GLOBAL JOURNAL

OF COMPUTER SCIENCE AND TECHNOLOGY: G

Interdisciplinary

An Economic and Modern Business

Operators & Customers Perspective

} Highlights {

Intelligence Solution for Textile

Construction of Large Scale Isolated

Discovering Thoughts, Inventing Future

Global Journals Inc.

Publisher's Headquarters office

Global Journals® Headquarters
945th Concord Streets,
Framingham Massachusetts Pin: 01701,
United States of America
USA Toll Free: +001-888-839-7392
USA Toll Free Fax: +001-888-839-7392

Offset Typesetting

Global Journals Incorporated
2nd, Lansdowne, Lansdowne Rd., Croydon-Surrey,
Pin: CR9 2ER, United Kingdom

Packaging & Continental Dispatching

Global Journals Pvt Ltd
E-3130 Sudama Nagar, Near Gopur Square,
Indore, M.P., Pin:452009, India

Find a correspondence nodal officer near you

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

eContacts

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

Pricing (Excluding Air Parcel Charges):

Yearly Subscription (Personal & Institutional)
250 USD (B/W) & 350 USD (Color)

Dr. Abdurrahman Arslanyilmaz

Computer Science & Information Systems Department

Youngstown State University

Ph.D., Texas A&M University

University of Missouri, Columbia

Gazi University, Turkey

Web: cis.ysu.edu/~aarslanyilmaz/professional_web

Dr. Chutisant Kerdvibulvech

Dept. of Inf. & Commun. Technol.,

Rangsit University

Pathum Thani, Thailand

Chulalongkorn University Ph.D. Thailand

Keio University, Tokyo, Japan

Dr. Sukhvinder Singh Deora

Ph.D., (Network Security), MSc (Mathematics),

Masters in Computer Applications

Dr. Sotiris Kotsiantis

Ph.D. in Computer Science, University of Patras, Greece

Department of Mathematics, University of Patras, Greece

Dr. Ramadan Elaiess

Ph.D.,

Computer and Information Science

Dr. Manpreet Singh

Ph.D.,

(Computer Science)

Nicla Romano

Professor in Cellular and Developmental Biology;

Cytology and Histology; Morfogenesis and Comparative Anatomy

Dr. Muhammad Abid

M.Phil,

Ph.D Thesis submitted and waiting for defense

Dr. K. Venkata Subba Reddy

Ph.D in Computer Science and Engineering

Loc Nguyen

Postdoctoral degree in Computer Science

Faisal Mubuke

M.Sc (IT), Bachelor of Business Computing, Diploma in Finanicial services and Business Computing

Jiayi Liu

Physics, Machine Learning,

Big Data Systems

Dr. Yuanyang Zhang

Ph.D in Computer Science

Asim Gokhan Yetgin

Design, Modelling and Simulation of Electrical Machinery;

Finite Element Method, Energy Saving, Optimization

Anup Badhe

Bachelor of Engineering (Computer Science)

Dr. S. Nagaprasad

M.Sc, M. Tech, Ph.D

CONTENTS OF THE ISSUE

The Impact of OTT Services in Nigeria: Regulators, Operators and Customers Perspective

By Damilola Fowora, Oludele Awodele, Olakunle Olayinka & Oyebode Aduragbemi

Babcock University

Abstract- Advancement in the field of Information Communication Technology (ICT) has led to creation of new technologies, one of such is Over-The-Top technology. This new technology offers low-cost delivery of digital information content and services which includes VoIP services, instant messaging services and so on to consumers. The Over-The-Top services do not have a network system of their own but instead rely on of telecommunication operator networks and other Internet Service providers for the delivery of their services, without any policy or lease agreement with these operators. This work focuses on considering the perspectives of the regulatory board, the telecommunication operators and the consumer has it relates to this technology. We also analyse the impact of the Over the Top technology has on the Nigerian economy also.

Keywords: over-the-top, regulators, nigeria, telecommunication operator, consumer.

GJCST-G Classification: C.2.1, D.4.4

THEIMPACTOFOTTSERVICESINNIGERIAREGULATORSOPERATORSANDCUSTOMERSPERSPECTIVE

Strictly as per the compliance and regulations of:

The Impact of OTT Services in Nigeria: Regulators, Operators and Customers Perspective

Damilola Fowora α, Oludele Awodele σ, Olakunle Olayinka ρ & Oyebode Aduragbemi ω

Abstract- Advancement in the field of Information Communication Technology (ICT) has led to creation of new technologies, one of such is Over-The-Top technology. This new technology offers low-cost delivery of digital information content and services which includes VoIP services, instant messaging services and so on to consumers. The Over-The-Top services do not have a network system of their own but instead rely on of telecommunication operator networks and other Internet Service providers for the delivery of their services, without any policy or lease agreement with these operators. This work focuses on considering the perspectives of the regulatory board, the telecommunication operators and the consumer has it relates to this technology. We also analyse the impact of the Over the Top technology has on the Nigerian economy also.

Keywords: over-the-top, regulators, nigeria, telecommunication operator, consumer.

I. Introduction

The field of telecommunications has indeed grown over the past decade from the first generation analog cellular networks to the fourth-generation digital networks with data rates of up to 10 Gbs at the downlink alone which is built on the internet protocol(Nortel, 2008). These advancements have brought about a new age of fast, cheap and efficient digital communication. The access to higher speeds of data transfer has led to the development of other modes of digital communication such as Over-The-Top (OTT) services which offers direct delivery of content directly to the consumer.

The ever-growing field of mobile telecommunication has evolved and various new technologies keep emerging. Today, there are so many ways to pass information or content from source to consumer creating a very competitive market. Over-The-Top services refers to the delivery of content to consumer via a carrier service or mobile operator without the carrier service itself being part of the planning, marketing, monitoring and regulating the content. Also, no financial or revenue agreement is made between the Over-The-Top (OTT) service providers and the carrier service. The carrier service acts simply as a medium for the delivery of content.

Communication is a vital part of any growing economy and it is also integral to the technological advancements, Nigeria is not an exemption. With a population of 195 million people (Worldometers, 2018), about 145 million have active GSM lines (NCC, 2018) which is over 74 percent of her citizens engaging in mobile digital communication. Mobile telephony in the country has gone a long way after its introduction to the Nigerian economy in August of 2001 with Econet and MTN being the first set of mobile operators in the nation(The Nigerian Voice, 2011). The impact of mobile telephony can not be under estimated, as at 2016 the industry was worth about 32 billion dollars (Vanguard Nigeria, 2016), contributing greatly to the gross domestic profit in the nation.

II. Over-the-Top Architecture

The Over-The-Top service provider provides service or content and also offer Information Communication Technology services but does not operate a network system and it has no ties to any telecommunication or network service operator(TRAI, 2015). The Over-The-Top service architecture rely on the global internet itself and gains network speeds in other to deliver content to consumers, hence it goes "over-the-top" of telecom service provider's network. Content and services provided with Over-The-Top are typically tailored towards media and communications at free or lower cost rates as compared to when the same services are delivered using the traditional network delivery process.

Author α σ ρ ω: Department of Computer Science Babcock University, Nigeria. e-mail: damilola.fowora@gmail.com
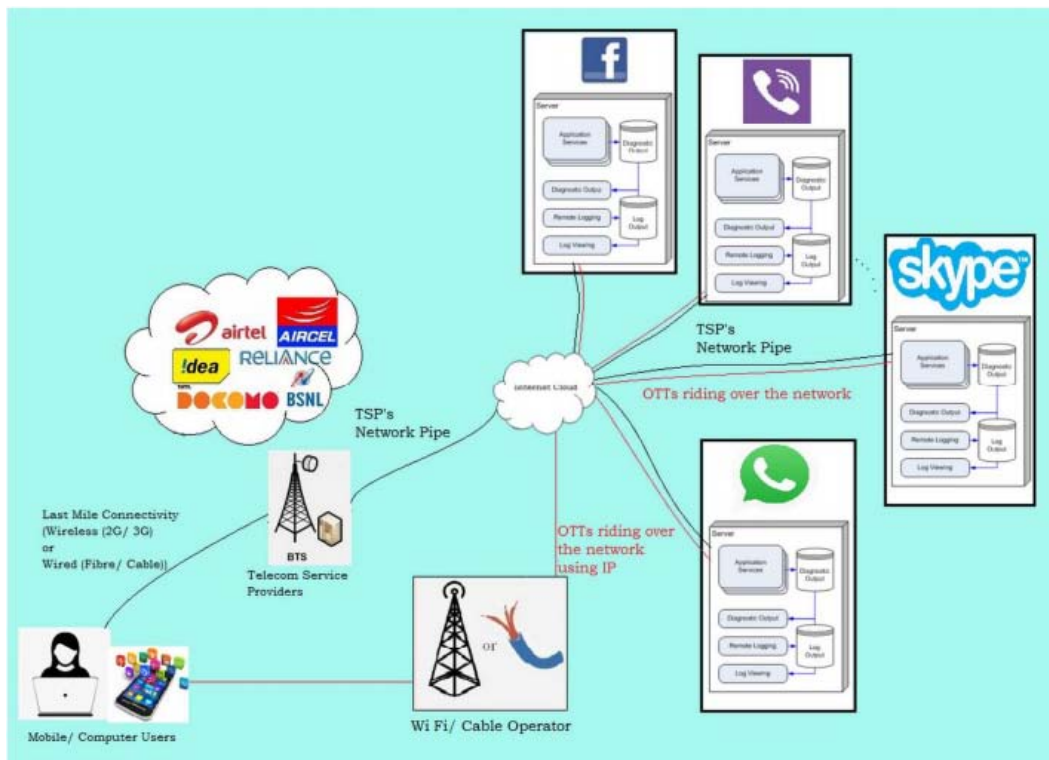
Figure 1: Over-The-Top Integration with Telecom Service Provider and other Service Providers

