh, Hsu, & Moon, 2013). The advancements in technology present an important concept regarding data analytics and data storage. All data in the organization is stored somewhere, but not all

data is transformed into data analytics. Organizations should be cognizant that not all data is required for usage.

b) Specific Methodology when Implementing a Corporate Taxonomy

Table 1 discusses the factors to take into consideration when implementing a corporate taxonomy. The development of Table 2 below is based on interview data from respondents in conjunction with the data from Table 1 above. Additional detail for each step is outlined in this section.

Table 2 : Steps to Take when Implementing a Corporate Taxonomy

1.	Obtain senior management support
2.	Name a responsible person to run the project (this person also is in charge of the governance meetings)
3.	Obtain contacts from all sub segments of the organization
4.	Ensure contacts understand and buy into rationale for corporate taxonomy structure (these are the champions for the sub segment of the organization).
5.	Taxonomy specialist runs through multiple simulations of taxonomy types (see table x for basic dictionary used by department B)
6.	Simulations occur until there are between six-12 high level classes
7.	Formulate sub classes if needed ensuring that the levels do not go further than three levels deep
8.	Test class structure once completed
9.	Review next steps (security, records management, data classification) to determine the next area of focus

c) Obtain Senior Management Support

As mentioned above, senior management support is crucial to ensuring buy in within the organization. If everyone in the organization is not collaborating on the effort, the taxonomy concept will fail. Per Gunnlaugsdottir (2012) the top three areas that influence a successful taxonomy are user input, training, and senior management support. Communication regarding a corporate taxonomy should also flow from the top management to ensure the organization understands that it is an organizational priority.

d) Name a Responsible Person

The person that is named to run the taxonomy project should have a background in document management, have a clear understanding of organizational standards, and have a background in Information technology (IT). The responsible person should also understand database management that will assist in understanding data structures in the organization. Having a solid background in project management will also assist with the implementation plans and coordination activities. The taxonomy specialist will be running the governance meetings as well as meeting with other organizational contacts that influence the integrations for taxonomy management, such as records management specialists and corporate committees that create standards. The taxonomy specialist handles interoperability that interconnects with end user informational needs. Per Verlag (2011), there are multiple components to ensure the taxonomy is running smoothly across the organization and having someone specifically running the taxonomy project will ensure all organizational units are represented. It is also vital that the responsible person has the authority to make decisions within the organization.

e) Obtain Contacts

The taxonomy contacts should be members of the existing organizations and have background experience with the data within the organization. The contact should be the person able to make decisions in the organization and have great communication skills as this person will handle communication within the subgroup. The contacts should be able to commit themselves to the project and ensure the subgroup has representation at all meetings. A separate change manager should also be in attendance to assist with the success of the project.

f) Ensure Contacts Understand the Process

The contacts are going to be the spokespeople for the process. Therefore, it is vital that they understand the process and have a working vocabulary of taxonomy terms. The simulations should not occur without obtaining all members buy in and support on the process. Having a change manager present will assist with the implementation process as well. Having a workshop to explain the benefits of taxonomy as well as the challenges of implementing a taxonomy is an important aspect of the learning process. This knowledge transfer assists in the understanding of why the taxonomy is important and increases buy-in from the team members. Appropriate training is vital to the success of the taxonomy implementation (Gunnlaugsdottir, 2012).

g) Perform Simulations Until High-Level Structure Emerges

Once all members have a basic knowledge of taxonomy and understand the organizational benefits. Simulations occur when end users present documents in a group setting and everyone classifies the documents. There are multiple ways to perform the simulations. An open forum occurs when all users show and review the documents and judge the documents based on their perceptions. A closed forum occurs when users vote on what they think each document should be. A mix of these procedures can also occur. The taxonomy specialist is in charge of running these

simulations. Pincher (2010) states that obtaining a high-level taxonomy structure is the key to understanding and user adoption of the class structure.

h) Create Sub-Classes

During the simulations, the taxonomy specialist handles running the meetings and continuously voicing the rule of six to 12 top level classes and two to three subclasses. Consensus should dictate the classes. All classes should be generic in nature to fit all aspects of the organization. In an event where participants will not agree, then the taxonomy specialist has the deciding vote. Pincher (2010) encourages organizations to leave the sub-classes at a high level to ensure a high-level structure that is viable within the entire organization.

i) Test Class Structure

Once the class structure is complete, it is important to complete more simulations. Does everyone agree that certain documents fit into certain classes? If not, then it is important that a consensus or understanding is achieved prior to completing the class structure exercises. In this step, it is also important to define terminology for the classes. For example, if one of the high-level classes is a procedure, define procedures. If there are subclasses under the procedure, ensure the high-level class definition makes sense with the lower class structures. Validating the potential class structure is another important way to obtain buy-in from the group (Pincher, 2010).