Over-The-Top service providers can access their consumers using two different ways. As seen in figure 1, Over-The-Top service providers can ride on top of the telecom service provider's network system without having any financial, policy or lease agreement with the telecom services. Using the method, the telecom service provider will be viewed as an Internet Service Provider providing internet connectivity and also bandwidth for the Over-The-Top applications. Also, another method for the Over-The-Top service providers to reach the consumers would also be to ride on top of bandwidth which is provided by Wireless Fidelity (Wi-Fi)

operators. Both these methods exempt the Over-The-Top service providers from any financial implications to the use of these network services. Some common examples of applications that employ Over-The-Top services include:

1. Skype
2. WhtasApp
3. Facebook
4. Twitter
5. Instagram
6. Youtube etc.

Table 1: Examples of Over the Top Applications

OTT video	Skype	- 300 million users (2013) - Allows for free voice/video Skype to Skype calling - Enable calling to Plain Old Telephone Service (POTS) via Skype-out service
OTT messaging	WhatsApp	- Top selling app in 47 countries - Processing 27 billion messages daily (June 2013) - 300 million active users (May 2013) - Available on all Smartphone platforms
OTT media	Netflix	- Curated/studio programming - 40 million subscribers (May 2013) - Accounts for 32.3% of all US peak downstream fixed access traffic

Source: Detecon Consulting, 2014

Table 1 show some common applications of Over the Top applications, these applications are among the top used in the world today with over 2.46 billion subscribers combined(Statista, 2018). With a world population of around 7.6 billion people, the Over-The-Top subscriber is about 32 percent of the total world population and this is expected to grow as the world ushers in the age of 5th generation networks which offers faster and cheaper data rates to consumers(Internet World Stats, 2017).

One of the major reasons for the advancement of Over-The-Top services today is the fact that it has a dynamic architecture, all a consumer needs to access quality content is internet connectivity and another reason is also that it is cheap and at low cost of access to the consumer.

III. Literature Review

There are many organizations, institutions and also researchers that have studied the impact of Over the top services on various key entities in the telecommunication industry has a whole. Joshi et al (2015) studied the impact of Over the top services on telecommunication service providers. They made a global review on how Over the top services affects telecommunications services, detailing how revenue is lost to this service and it also shows how there has been a global shift in the consumer preference of this service to traditional telecommunication services.

This dramatic change in the preference of the consumer to be more drawn to the Over the top services than the traditional telecommunication services is not a new phenomenon. John Sladek (2006) wrote a paper detailing how Over the top services would be the new frontier for digital content delivery to the consumer. The work showed the future of digital communication and predicted that if the telecommunication operators are not careful, they would simply be used has a tool for the Over the top services providers to ride over and provide contents to the consumer.

Quoc Lai Nguyen (2016) did a literature review of Over the top related policy and regulatory issues. The work showed the complexity involved in regulating over the top services, due to the inabilities of regulators and also telecommunication operators to keep up with the dynamic and changing markets. The work gave examples of the failing attempts made by regulators in the United States to regulated over the top services and due to this unregulated technology, the telecommunication providers are losing their hold on the market, this can be said to be the case in Europe, where over the top services have a third of the telecommunication market share.

Baldry et al (2014) and Fedrick et all (2013) did quite similar works on over the top technology, detailing how it is creating a revolution in the world of telecommunication, they also make it know that if they are not regulated certain issues start to emerge. Issues of security, privacy were raised and also the only way to create a safe web space for the transfer of digital content would be regulations being imposed on over the top services. Suijata et al (2015) had a different view on the situation, they argued that regulations would create a monopolistic network environment where the telecommunication operators decide how digital contents are delivered and with the heavy monetary sanctions innovation wouldn't be possible on the part of the over the top service providers.

IV. Impact of Over-the-Top Applications on the Nigerian Economy

In Nigeria today, the Nigerian Communications Commission (NCC) is an independent regulatory board that regulates the activities that occur in her telecommunications industry(NCC, 2018). The Commission is tasked with creating a conducive environment for the operations of telecommunications operators while ensuring adequate Quality of Service to its consumers throughout the country. The Nigerian Communications Commission (NCC) regulates digital technology in the country and with the advent of Over-The-Top services which brings about exciting prospects, certain issues start to emerge.

As at 2017, the National Bureau of Statistics (NBS) has stated that the telecommunications sector contributes over I.385 billion naira to the Gross Domestic Product (GPD) of the nation which is over one quarter of the total Gross Domestic Product (GPD) of the nation (Gabriel, 2016) this has a huge impact on the Nigerian economy. Also, job creation is also on the rise, as digital communication opens a new frontier when it comes business creation. Over the top applications have created a source of employment and a source of income for many individuals. Businesses are often time built on Over the top applications, applications such has Facebook, Twitter, Jumia, Konga and so on are means in which business is conducted, over 12.2 billion dollars was made through Facebook in the year 2015 and this is vastly due to the popularity of Over the top applications and this too has positively impacted the economy(Frommer, 2015).

Year	Money Supply[2] (M₂) (N' Billion)	Credit to Private Sector[2] (CPS) (N' Billion)	GDP at Current Basic Prices (N' Billion)	Financial Deepening	
				(M₂/GDP) (%)	(CPS/GDP) (%)
2005	2,637.91	1,838.39	22,269.98	11.8	8.3
2006	3,797.91	2,290.62	28,662.47	13.3	8.0
2007	5,127.40	3,680.09	32,995.38	15.5	11.2
2008	8,008.20	6,941.38	39,157.88	20.5	17.7
2009	9,411.11	9,147.42	44,285.56	21.3	20.7
2010	11,034.94	10,157.02	54,612.26	20.2	18.6
2011	12,172.49	10,660.07	62,980.40	19.3	16.9
2012	13,895.39	14,649.28	71,713.94	19.4	20.4
2013	15,160.29	15,751.84	80,092.56	18.9	19.7
2014	17,679.29	17,129.68	89,043.62	19.9	19.2
2015[1]	18,901.30	18,675.47	94,144.96	20.1	19.8
2016[3]	21,607.68	21,082.72	101,489.49	21.3	20.8

Source: CBN(2016)

Figure 2: Statistical Bulletin: Financial Statistics

Figure 2 gives a general overview of money supply in the nation, we see a steady increase in the Credit to Private Sector in the nation, the telecommunication industry makes up a vast portion of the private sector in the nation and we see huge financial resources being deposited into that sector.

The various telecommunications operators in the country are vastly privately controlled and operate with certain degree of anonymity, provided they follow guidelines as specified by the Nigerian Communications Commission (NCC), one of such is ensuring that all Subscriber Identity Module (SIM) card is registered to a specific user. With the anonymity these operators have, they can bill users how they want and they decide the various tariff plans for users without ny input from the Nigerian Communications Commission (NCC). Since, there are also other telecommunication operators offering the same service, the cost for services on these telecommunication operators stay within an affordable range.

With the advent of Over-The-Top services, certain issues start to emerge, the consumers can have access to quality information service content at a much cheaper rate than the telecommunication network can keep up with.

Table 1: OTT Applications Effect on Network Operators

OTT	Examples	Minimum Speed Req. for Good Quality Service	Challenge for the Network Operator	Implication for the Network Operator
Messaging and Voice Services (Communication Services)	VoIP, Skype, Chat with and without video, Gmail, WhatsApp, Wechat, Line, Viber	<1MBps	Fixed and Mobile telephony substitute, SMS substitute	Competition, Loss of value of traditional services offered
Application eco-systems	Social networks, Facebook, Linkedin, Twitter, Instagram, WeChat, various ecommerce apps including mpayments, mwallets- Amazon, Flipcart, Snapdeal Alibaba	<1MBps	Another medium for communications . (In case of ecommerce apps, it is another market place)	Competition, Loss of revenue of traditional services offered. (In case of ecommerce apps , loss of revenue to existing brick and mortar establishments)
Content	OTT-TV, OTT Video, streaming and video on demand(VoD), Netflix, Netmovies, Hulu, Cuevana TV, Youtube	4-10 MBps	Substituting TV	Not in direct competition/ Loss of audience (hence advertising) for traditional TV services

Over-The-Top services has greatly impacted the telecommunication industry in this country, the regulators, operators and also the consumer have all been affected by this new technology and the question

everyone is asking is should these OTT services be regulated or not. Currently they are not regulated and since they have no financial or lease agreement with the telecommunication operators, they might eventually drive them out of business since the OTT services can provide the same content as the telecommunication operators at much more cheaper rates.

This affects the industry greatly and the Nigerian economy has a whole. Telecommunication operators in Nigeria lost about 26-billion-naira voice calls revenue in the year 2017 due to the apparent decline of subscribers to use their services to make phone calls(Adaramola, 2018). Over-The-Top services was attributed as the cause of these loss, because they offer cheaper rates of cellular communication. Using Globacom Limited Telecommunications as an example, they offer about 12.5 Gigabytes of data for just two thousand five hundred (2,500) naira, with this amount of data users can make calls on Over-The-Top services for thousands of hours to anyone across the world no matter the geographical location without any additional charges for international or local calls. If the same two thousand five hundred (2,500) naira was used on calls alone the users might have about two to three hours of voice calls and when international numbers are dialled, the user might have about an hour of voice calls. The users would tend to save money and go for the cheaper option of the two and these would lead to losses for the telecommunication operators and the economy has a whole.

Considering not only the financial implications of having an unregulated Over-The-Top service offering content to consumers, issues of national security also arises. Over-The-Top services offer services that are encrypted and offers protection for consumers to remain completely anonymous and the content they share completely discrete. A typical example of these is messages sent with WhatsApp are so encrypted that it is extremely difficult for WhatsApp to in fact view them and prevents governments agencies from view them too(Griffin, 2016). Also, law enforcement agencies cannot obtain records from these Over-The-Top service providers to be used in criminal investigation. The privacy enjoyed by consumers can also be used to mask criminal activity and these possess a serious security threat to the nation(Adebayo, 2017).

V. Regulators Perspective on Over-the-Top Services
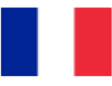
The effect of Over-The-Top services on the nation cannot be over emphasised and it raises more questions, one of such questions is should Over-The-Top services be regulated or not. In Nigeria, the executive chairman of the Nigerian Communications Commission (NCC), Prof. U.G Danbatta has announced to the public that the Nigerian Communications

Commission (NCC) will take a neutral position on the matter. He made it clear that the Commission will not regulate Over-The-Top services and they are making it known to the public to take advantage of these services since they are very much affordable(Ekekwe, 2017). Nigeria is currently tending towards capitalist market where privately-owned institutions perform business and control their own markets and with competition from various other institutions offering the same service or content, the cost to the consumer is kept at a minimum. Due to this capitalist notion, the Commission would not want to disrupt this balance even if it bankrupts the telecommunication operators. The Commission has urged the telecommunication operators to be more innovative and basically find a way round this issue.

There are numerous reasons why Over-The-Top services remain unregulated, one of such is the complexity involved in the nature of Over-The-Top services themselves. Regulatory process has not been able to keep up with the fast developments of these services (Nguyen, 2016). An instance of these can be found in the US, Federal Communications Commission (FCC) has attempted to regulate Over-The-Top services and they have been twice been overturned by the courts, the overturn was due to the uncertainty on how the Federal Communications Commission (FCC) would intervene and oversee the relationship between the Over-The-Top services and the telecommunication network operators. The situation in Europe is a lot more worse as telecommunication network operators loss about a third of the market to Over-The-Top services(Global Stats, 2018).

The Commission decision to remain neutral as been a topic of discussion between the Nigerian Communications Commission (NCC) and the telecommunication operators that feel let down by them, but the Commission still stands on the premise that the consumer is the one left with the choice to choose and forcing them would not be the best strategy so they remain neutral.

Table 2: Shows some nations in which net neutrality laws are in effect

Country		Approach	Implications OTT
China		VoIP is considered a basic service, reserved for duly licensed operators	OTTS usually blocked if they are not allowed by the regulator.
France		Ongoing investigation - OTT (Skype in this case) could be classified as an operator, in which case it would be subject to the same rules as the other operators.	Symmetric regulation for OTTS that offer VoIP.
South Korea		Internet connection is neutral but with flexibility.	Operators can set a price for services dedicated to premium users of OTT (premium payable by the costumer).
United Kingdom		The differentiation of service and traffic is accepted.	Shapping is accepted if there is no partnership with OTT.
Germany		All VoIP providers are subject to the same rules.	Symmetric regulation to OTTS that offer VoIP.
UAE		The VoIP service offering is subject to license	OTT services are blocked in the United Arab Emirates

Source: (Adebayo, 2017)

Net neutrality or internet neutrality which is the absence of discrimination of any type on the transmission of digital content over the internet also plays a significate role in ensuring that regulatory board in Nigeria stay neutral on this position. Net neutrality offers protection to investors and also the consumers, ensuring that that they are not overcharged for services and contents and also that investors can be allowed to be innovative without being held back with lease fees and policy agreements. In Nigeria today, there are no net neutrality laws(NCC, 2018), although one can argue that this leads to a more competitive market, Table 2 shows some nations in which net neutrality laws are in effect.

VI. Telecommunication Operators Perspective on Over-the-Top Services

Nigerians spend a total of about 197 billion naira on a monthly basics on internet usage(BusinessNews Staff, 2017), the total sum accumulated by the telecommunications operators at the end of a financial year is high based on the number of Nigerians that subscribe to the internet for digital contents. This high increase in these figures can be attributed to the high use of Over the Top applications that is currently sweeping the nations, this achievement is also recognized by the International Telecommunications Union (ITU)(NCC, 2018) (BusinessNews Staff, 2017), which has referred to the Nigerian telecommunication industry as among one of the world's fast-growing telecoms industry. These is also a way in which Over the Top applications has proved to be beneficial to the telecommunication operator, but considering the losses these telecommunication operators suffer in other areas of their operations, they call for regulating Over the Top applications.

The telecommunications operators are currently losing revenue to these Over-The-Top services and applications. A text message sent via Facebook is money lost that could have been gained through the use of Short Messaging Service (SMS), a call made via Skype is money lost also.
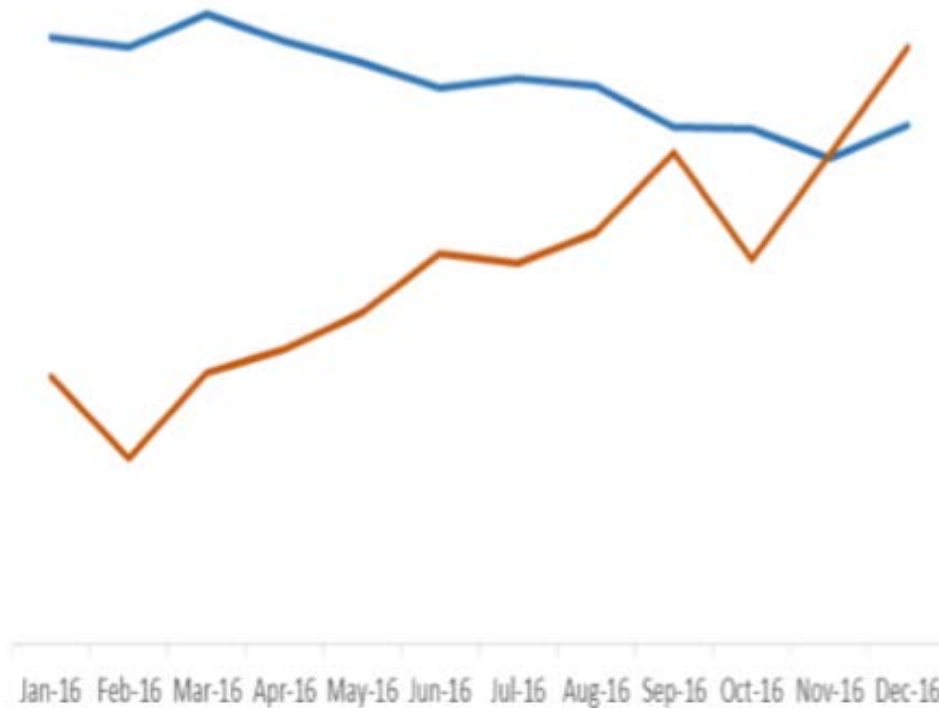
Figure 3: Showing the Decline of Billed Calls and the Rise of VoIP Calls