j) Review Next Steps

To continue the momentum of taxonomy project, it is of great importance to start the project work of determining system alignment. The taxonomy specialist will meet with each of the contacts to determine the systems of impact and how to implement the taxonomy in each system, determine if the system needs to be integrated into another system, or some other method of implementation. Since records management, security, and other mechanisms may be department-centric, these facets can be interwoven into other projects as they emerge. The taxonomy specialist will be a key role in organizational data security measures and information analytics within the organization.

k) Implications

There are multiple aspects of the study to take into consideration when reviewing the best method for implementing a corporate taxonomy. The steps in this paper describe an overall high-level process of implementation. As every organization differs in structure, the method to deploy a corporate taxonomy should fit the specific needs of the enterprise. The grounded theory study is formed from interviews and follow-up conversations with five taxonomy experts within one organization within two different departments. Therefore, the participants were limited to the study. It will be challenging to find multiple taxonomy experts within one organization as it is a unique skillset to encounter within corporations.

There is a need for additional research on the best method to implement a corporate taxonomy to obtain some common ground for practitioners. Understanding how organizations manage unstructured data would also be a benefit to the current foundational literature on the corporate taxonomy subject. Also, organizations that are currently implementing a corporate taxonomy should compare and contrast the method of implementation against the method above to determine if additional insight can be added to the body of research.

XII. Conclusion

In conclusion, the research directly relates to Lewin's change management theory as the study results show that change management is vital in ensuring organizational implementation success. The planning aspect of Lewin's change management theory is especially dominant in the grounded theory study above. Multiple participants stated that planning for the implementation and ensuring all parties are a part of the project is the only way to achieve success. Planning is especially important with something as wide-scale as a corporate taxonomy that impacts the entire organization. Martec's Law is also prominent in the research above as technology is changing at such rapid rates it difficult for organizations to work on foundational data projects while attempting to maintain the current work progress.

The article presented a grounded theory study that reviewed two separate taxonomy structures within one organization based on the timeframe and organizational needs. Multiple similarities and differences between the two department's taxonomy were present to provide background information. The outcome of the study presented major themes such as end user concerns, workflow management and how to be successful, benefits of taxonomy, issues with taxonomy implementations, and how to ensure a successful corporate taxonomy implementation. In the discussion section, a specific procedure is available which presents an optimal solution to implement a corporate taxonomy. Therefore, the article answers the primary purpose of developing a methodology to follow while implementing the corporate taxonomy in organizations.

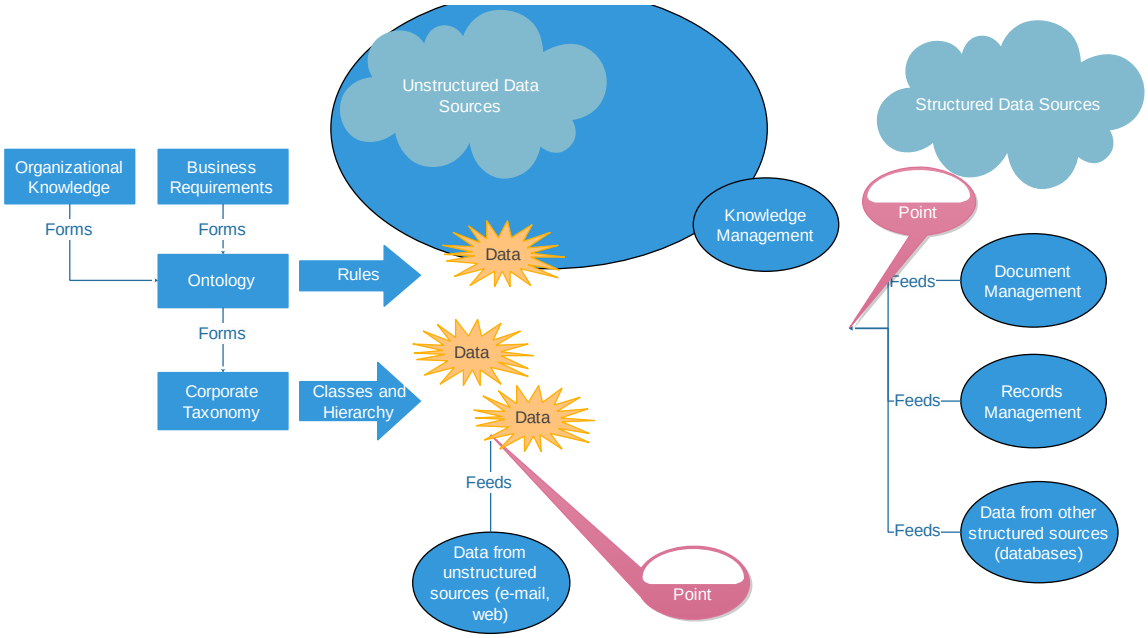

Fig.1. Knowledge Management, ECM, Ontology, and Taxonomy Concept Map

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Global Journal of Computer Science and Technology: H Information & Technology
Volume 15 Issue 5 Version 1.0 Year 2015
Type: Double Blind Peer Reviewed International Research Journal
Publisher: Global Journals Inc. (USA)
Online ISSN: 0975-4172 & Print ISSN: 0975-4350