The telecommunications operators are experiencing significant losses in revenue to applications VoIP services such Skype, WhatsApp and so on as shown in Figure 2 and Figure 3. The operators cannot match the Over-The-Top services in terms of cost and are left to find other ways to innovate and encourage the end users to use their platforms, one of such methods is offering the end users special bundles to encourage them to patronize their services like offering free call and free texts after a certain amount of money is loaded.
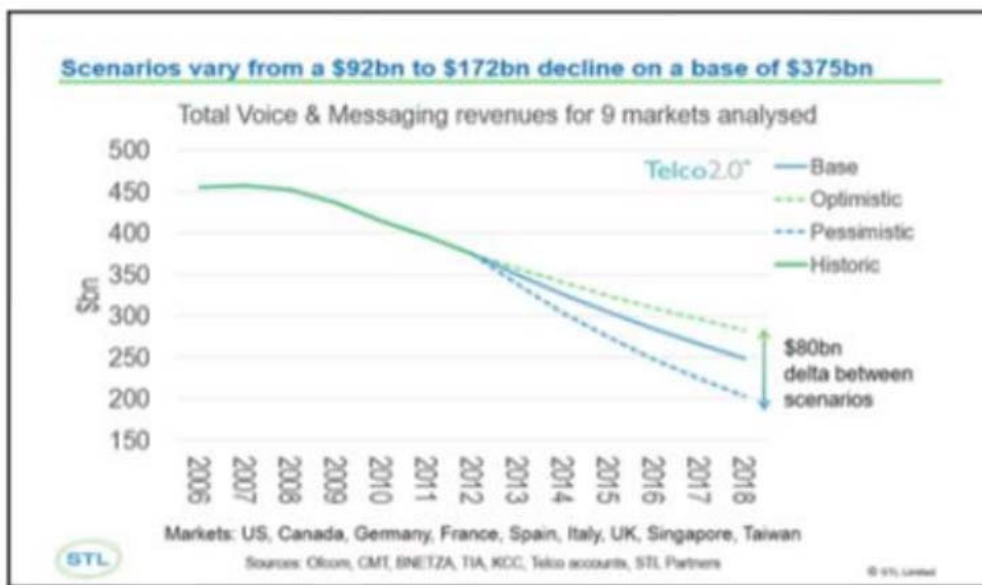
Figure 4: Showing Declining Revenues in Telecommunication Services

The telecommunications operators are advocating for relegations been placed on the Over-The-Top services which would ensure a levelled business field for both the Over-The-Top services and the network operators. Some countries are currently regulating the Over-The-Top services in their nations for example in China, Over-The-Top services are blocked if they are not licenced by regulators, in South Korea the operators set prices for Over-The-Top services. Some nations do not even bother to regulate these Over-The-Top services, they ban them out rightly, an example of this would be the United Arab Emirates. The regulators today have no plans to regulate the Over-The-Top services and the operators are left to figure out a way to continue making money and stay in business.

VII. Consumer Perspective on Over-the-Top Services

The Nigerian market today is highly competitive, quality of service is very paramount to the consumer. The telecommunication operators are always looking for creative ways to get subscribers hook to their network services, operators offer services such as caller tunes, airtime borrowing, free texts, free calling minutes and so on, all in the bid to capture a very dynamic customer base with a very dynamic demographic. Over-The-Top services give the consumer assess to content and services which are similar to what can be gotten from the telecommunication operators but at a cheaper rate. When considering the opportunity cost of making a call using VoIP applications and using the telecommunication services or sending a text using chat applications and via the Short Messaging Service (SMS), one would see that the opportunity cost is very high in favour of Over-The-Top services. A consumer would prefer to spend less for the same service being offered by the telecommunication operators. Over-The-Top services as helped the consumers to spend less for content and digital services, showing a change market dynamic. The telecommunication operators do not have as much monopoly over digital communication services as they use to and the consumer would prefer the to pay less.

In Nigeria today about 87.37% of the overall 145 million that have active GSM lines use are active users on Facebook alone, and over 90% have their lines connected to WhatsApp(Global Stats, 2018). This shows how much these Over-the-top applications have been widely incorporated into the average Nigerian consumer everyday life. The ease and also the low cost of content delivery between consumers and also between content providers and consumers is maximized by the average consumer. This was the major contributing factor to the telecommunication losing over 26-billion-naira in revenue in the year 2017(Adaramola, 2018). The average Nigerian would prefer to send a message using one of the Over-the-top applications where the cost sending the message is basically insignificant as compared to paying 4 naira sending the same message via the short messaging service (SMS). The average WhatsApp user sends about 1,200 messages per month and also receives about 2,200 messages per month(Petronzio, 2014), it this same number of messages was sent over the short messaging service (SMS) a net average of 6,800 naira will be spent per month by each subscriber on just text alone. In a country in which the minimum wage is about 18,000 naira, paying about 6,800 naira on text alone is very high. The Nigerian consumer would prefer to use Over-the-top applications with itslow-cost benefits.

VIII. Conclusion

Over-The-Top services has been a revolution to data communication, offering digital content at a low cost to the consumer. The low-cost delivery of digital content has left consumers preferring the optimize the advantages of using Over-The-Top services. Telecommunication operators have recorded significant loss to Over-The-Top services, and these services ride over the telecommunication operators network without any policy or lease agreement. Regulators in the country have decided to remain technologically neutral and will not regulate the Over-The-Top service providers. Network operators are being pushed to be more innovative in other to stay relevant in this dynamic new market.

References Références Referencias

1. Adaramola, Z. (2018, January 29). Telcos Lost N26bn Voice Calls Revenue in 2017. Retrieved from Daily Trust: https://www.dailytrust.com.ng/telcos-lost-n26bn-voice-calls-revenue-in-2017.html
2. Adebayo, G. (2017). "Over the Top" (OTT) Provision of Telecoms Services in Nigeria. Las Vagas: Associan of Licensed Telecommunications Operators in Nigeria.
3. BusinessNews Staff. (2017, September 1). Nigerians Spend N197bn Monthly on Internet Data. Retrieved from BusinessNews: http://businessnews.com.ng/2017/09/01/nigerians-spend-n197bn-monthly-on-internet-data/
4. Ekekwe, N. (2017, June 24). How MTN, Glo, Etisalat, Airtel Will Solve OTT Problems and Boost Revenue In Nigeria. Retrieved from Tekedia: https://www.tekedia.com/how-mtn-glo-etisalat-airtel-will-solve-ott-problems-and-boost-revenue-in-nigeria/
5. Frommer, D. (2015, January 28). Here's how much money you made for Facebook last year. Retrieved from Quartz: https://qz.com/335473/heres-how-much-money-you-made-for-facebook-last-year/

6. Gabriel, O. (2016, February 8). Telecommunications Spurs Growth in GDP. Retrieved from Vanguard: https://www.vanguardngr.com/2016/02/telecommunications-spur-growth-in-gdp/

7. Global Stats. (2018, Febuary 2). Social Media Stats in Nigeria. Retrieved from StatCounter: http://gs. statcounter. com/social-media-stats/all/nigeria

8. Griffin, A. (2016, April 5). WhatsApp End-to-End Encryption. Retrieved from Independent: www. independent.co.uk/life-style/gadgets-and-tech/ news/whatsapp-update-encryption-end-to-end-messages-security-government-privacya6970101. html

9. Internet World Stats. (2017, January 18). Internet World Stats. Retrieved from Internet World Stats, Usage and Population Satistics: http://www.internet worldstats. com/stats.htm

10. J. Sujata, S. S. (2015). Impact of Over the Top (OTT) Services on Telecom Service Providers. Indian Journal of Science and Technology, 8(4), 145 – 160.

11. NCC. (2018, January 14). Subscriber Data. Retrieved from NCC: https://www.ncc.gov.ng/ stakeholder/ statistics-reports/subscriber-data

12. Nguyen, Q. L. (2016, July 22). A LITERATURE REVIEW OF OVER-THE-TOP. Dortmond, Germany: RHEIN-WAAL UNIVERSITY OF APPLIED SCIENCE.

13. Nortel. (2008). Long-Term Evolution (LTE): The vision beyond 3G. Nortel Networks, 2(5), 36-42.

14. Petronzio, M. (2014, Febuary 21). Average WhatsApp User Sends More Than 1,200 Messages Each Month. Retrieved from Mahable: https:// mashable.com/2014/02/21/whatsapp-user-chart/# cMDj2KMw8Gqm

15. R. Friedrich, C. B. (2013). Enabling the OTT revolution & How telecom operators can stake their claim, Booz & Company.