Improving E-Learning Performance Through Social Communications

By Mohammed Yaqub

Abstract- E-learning is a way of teaching by using modern communication mechanisms of computer networks, multimedia of (sound, image and graphics), electronic libraries and search mechanisms, as well as Internet portals, whether remote or in the classroom. The aim is to use all kinds of technology for the delivery of information to the student in the shortest time with less effort and greater benefit. In this paper, we attempt to solve the problem of isolating or missing social interactions of learner request, the professor perhaps not be always involved in the request and the missing of competitions and quality. To improve e-learning, it is recommended to it with sociality. In this paper, we used some algorithms such as (k-mean algorithm, decision-tree algorithm, Apriori algorithm, course rank algorithm) as tools to achieve our goals in finding most suitable friend and most suitable course for the user's.

Keywords: collaboration technologies, e-learning, open social learning network "osln", learning management system, social network.

GJCST-H Classification: I.2.6 C.2.0

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I. Introduction

Since the 1990s, the rapid development of information knowledge not only provided a boost to the revolution in a community-wide application of information technology, but also led to revolution in educational information technology. Educational information technology gradually break with the traditional theories and ways of education, and drive the reform of education in its mode, thought, theories and concepts , basis of these over an educational goal named "lifelong learning" was put forward to the public. With the deepening of Education information technology [1][2].

E-learning allows learners individually to learn “any location, anytime” and offers immediate access to specific information. E-learning is essentially the coalition practice unlike other technologies. E-learning technology is not mature and can find the multiplicity of standards [3][4]. E-Learning Revolution is a process of learning by enabling new technologies, which will hopefully be offered a learning process efficient and effective, which does not exist today [5]. E-learning teaching design is a complex project that involves many recent theories of course [6].

The root of e-learning is not paradigm shift from what went before but growth and development from previous practice and theory [7]. A social network is a structure formed by people and by connections between people, with the connections enabling interactions and exchange of information and influence [8]. Social networking is definitely not a new phenomenon in the field of education and teaching. It could be claimed that at some point in history we forgot the importance of social network in the learning process [9]. This phenomenon not affect only the way how learner perceives education based on Social Network but also affect how training establishment can achieve their goals related to e-learning. All these reasons require greater attention to the evaluation of e-learning systems [10]. The system evaluation is not just the final phase of the process of software development, but also it should be seen as an important information source throughout the complete software life cycle [11].

a) Clustering in E-learning

Clustering is a data mining that divided the data into groups where learners belong together. Each learner is assigned to the group that is most similar to each other's. Clustering doesn't require a prior knowledge of the groups that are formed. Many algorithms to apply clustering. The most famous clustering algorithm is the K-Means algorithm presented by J.B. Mac Queen in 1967 [12]. It's one of the simplest unsupervised education algorithms, it's very fast [13] and iterative in nature [14] that used to classify features into k number of group. The grouping is done by minimizing the similarity between the learners and the corresponding cluster centroid [13] where learners are moved among the set of cluster until required set is reached. In our proposed system, analysis of social networking sites is totally dependent on clustering algorithms [14]. We cluster students based on information taken from user profile. Initially we choose learner preferences as the clustering criteria. The most specific pre-processing method is a compilation method to generate patterns that would work as heuristics to design social networking more effective sites. To make up for this, individualization can be achieved by association rule technique. The advantages to first apply clustering is not only to scale down the candidate sets, but also to guide association rule into a more focused area where high quality, personalized recommendations can be made.

Author: Anbar, Iraq. e-mail: yaqubmoha@gmail.com

b) Association Rules in E-learning

Association rule is usually divided into minimum support is applied to find all frequent itemsets in DB and these frequent itemsets and the minimum confidence constraint are used to form rules [14]. We use Apriori Association Algorithm that is an influential algorithm for frequent exploration itemsets for Boolean association rules [12]. Apriori Association rule used to mine the frequent styles in database. Support and confidence are the normal method that used for measuring a quality of association rule. Support for the association rule X->Y is the percentage of transaction in DB that contains XUY. Confidence for the association rule is X->Y is the ratio of the number of transaction that contains XUY to the number of transaction that contain X. Support and confidence formulas are defined as [14]:

$$supp(A \rightarrow B) = \frac{\#\ records\ containing\ for\ Both\ A\ and\ B}{Total\ Records}$$

$$conf(A \rightarrow B) = \frac{\#records\ containing\ for\ Both\ A\ and\ B}{records\ containing\ A}$$

The main aim of this paper is to build e-learning system in the form of open social learning network using enhanced e-learning integrated with social techniques. The system should be capable of improving the overall performance of student activities similar to "face to face" traditional model , improving the overall timing of user's actions, forming a scalable e-learning framework for any type of users and instructors, finally efficient and easy learning system that students can interact with it.

This paper goes as follows: in section 2 we present a related work of previous utilization of social network in e-Learning. Section 3 presents the proposed framework and offline and online components. Section 4 presents the experimental results and evaluation of proposed system. Section 5 presented conclusion of this paper. Paper ends with references.

II. Related Work

In many other systems, and although many of advanced algorithms and tires are designed for describing the e-learning, and these frameworks, such as:

Blackboard provides the foundations to build a society both learning complex and dynamic. Perspectives theory emerging online education based on clearly limits and creates new structures for the learning process, and off-campus [15]. It's one of the more successful and popular commercial e-learning systems. It can be extended according to own needs [15].

Moodle it is very popular free Course Management System (CMS) that has its origins in the 1990ies. In 2003 the company moodle.com was launched to provide commercial support, managed hosting, consulting and additional services. Since 2005 There are fixed team of lead developers employed by Moodle, aside from a large community of developers and supporting organizations contributing source code, ideas, etc. to the project. The general design tries to consider pedagogical principles and learning theories. The lesson module of Moodle also offers different learning paths. As the user's possible answers on a question could be used as starting points for different learning paths, some kind of "weak adaptively" is supported [17][18].

Web-based Learning Environment plays an important role for education today. Currently, the students have more options in studding compared to such as Virtual-U and WebCT [19], WebCT (Web Course Tools) was developed in 1995 by Murray Goldberg, a faculty member at the University of British Columbia. Universal Learning Technologies purchased WebCT in 1999. WebCT integrated means of communication, including a bulletin board, chat rooms, e-mail and calendar on site WebCT. In addition, it can be graphics, audio files and video to the integration site WebCT. These features facilitate interaction between faculty and student members [20].WebCT offers a collections of features and tools that may be added to courses including chat system, Conferences system, student track progress, and maintenance of grade distribution, access control, and navigation tools, contests marked cars, E-mail, calendar and, of course, and student home pages[21].

ATutor as open source system supporting learning content management and specifically consideration of matters relating to access and the capability to adapt. It was first released in 2002 after two studies conducted that evaluated the accessibility of learning platforms to people with disabilities. Several features are planned for the immediate future, including a barrier free authoring tool and a streaming media server [22].

III. The Proposed Framework

a) Proposed System

To overcome the problem of traditional e-learning, we proposed a hybrid framework that satisfies the social e-learning framework supported by new features. Agent feature, each agent in society holds a collection of resources such (Profiles, Friendship, and Courses) which are rated by using the algorithm. Collaborative feature, each scholar and instructor has his own sharing and chatting tool which displays the disposal. Semantic Support feature, each scholar and instructor has been supported with intelligent process which suggests the best friend.

Online social network is collected of operators, links, and collections. All online social networks, to fully participate in the social network on the net, a user necessity register with the site. The user profile composed by the site contains information on voluntary

users, which can be a fake sometimes. After a user registered in a site, the user then creates links to other users.

Here, forming links users for various motives: the users can be real-world acquaintances, business associates; they can segment some common interests; or they are interested in each other's contents. For a user, the set of users with who has links are called the contacts of the user. Online social network s such as Orkut, Renren and Flickr, according to the user's explicit graph form, share content, and location. For greatest online social networks Renren net; a user's contacts and his/her profile are often visible to those users who visit the user's account. Some locations like LinkedIn only let operators to display information (contacts and profile) of its contacts.

Users can publish messages to groups and upload shared content to the group. Several of these sites, links among members are public can creep automatically to capture and study of a large portion of users connected. Figure1.1 shows the flowchart of the proposed sytem.

User registers and logs into system to complete the profile with all information needed.

- If user is a student he can do:

Edit his Profile

- If he completed his profile information update and he received friend suggestion closest to his information then :

((Add Closest Friend, Add Closest Course, Add the best friend with the high weight in activity ((comment, sharing ,number of user login)), high degrees in exercise and quiz finally the number of Most Frequent Asked)) .

- Else found for friend and add him or update profile information

((found for Friends, Search for interested course, search for professors, Search for instructors, he can take exam, he can take Exercises, He can take course , he can share resources, he can comment on status he want, he can add student, instructor and professor, he can logout)).

- If the user is not a student (Instructor/professor) then he can do:

Edit his Profile:

((He can create Course, he can assign students to course, he can create exam he can create exercises, he can share resources and comment on status he want ,he can logout)).