16. S. Baldry, M. S. (2014). The Rise of OTT Players – What is the Appropriate Regulatory Response. Deutsche Telecom Group.

17. Statista. (2018, January 25). Number of Social Media Users Worldwide from 2010 to 2021 (in billions). Retrieved from Statista: https://www. statista.com/statistics/278414/number-of-worldwide-social-network-users/

18. The Nigerian Voice. (2011, August 10). 10 Years of GSM Revolution. Retrieved from The Nigerian Voice: https://www.thenigerianvoice.com/news/57892/1/10 -years-of-gsm-revolution-in-nigeria.html

19. TRAI. (2015). Regulatory Framework for Over-The-Top (OTT) Services. India: Telecom Regulatory Authority of India.

20. Vanguard Nigeria. (2016, April 9). Nigeria's Telecoms Industry's Investment Profile Hits $32bn, says Danbatta. Retrieved from Vanguard: https:// www.vanguardngr.com/2016/04/nigerias-telecoms-industrys-investment-profile-hits-32bn-says-ncc-boss/

21. Worldometers. (2018, January 20). Nigerian Population. Retrieved from Worldometers: http:// www.worldometers.info/world-population/nigeria-population/

This page is intentionally left blank

An Economic and Modern Business Intelligence Solution for Textile Industries in Bangladesh

By Md. Al-Hasan, Mst. Rubina Aktar & Mohammad Sajib Al Seraj

Michigan Technological University

Abstract- Textile Industries are doing most promising business in Bangladesh from last few years. We are already in top five garments exporting country list and the demand of our garments product is increasing day by day both in our country and outside the country. Because of increasing demand of this sector textile industries are also growing very fast in number. To meet the end users demand now textile industries have to compete with the quality of others so that they can satisfy the need of different users of garments product. Analyzing user mind is really a tough task to grow the textile business with latest trend and mode of new generations. Business Analytics can make this tough task very easy by analyzing different sales report with different perspectives. To meet the new trend and demand of new generation, proposed business analytics setup of different technologies is much better for the textile industries compared to existing systems used in Bangladesh.

Keywords: textile business; business intelligence; BI; textile business analytics; ETL; DHW; tableau; business data visualization.

GJCST-G Classification: I.2.1

ANECONOMICANDMODERNBUSINESSINTELLIGENCESOLUTIONFORTEXTILEINDUSTRIESINBANGLADESH

Strictly as per the compliance and regulations of:

An Economic and Modern Business Intelligence Solution for Textile Industries in Bangladesh

Md. Al-Hasan ᵅ, Mst. Rubina Aktar ᵒ & Mohammad Sajib Al Seraj ᵖ

Abstract- Textile Industries are doing most promising business in Bangladesh from last few years. We are already in top five garments exporting country list and the demand of our garments product is increasing day by day both in our country and outside the country. Because of increasing demand of this sector textile industries are also growing very fast in number. To meet the end users demand now textile industries have to compete with the quality of others so that they can satisfy the need of different users of garments product. Analyzing user mind is really a tough task to grow the textile business with latest trend and mode of new generations. Business Analytics can make this tough task very easy by analyzing different sales report with different perspectives. To meet the new trend and demand of new generation, proposed business analytics setup of different technologies is much better for the textile industries compared to existing systems used in Bangladesh. Textile industries can use this solution by collecting data from their different sales point for better production policy which will satisfy the end user of the textile product as well as enhance the textile business.

Keywords: textile business; business intelligence; BI; textile business analytics; ETL; DHW; tableau; business data visualization.

I. Introduction

Most of the textile industries in Bangladesh still using manual procedure for their different purposes. They are using paper-pen for different business process and report generation which is really time and more human resource consuming. They engage different unit or department for different low-level and high level reports of production efficiency, sales, profit, market share etc. And they don't have a central process to maintain all business analytics reporting task.

However, few of the textile industries are now following some automated IT approach for their business intelligence reports at different level (operational level, managerial level, high management level). Apart from manual calculation and reporting process we have found bellow automated processes:

- Some default analytical reporting panel along with ERP software of textile industries

Author ᵅ: Department of Computer Science & Engineering, Bangladesh Army University of Science & Technology, Saidpur Cantonment, Nilphamari, Bangladesh. e-mail: al-hasan@baust.edu.bd
Author ᵒ: Department of Electrical & Electronic Engineering, Bangladesh University of Engineering & Technology, Dhaka-1205, Bangladesh. e-mail: rubina@bubt.edu.bd
Author ᵖ: Department of Computer Science, Michigan Technological University Houghton, MI 49931, USA. e-mail: sajib.cuet027@gmail.com

- Crystal report or other reporting service which generate reports from 2D relational databases
- Excel Analysis from various raw data

Many textile industries are using ERP software for proper tracking of materials, production process and buy-sell method of the products/materials involving whole supply chain management procedure. Actually main purpose of these software solutions is enhancing proper resource planning of the enterprise whether resource could be human, raw materials, finished products or any virtual method or product. Along with proper planning of procurement of materials, processing of material to make finished product and selling finished product ERP software also provide some default reports to analyze on these data and process. This kind of analytical reporting actually can provide only operational insight of the product. But, for strategic and long term forecasting these default reporting modules are not appropriate. Many reputed organization use their transactional databases as direct data source of analytical reporting and do some limited calculation and generate different custom reports from small volume data of targeted transactional database. But, for better forecasting we need at least last 5 years historical data which should be maintained in data-warehouse in proper format. After that we can do our intended analysis for textile business forecast on that big data source of historical data keeping transactional database free from the load of analysis [1].

In many textile industries different departments use excel for keeping various records along with some business calculations. And when higher management seek for a specific report from them, they integrate excel records of different to generate some excel reporting and most of the cases they use pivot table function for generating reports. But, these reports provide very specific and small range of analysis [2].

II. Proposed Model

This thesis-work ensures proper business analysis of textile industries in Bangladesh following bellow steps:

- Build Data Warehouse using Inmon Model
- Define Business Analysis Logic
- Use an Advance Reporting Platform

Now-a-days most of the textiles companies are using excel analysis to get some insight which is not

able to produce better forecast and report. Many of them are using the default reporting features of their ERP software which is not able to provide better customized business analytics. To make a stand-alone business analytics solution here SQL Server 2012, SQL Server Integration Service (SSIS) and Tableau Reporting Server is used. Raw data collection, data cleansing, data conversion tasks will be done by SQL Server Integration Service which is an automated tool to gather data and make data into useful information for analysis. Different business calculation and analysis will be done with SQL Server 2012 which could be treated as analysis layer. For some advance data analysis and reporting to show the business insight [2] in a visual representation Tableau reporting server is used which can act as a server for different reports. In Tableau there are many analyses and reporting option with different customize configuration.
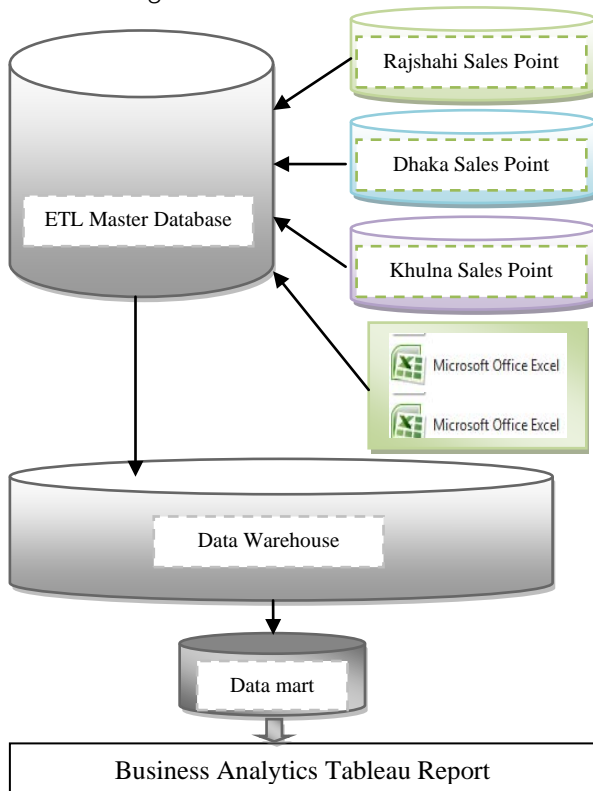
Fig. 1: Textile Business Analytics Model

Here, in Fig. 1 raw sales data and other related data of textile industries is collected from different sales points. Business analytics require a huge amount of historical data of a business and textile business data should be collected from different sales points and other related transactional database of textile business. Fig.1 shows the complete analytical model where raw data extract-transform-loading (ETL) process is done first. In this thesis, raw transactional data is collected from some regional database (Rajshahi sales point, Khulna sales point and Dhaka sales point) and related sales data which is maintained in excel data format. Raw data

collection and transformation process is done in the ETL server database which is finally fed to data warehouse which contains huge collection of textile business data in a structured format. After building the data warehouse textile business reporting specific data mart is formed, on which many business logic is employed through sql (standard query language) script with some stored procedures. For business analysis and different analytics reporting tableau report server is used where tableau server give many option for analytics to get business insight [3].

III. Textile Business Analytics and Smart Reporting

Analysis is the most important part for a system development. Before implementation analysis helps to find out the requirements of the system going to develop. Through BI, textile industries take the advantages on ending of textile quotas and inducing producers to race for capturing maximum global share of the world textile markets, uncertainties due to continuing trade disputes, Changing competitive environment and Globalization and improve their:

- Merchandise Management
- Loss Prevention
- Financial Analysis
- Category Management
- Sales and Marketing Analysis
- Employee Performance Management
- Customer Analysis and Relationship Marketing

Textile manufacturers and apparel retailers can look at BI to improve purchasing, profitability, marketing efforts, inventory and store management, customer service and financial reporting. Today, systems are built to collect selling information via the sales documents in near real-time. Manufacturers can use affordable technology to monitor the "sell through" information daily and are able to compare the rate of sale to the actual stock position at the retail location. If "stock outs" are occurring, manufacturers can immediately check inventory availability or identify a "like product" for shipment. This creates a partnership with the retailer, alerting them to possible sales losses and offering additional stock for immediate delivery [4].

a) *Analysis Environment*
- SQL Server 2012
- SQL Server Integration Service (SSIS)
- Tableau Analysis and Reporting Server

b) *Analysis and Analytics Reporting*
There are many business analytics reporting possible with the same data feed in the tableau reporting server.
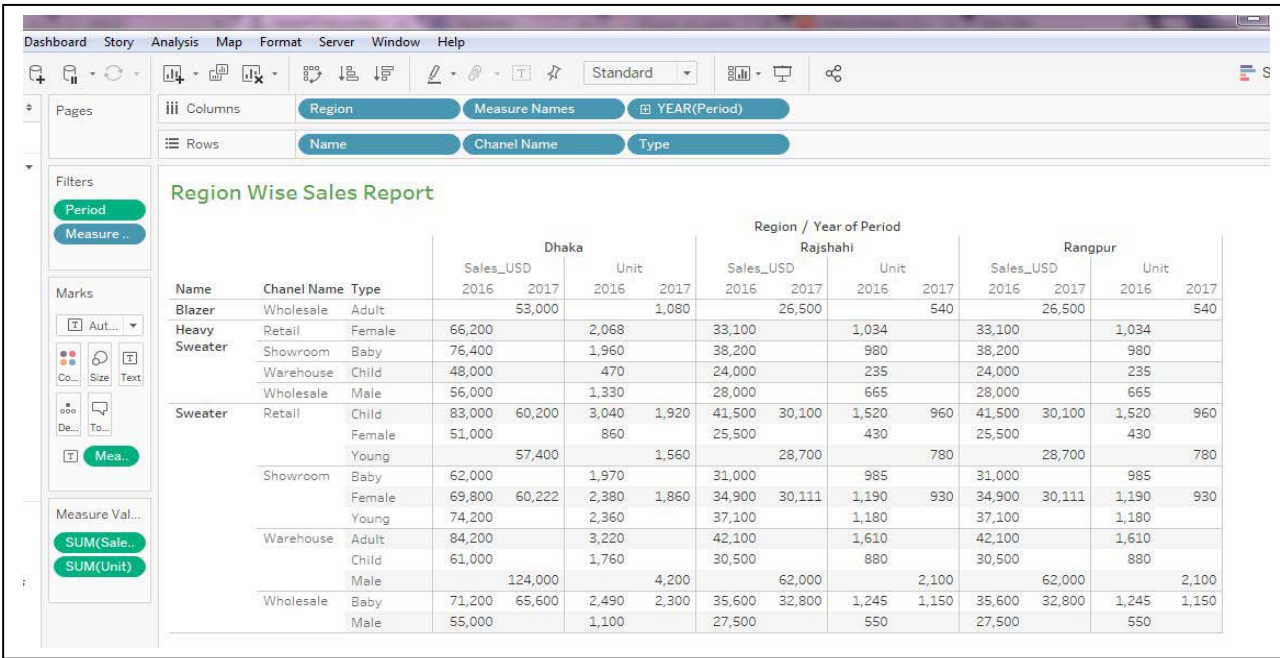
Fig. 2: Region Wise Sales Report with Unit Values(Tabular Format)
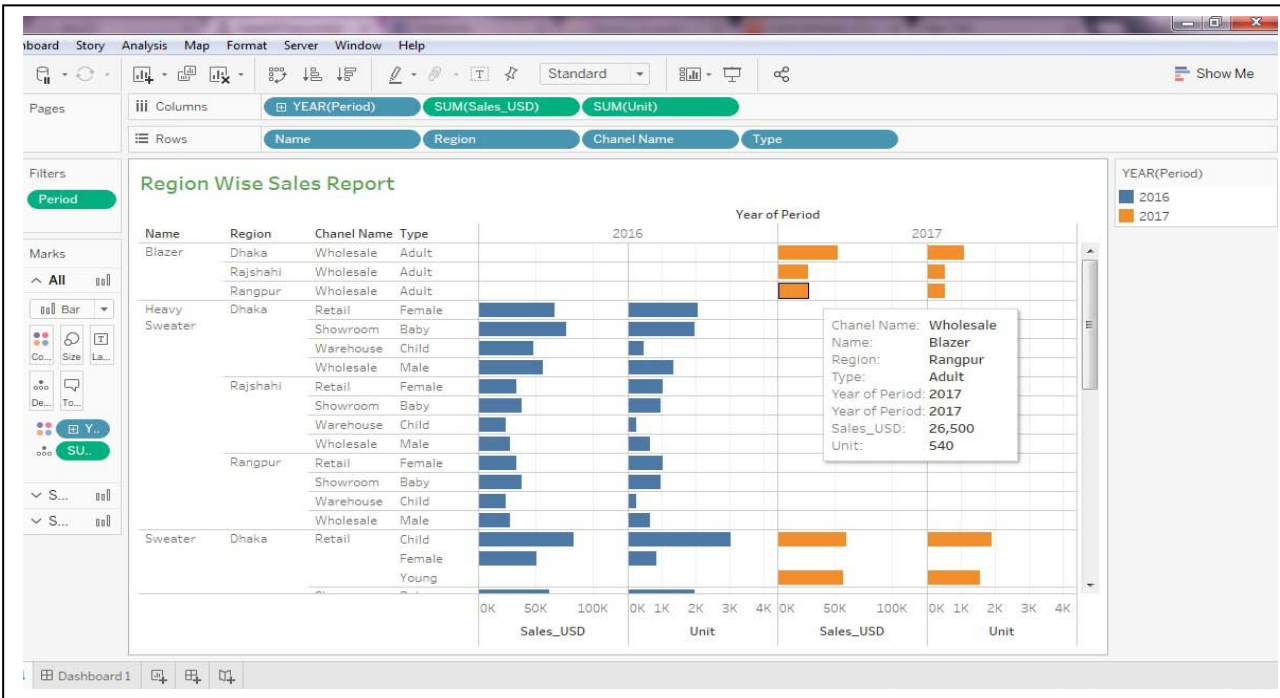
Fig. 3: Region Wise Sales Report with Unit Values (Tableau Graphics)

Tableau sever has a data analytics engine which automatically define dimension and measures from the data sources feed to tableau [5]. It gives us drag and drop facility to place our dimensions in rows or columns to view our measure information from various angle. From the analysis with different dimension and measure there can be generated many report in tableau which could be viewed in any devices like; tab, computer, mobile.

c) Graphical Comparison

Business Intelligence [6] reports can be generated in many perspectives like; channel-wise sales, period-wise sales, product-wise sales and units,

region-wise sales and units of textile product. Fig. 3 shows the region-wise sales and units of different products with respect to different channel and product type where Fig. 4 shows the same thing in more visual interface.

After making proper use and analysis of proposed model, it is identified that this arrangement is very much capable of handling textile business analytics for forecasting the future need in Bangladesh [7].

IV. Conclusion

In this thesis paper, we have worked to get a suitable business analytics solution for textile industries in Bangladesh. Considering the economic and other technical aspects, our proposed model with the combination of two different servers and services works better to get complete BI solution for textile industries. BI reporting specially tableau reporting makes the business outcome easy to visualize for higher management. And higher management can make the right decision very fast from this automated system of business analytics. Textile industries will be benefited highly for making proper production plan of garments product by using this business analytics solution.