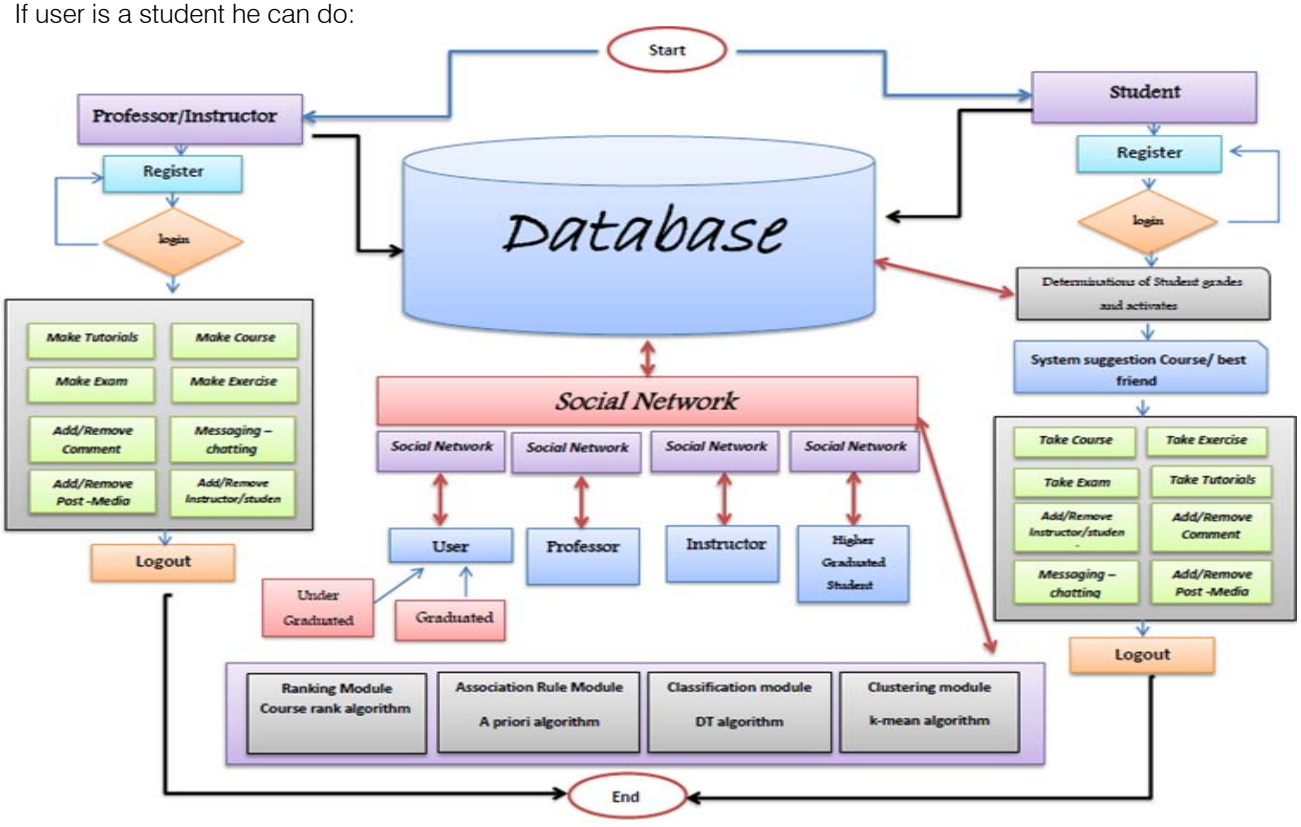

Figure 1.1: flowchart of the proposed system

The main steps of a proposed system:

Step 1: Clustering Module

Input: Scholars profiles from Dataset

Output: Students Clusters and Clusters centers

Function: using K-means algorithm, it divided the data into groups that belong with learners. Each learner is assigned to group that is the most similar to him/her.

Step 2: Classification Module

Input: New scholar profile from Dataset

Output: Scholar specified class and similar friends

Function: busing decision-tree, it classifies new scholar into specified class which resulted from K-means algorithm in the step 1. and, assign the remain scholars in the class as friends to him/her.

Step 3: Association Rule Module

Input: Courses and Scholars Classes from Dataset.

Output: Courses Association Rules.

Function: by using A-priori algorithm based on association rules to show how the relation between courses and scholars.

Step 4: Ranking Module

Input: Recommendation of the student friends and courses from the previous sections.

Output: Ranked courses and friends.

Function: by using Course Rank algorithm based on courses to rank the recommendation output of courses and friends which the most similarity to new scholar. Figure 1.2 shows a block diagram of the proposed system.

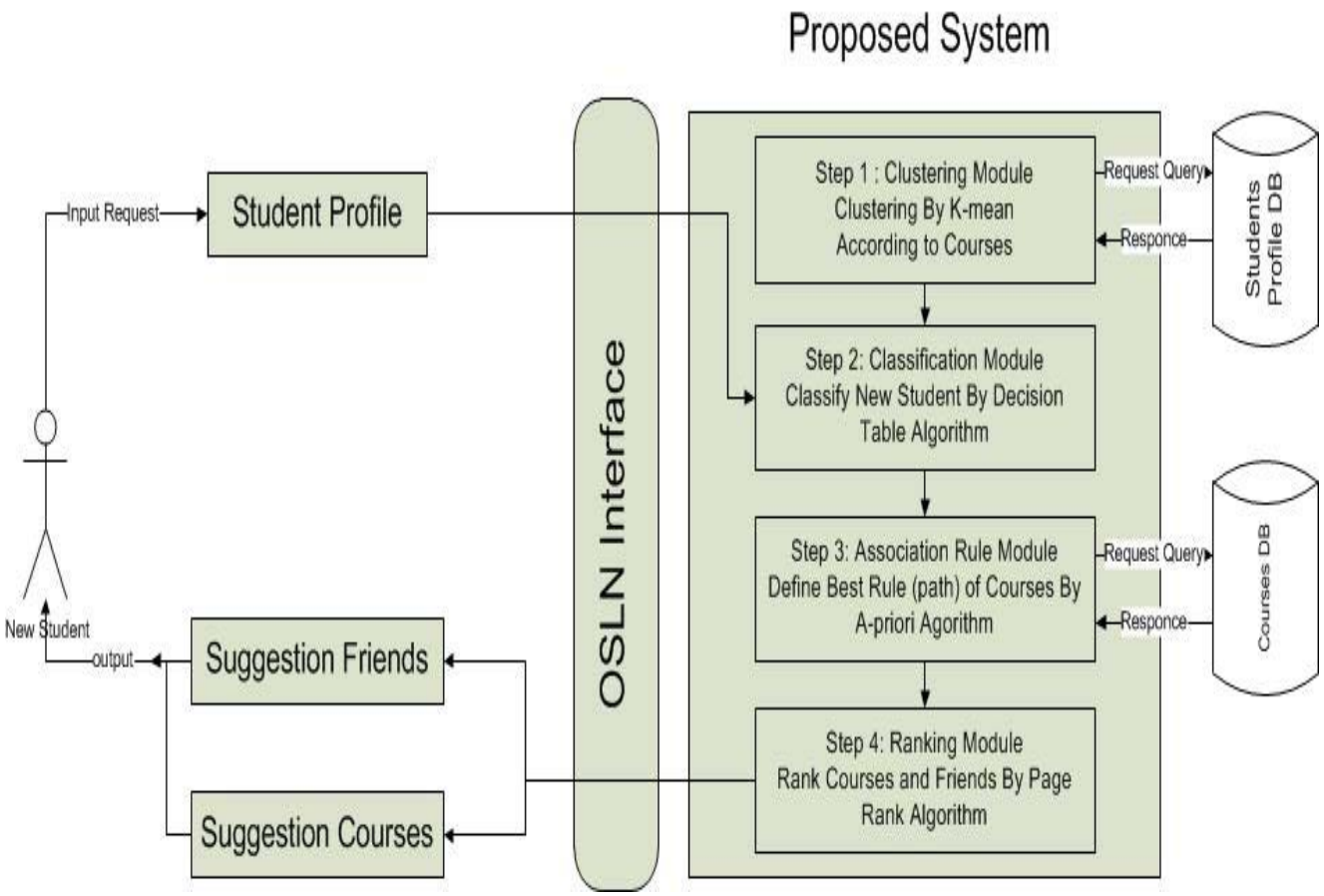

Figure 1.2 : Block Diagram of the Proposed System

b) Offline and Online Component

We can classify Open Social Learning Network OSLN components into Online and Offline components that perform the required tasks before users are connected to the system, so when users ask for queries, OSLN can respond to them. Offline component consist of cluster the users and apply association rule on these clusters. Online component consist of ranking to generate lists, Figure 1.3 presents the classification of OSLN components.

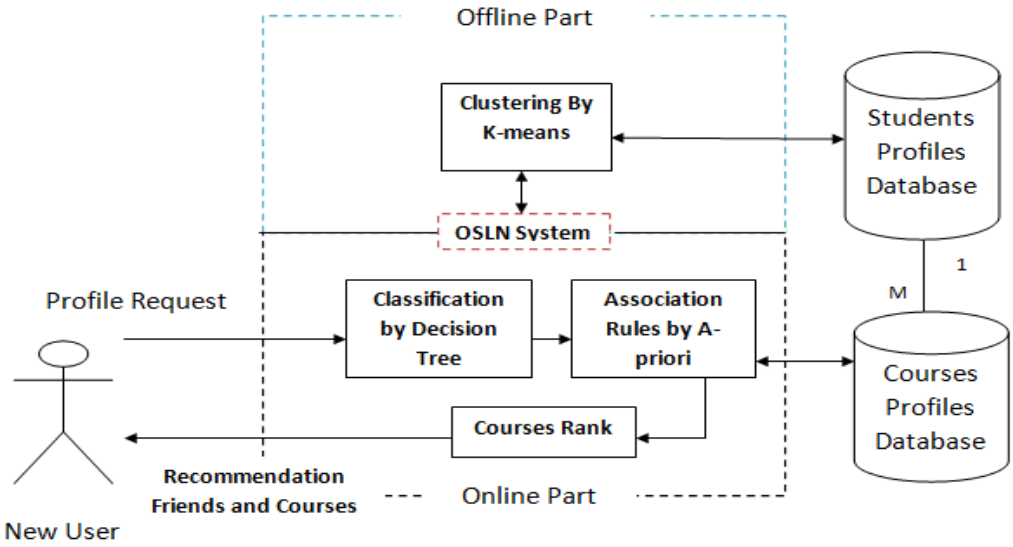

Figure 1.3 : Offline and online components of OSL

IV. Experiment Result

a) Data Base

The systems database table and relationships were developed using a relational database management system (RDBMS) My SQL version :5.5, We need Apache and used version 2.2.17, with PHP Language version 5.3 To evaluate our proposed system we did our experiments using data of 500 students and 9 courses. The entity relationship diagram (ERD) is shown in Figure 1.4, and table 1 shows the Weighted list of Interested Courses.