References Références Referencias

1. B. K. Mishra, D. Hazra, K. Tarannum, "Business Intelligence using Data Mining techniques and Business Analytics," International Conference System Modeling & Advancement in Research Trends (SMART), 2016.
2. O. Marjanovic, T. Ariyachandra, B. Dinter, "Introduction to HICCS-47 Business Analytics, Business Intelligence and Big Data Minitrack," 47th Hawaii International Conference on System Science, 2014.
3. L. Duan and L. Da Xu, "Business intelligence for enterprise systems: a survey," Ind. Informatics, IEEE Trans., vol. 8, no. c, pp. 1–9, 2012.
4. BI for Textile Manufacturers & Apparel Retailers. [Online]. Available: http://www.fibre2fashion.com/industry-article/5377/bi-for-textile-manufacturers-apparel-retailers? page=1
5. Tableau Official Website [Online]. Available: https://www.tableau.com
6. Ernie Mazuin Mohd Yusof, Mohd Shahizan Othman, Yuhanis Omar, Ahmad Rizal Mohd Yusof, "The Study on the Application of Business Intelligence in Manufacturing: A Review," IJCSI International Journal of Computer Science Issues, Vol. 10, Issue 1, No 3, January 2013
7. BGME Report [Online]. Available: http://www.bgmea.com. bd/home/pages/tradeinformation

An E-Passport System with Multi-Stage Authentication: A Casestudy of the Security of Sri Lanka's E-Passport

By Bhagya Wimalasiri & Neera Jeyamohan

Asia Pacific Institute of Information Technology

Abstract- E-passport or Electronic passport is one of the newly established research areas, especially since in the last few years there have been numerous reported attempts of illegal immigration across a number of country borders. Therefore, many countries are choosing to introduce electronic passports for their citizens and to automate the verification process at their border control security. The current e-passport systems are based on two technologies: RFID and Biometrics. New applications of RFID technology have been introduced in various aspects of people's lives. Even though this technology has existed for more than a decade, it still holds considerable security and privacy risks. But together with RFID and biometric technologies an e-passport verification system can reduce fraud, identity theft and will help governments worldwide to improve security at their country borders. In 2017 Sri Lankan government proposed to introduce a new e-passport scheme which will contain embedded RFID tags for person identification purpose.

Keywords: watermarking, e-passport, RFID, facial verification, signature verification, encryption, feature-matching.

GJCST-G Classification: K.6.5

ANEPASSPORTSYSTEMWITHMULTISTAGEAUTHENTICATIONACASESTUDYOFTHESECURITYOFSRILANKASEPASSPORT

Strictly as per the compliance and regulations of:

An E-Passport System with Multi-Stage Authentication: A Casestudy of the Security of Sri Lanka's E-Passport

Bhagya Wimalasiri ᵅ & Neera Jeyamohan ᵟ

Abstract- E-passport or Electronic passport is one of the newly established research areas, especially since in the last few years there have been numerous reported attempts of illegal immigration across a number of country borders. Therefore, many countries are choosing to introduce electronic passports for their citizens and to automate the verification process at their border control security. The current e-passport systems are based on two technologies: RFID and Biometrics. New applications of RFID technology have been introduced in various aspects of people's lives. Even though this technology has existed for more than a decade, it still holds considerable security and privacy risks. But together with RFID and biometric technologies an e-passport verification system can reduce fraud, identity theft and will help governments worldwide to improve security at their country borders. In 2017 Sri Lankan government proposed to introduce a new e-passport scheme which will contain embedded RFID tags for person identification purpose. Therefore, this paper proposes a novel multi-stage e-passport verification scheme based on watermarking, biometrics and RFID.

Keywords: watermarking, e-passport, RFID, facial verification, signature verification, encryption, feature-matching.

I. Introduction

E-passports or electronic passports are a combination of traditional paper passports with an embedded Radio Frequency Identifier (RFID) tag. The RFID tag stores the information printed on the passport bio-data page along with additional biometric information (i.e., iris, fingerprint scans) of the holder. Being machine-readable, the concept of electronic passport improves the efficiency of the verification process at border control security. Concurrently the security of the entire passport authentication procedure is strengthened by e-passports with the duplication of bearer information printed on the bio-data page as well as the inclusion of biometric parameters. Many countries around the world have already adopted the use of electronic passports with the rest increasingly following in their footstep.

The security of an electronic passport system can be reinforced with the incorporation of a multitude of tactics that establish the owner's identity as well as remedy some of the inherent vulnerabilities of RFID technology itself. This paper proposes a system which utilizes a digital watermarking mechanism to establish owner's identity and to verify the integrity of the information stored in RFID tag. The system also comprised of encryption techniques to ensure the confidentiality of the information stored inside the RFID tag. The remainder of this paper will be structured as follows. Section 2 overviews the existing literature in the subject while section 3 addresses the security issues the proposed system attempts to solve. Section 4 discusses the proposed solution in detail. Experimental results obtained from the software simulation of the proposed system is analyzed in the 5ᵗʰ section with the final section containing the concluding remarks.

II. Literature Reviews

Strengthening the security of e-passport systems has always been a sought-after research topic given its vitality to a fortified national defense system. With the adaptation of RFID as the principal technology in modern e-passport implementations, refining its security has become a leading research area given the hardware-based unsophisticated nature of the technology. Consequently, many security experts and academics have proposed various approaches to address known RFID vulnerabilities in the context of e-passport systems as well methods to improve the security of passports systems overall.

Al-Hamami & Alhafez[1] have proposed the use of Diffie-Hellman key exchange Algorithm to share a private key between the RFID tag and the NFC-implemented Inspection System, while separately storing a unique watermark, inside the passport photo and the RFID tag. These stored watermarks will later be compared during the verification process to ensure that the Tag has not been cloned. Mehan et al. [2] suggested a method for authenticating electronic passports by using Elliptic Curve Cryptography (ECC) applied in the dual domain (i.e., spatial and frequency) where the passport holder's image is split into twin segments, and the holder's passport particulars are fragmented into two parts as well.

Wang et al. [3] proposed a two-stage verification method, where a person is enrolled, during which the image is watermarked, and authenticated

Author ᵅ ᵟ: School of Computing, Asia Pacific Institute of Information Technology Colombo, Sri Lanka. e-mails: bwimad@gmail.com, neera@apiit.lk

when the watermark is extracted and verified. Their proposed system was based on multi-modal biometrics where both facial and palm samples of the user are extracted to produce the inputs.

The purpose of the approach suggested by Saeed et al. [4]was to increase the security of existing e-passport protocols to eliminate the data leakage and tag-cloning threats associated with embedded RFID technology. They proposed the use of increased key-sizes to avoid data leakage, storing the private key of the chip in an inaccessible location to prevent tag-cloning. In the system suggested by Peeters et al. [5], they propose to ensure passport-bearer privacy by replacing the use of bootstrap from the low entropy value in the e-passport MRZ with a mutual authentication pattern. This method involves two authentication stages; a terminal authentication followed by an e-passport authentication. Viswanathan et al.[6]suggested a method that embeds an invisible watermark inside the passenger photograph, created using passenger's full name and passport number during the initial issuance of the passport. This method attempted at establishing a correspondence between passport's photo and its owner which could later be verified at border control.

III. Security of an E-passport

a) Establishing a link between facial image and bio-data

One of the main prevalent issues in the e-passport authentication process is establishing a correspondence between the holder's facial photograph and the provided information. It is a common practice among illegal immigrants, blacklisted passengers, and other criminals to forge passport documents with their images and someone else's bio-data. Accordingly, it's evident that there is a requirement for a mechanism to bind the facial photograph of a passport holder with their information and be able to verify the authenticity of it.

b) Facial Image & Signature Verification

Forgery of passports using facial images resembling the valid owner of a passport and forging their signatures aren't entirely unheard of and is a practice that is continued to be carried out even to this day. According to an official authority at Department of Emigrations and Immigrations of Si Lanka, individuals have managed to manipulate the issuance office into issuing passports that necessarily did not contain their personal information. This type of counterfeit is done by trying to impersonate the legitimate owner of the information where the impersonator either accurately resembled the appearance of the authentic owner (i.e., twin sibling, relative) or managed to manipulate the appearance (i.e., change hair, wear make-up) to resemble the original owner. Similar kinds of attempts

are carried out to falsify the hand-signatures of passport holders which necessitates the requirement of a system that allows for the detection of such forgeries.

c) Data Skimming

An inherent vulnerability related to the security of RFID technology is the ability to read the material stored inside an RFID tag, by any individual in possession of an RFID reader, since there isn't any default mechanism in place to encrypt the information stored within the tag. The danger of this threat lies in the fact that even a short distance, such as 3-foot, could allow an attacker to perform a skimming attack against an e-passport. Skimming poses one of the greatest threats related to e-passports since as per the mandate of the ICAO (International Civil Aviation Organization), e-passports contain sensitive passenger information such as passenger name, date of birth and passport identification number[7]. Actual deployments will include biometric information, nationality, profession, and place of birth [7]. Hence, it's imperative to deploy a mechanism that ensures the confidentiality of the stored information within the RFID tag.

d) Tag Cloning

Cloning means that an adversary produces emulators of a genuine RFID transponder that behave identically and hence cannot be distinguished from the original transponder [8]. Although Baseline ICAO regulations mandate digitally signing e-passport data, which theoretically allows the RFID reader to validate that the data originated from the legitimate passport-issuing authority, it still fails in binding the data to ane-passport or RFID tag. Thus it provides no defense against potential cloning of e-passport tags [7]. This vulnerability requires being readily addressed to protect the integrity of any e-passport system.

e) The Validity of Information Stored Inside the RFID Tag

It's extremely vital that the border security can verify that an e-passport contains the exact data that was written in the tag during the issuance process. They should be able to authenticate that the information stored by the legitimate passport issuing authority has not been tampered with and that they can undeniably verify the authenticity of information stored inside the embedded RFID tag ensuring guaranteed national security.