Figure 1.4: Database Table Relations Diagram

Table 1: Weighted list of Interested Courses

Course Name	Interested Weights
Introduction to programing	99
Data Structure	61
Algorithms	50
C++	41
Java	75
Oracle Database	50
Object Oriented	25
Information Security	42
SQL server	57

b) Clustering Module

Clustering is a data mining technique that separates the data into groups whose learner belong together. Our clustering module utilizes k-mean cluster algorithm to build cluster of the students. Learners clusters are based on users interests. After applying K-means clustering algorithm by using data mining tool (WEKA), we get the results that shown in Table 2.

Table 2 : Distribution %of students by clusters

Cluster	%of student in the clusters
Cluster 0	7%
Cluster 1	17%
Cluster 2	14%
Cluster 3	8%
Cluster 4	17%
Cluster 5	8%
Cluster 6	15%
Cluster 7	9%
Cluster 8	5%

c) Association Rule Module

This module used to show the relation between the course and learner. Learners will study from course which they are interested. In this method we make combination of Clustering and Association Rule Algorithm. First we apply the Simple K-means algorithm to sample data of interactions, we will get some clusters. Then apply the A priori algorithm to the data after cluster. Table 3 we show the result of A priori algorithm after applying on Clustering Module:

Table 3 : Result of A priori algorithm after applying on Clustering Module

Parameters in algorithm	Result using A priori Association Algorithm by WEKA
Minimum support: 0.1 (50 instances) Minimum metric <confidence>: 0.9 Number of cycles performed: 18	1. Java=i Oracle Databases=i 86 ==> total=s 86 conf:(1) 2. Algorithms=i C++=i 55 ==> total=s 55 conf:(1) 3. Introduction to Programming=i Oracle Databases=i 54 ==> total=s 54 conf:(1) 4. Java=i Oracle Databases=i Object Oriented Development=i 54 ==> total=s 54 conf:(1)

d) Ranking Module

After execute the Clustering module and Association rule module. By using course rank algorithm running to recommend learning objects to learners. In this module the recommendation of most suitable course and most suitable friend, by using equation (3) calculated course rank weight. Table 5 show the course rank Wight for each course in the proposed system.

$$R(C_i) = \frac{pr_i C_i}{L_i} \quad (3)$$

Where

- Pr_i is the A-Priori Result for the course C_i
- L_i is the number of students interested for course C_i

Table 4 : Weighted list of Courses Rank Algorithm

Course Name	Course Rank Weight
Introduction to programing	0.55
Data Structure	0.016
Algorithms	1.1
C++	1.34
Java	2.16
Oracle	1.71
Object Oriented	1.14
Security	0.023
SQL server	0.017

e) Recall and Precision Concept

Precision and recall are the basic measures used in evaluating quest strategies, by using equation (1) and (2) calculated it [23]. To evaluate a proposed system (OSLN) we use measuring the accuracy of usage prediction, when using prediction accuracy on result of rules of association module, we found 0.859 for precision and 0.778 for recall, that mean a good recall and a good precision of proposed system, in Table 5 we show the Recall and Precision of the system by using the weka system the result show the Recall and Precision is a good of a proposed system:

$$\text{Precision} = \frac{True\ Class\ A}{True\ Class\ A + Flase\ Class\ A} \quad (1)$$

$$\text{Recall} = \frac{True\ Class\ A}{True\ Class\ A + Flase\ Class\ B} \quad (2)$$

Table 5 : Result of Recall and Precision

Cluster Name	Precision	Recall
Introduction to programing	0.941	0.866
Data Structure	0.883	0.722
Algorithms	0.833	0.754
C++	0.756	0.756
Java	0.953	0.884
Oracle	0.879	0.821
Object Oriented	0.923	0.842
Security	0.778	0.688
SQL server	0.793	0.674
Weighted Avg.	**0.859**	**0.778**

f) Evolution of the System Suggestion most suitable friend

1. We calculate **most suitable friend** by using the equation (4):

$$BF = \sum_{i=0}^{n} Fw_i / n_f \quad (4)$$

Where

- BF: Best Friend
- F: Factor
- n_f: Number Of Factor
- w_i: Degree of Importance Factor

2. We calculate **Most Frequent Asked Questions** by using the equation (5):

$$\mathrm{MFQ} = \sum_{i=1}^{n} \mathrm{MF_x} / \mathrm{n} \quad (5)$$

Where

- **MFQ :** Most Frequent Asked Questions
- $\boldsymbol{MF_x}$**:** Number of Frequent Asked Questions
- $\boldsymbol{n}$**:** Number of Example

3. We calculate **Exercise and quiz** by using the equation (6)

$$E = \sum_{i=0}^{n} E_n / n \quad (6)$$

Where

- **E:** Exercise
- $\boldsymbol{E_n}$**:** Number of Exercise Degree
- $\boldsymbol{n}$**:** Number of Exercise

4. *Comment:* Suppose that the Comment measured from 60, Where the number ignores every comment over 60 is calculated the following equation (7):

$$CA_u = \sum_{i=0}^{n} C_n / 60 \quad (7)$$

where

- $\mathrm{CA_u}$: Average of Comment user
- C_n: number of Comment user number

5. Share: Suppose that the sharing measured from 60, Where the number ignores every sharing over 60 is calculated the following equation(8) :

$$SH_u = \sum_{i=0}^{n} S_n / 60 \quad (8)$$

Where

- $\boldsymbol{SH_u}$**:** Average of sharing user
- $\boldsymbol{S_n}$ **:** number of Sharing user number

6. Number of User Login: Suppose that the degree of Number of User Login measured from 60, where the counter ignoring each User more than 60 and calculates the following equation (9):

$$L_u = \sum_{i=0}^{n} U_n / 60 \quad (9)$$

Where

- L_u: average of user login
- U_n: Number user login

7. We can calculate activity by using equation (10).

$$AC = \sum_{i=0}^{n} (CA_u, SH_u, L_u)/3 \quad (10)$$

In table 6. The system show the suggestion most suitable friend to student (ID-125) that is Register in Java The result of the system most suitable friend is the student (ID-185).

Table 6 : The system show the suggestion most suitable friend to student (ID-125)

User –ID	Activity			Most Asked questions MFQ	Exercise & Quiz	most suitable friend
	Comment	Share	Number of user login			
103	70%	40%	75%	90%	60%	67%
127	50%	38%	35%	30%	20%	35%
157	45%	52%	77%	39%	68%	56%
185	83%	88%	92%	89%	95%	89%

g) Critical Evolution for All Students

In our work we based on many critical to check student active by calculate Table 7 show the relationship between profiles and activity with other parameters like performance, accuracy and security. These equations used to inform the values in the table.

Profile: During the experiment results, define profile as the ratio of the Setting Completion by summation of its value.

Performance: During the experiment results, define performance is the average profile completion and user activity

Accuracy: Throughout the experiment results, define accuracy as the product of the Performances multiply in 0.9.

Security: During the experiment results define security
If (activity > 50) then Security = activity / 2
If (activity < 50) then Security = activity * 2
If (activity = 50) then Security = 50

Table 7: show the relationship between profiles and activity with other parameters like performance, accuracy and security for each student

User – ID	profile	Activity			performance	Accuracy	Security
		Comment	Share	Number of user login			
100	87	62%	75%	65%	77%	69%	44%
101	52	47%	33%	52%	54%	49%	41%
102	77	87%	86%	96%	57%	51%	60%
103	94	25%	35%	63%	68%	61%	81%
104	65	52	47	43	56%	49%	94%

V. Conclusion

We have attempted to provide our interpretation of the current social-technical educational system shaped by technologies and practices of the "Knowledge Society" to locate the role of learning and learners in a lifelong perspective. We believe that both users' attitudes and available technologies are mature to let us envisage that each network user could easily engage in a lifelong learning personal experience if properly lead by appropriate methodologies and sustained by accordingly designed and developed personal learning environments. Furthermore, to this extent we have provided a model to schematize the knowledge flow occurring during an effective learning experience in a connectionist environment. The purpose of this model is twofold: from one side it may be used by personal learning environment designers as a guideline for checking if all phases and enabling conditions are supported by the integrated tools; on the other side it may be used by instructors or designers to set up learning activities. Moreover, we proposed efficient and effective framework and algorithm for clustering, classification and association rule in online social networks and for maximizing the influence in such networks. We would like to continue enhancing the efficiency and efficacy of our approaches for association rule and influence maximization problems.

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Before start writing a good quality Computer Science Research Paper, let us first understand what is Computer Science Research Paper? So, Computer Science Research Paper is the paper which is written by professionals or scientists who are associated to Computer Science and Information Technology, or doing research study in these areas. If you are novel to this field then you can consult about this field from your supervisor or guide.

TECHNIQUES FOR WRITING A GOOD QUALITY RESEARCH PAPER:

1. Choosing the topic: In most cases, the topic is searched by the interest of author but it can be also suggested by the guides. You can have several topics and then you can judge that in which topic or subject you are finding yourself most comfortable. This can be done by asking several questions to yourself, like Will I be able to carry our search in this area? Will I find all necessary recourses to accomplish 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.

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

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ISSN 9754350