IV. Proposed Solution

The proposed solution addresses all the security concerns discussed under section 3, details of which are explained in this section.

1) Passport Issuance

This phase takes place at Department of Emigration & Immigration of Sri Lanka where the

passports are issued for individuals for the first time. The stages involved in the passport issuance process are individually discussed as follows.

a) Acquisition of Information

During this initial stage of the system, relevant information about the passport applicant will be acquired (i.e., applicant image, signature, full name, gender, assigned passport number, date and place of birth, profession, NIC number, nationality, type of passport, date of issue and date of expiration). The acquired data will be validated for the correct data input format (i.e., dates in DD/MM/YYYY format etc.) and the existence of mandatory fields (such as first and last names, passport number etc.). Failure of the input validation process will prompt the data entry operator to enter the data in the correct format or to complete all mandatory fields.

b) Watermarking the Facial Image

Watermark creation requires applicant first, second, third and family names and passport number as input parameters. A random four-digit numeric key will be generated using which each input parameter will be encoded to produce a numeric value. However, since not all applicants possess second and third names, in such cases a custom value will be assigned for those parameters. Using these encoded parameters, a numeric watermark and the location to store the generated watermark within the image will be calculated and the watermark will be embedded in the calculated location. The watermark will be embedded replacing the highest intensity of RGB channels at any calculated location. As illustrated in figure 1 the watermarked image is indistinguishable from the unwatermarked image which preserves the undetectability of the watermark and perceptual similarity from the original image.

a) before   b) after

Figure 1: Image before and after inserting watermark

c) Generate RFID Tag

The RFID tag contain all initially acquired information of the applicant. To prevent data skimming attacks the information stored in the RFID tag will be encrypted using AES. The key for the AES encryption will be randomly generated to contain 14 alphanumeric and special characters.

d) Save Information in Corresponding Databases

All information initially acquired will be saved in a centralized passport holder information database. Additionally, all required watermark calculation values will be stored in the centralized watermarking information database, which will be used during the validation process to verify the recalculated watermark. The key that was used for the AES encryption will also be centrally stored.
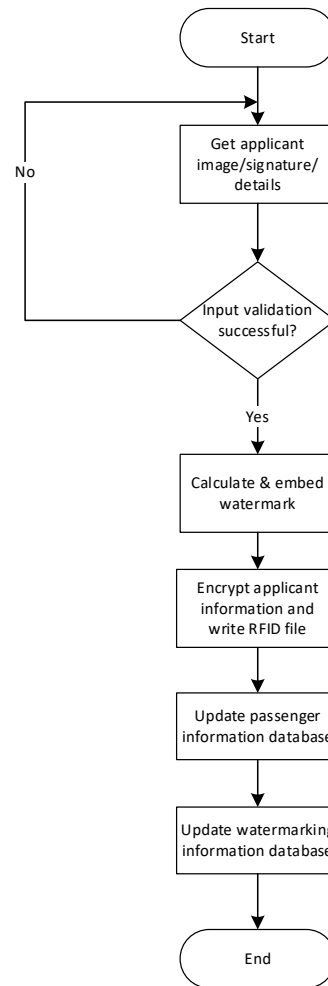
Figure 2: Issuance Process

2) Passport Verification

Passport verification is the secondary stage of the proposed bipartite solution. Passport verification process consists of the following phases.

a) Acquisition of Required Parameters

During this stage, holder's passport number and the scanned image of passport bio-data page are acquired and stored at a temporary location. Simultaneously, the encrypted text file inside the embedded RFID tag is accessed, retrieved and temporarily stored.

b) Verification of RFID-stored Information

As the first step of the verification process, using the passport number, the centralized passport holder information database is accessed, and the respective database record for passport holder is displayed. Simultaneously, the password for AES decryption of the RFID file is retrieved. The encrypted RFID file is then decrypted, and the information is displayed alongside the retrieved database information. Human intervention is required to verify the details and in this case the border-control official can decide whether or not the information presented in the passport and the information retrieved are similar.

c) Facial Image Verification

During the second stage of the verification process, the facial image section of the scanned bio-data page is compared against a centrally stored facial image template. The images are matched using the feature key-points based algorithm SIFT, which would display the number of best-matched key-points between the two images. If the number of similar key-points is equal or greater than a predetermined threshold, set based on experimental results, the two images will be verified as similar. Otherwise, the proposed solution will flag the bearer-image as a mismatch.

d) Hand-Signature Verification

This stage follows a verification procedure akin to the facial image verifications procedure. The section of scanned bio-data page where the bearer's signature is contained is extracted as an image and compared against the centrally stored template of the bearer signature that has been obtained during the issuance stage. The SIFT algorithm is again utilized here to detect identical key-points between the two images. Based on experimental results, a different threshold is set for signature verification, where the similarity of the two signatures is authenticated if the number of matched key-points is similar or greater than the determined threshold.

e) Recalculate and Verify Watermark

This is the final stage of the verification mechanism. The central database is accessed, and the bearer's full name and the key used for the initial watermark calculation is extracted. The watermark is recalculated using the retrieved information along with the bearer passport number in real-time. The recalculated watermark values (watermark plus storage location) are compared against the centrally stored values to ensure the legitimacy of the watermark thus establishing a correspondence between bearer information and their facial image. Furthermore, the watermark embedded inside the facial image (which is stored inside the RFID tag) is compared against the centrally stored watermark. This is done to ensure that

the RFID tag is bound to the holder of the passport which confirms that the tag has not been cloned.
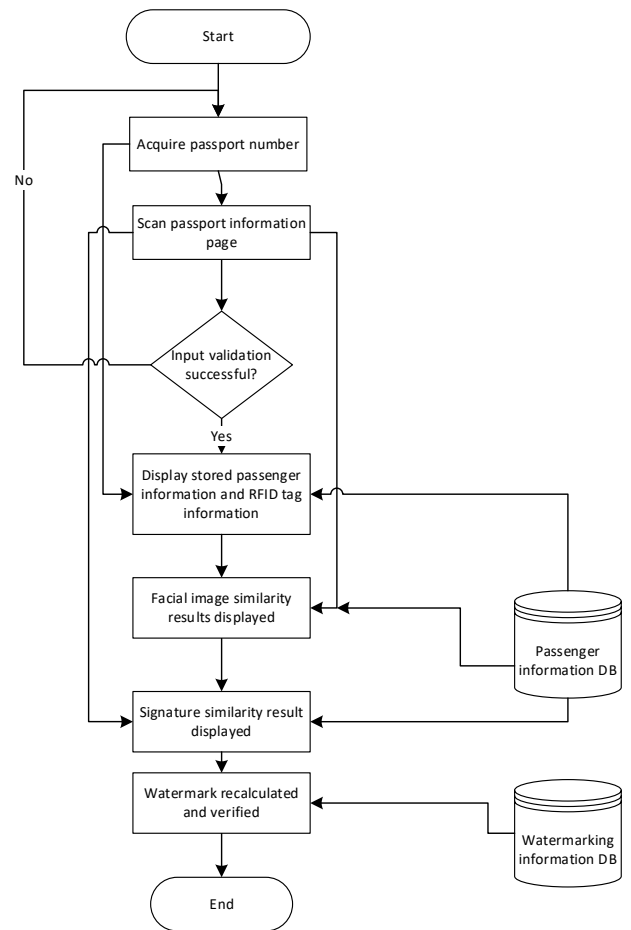
Figure 3: Passport Authentication Process

V. Experimental Results

The prototype was developed using Python programming language version 2.7. As the inputs for the developed verification prototype, passport holder's passport number and the scanned bio-data page of the passport are acquired which proceeds the following multi-stage verification procedure.

a) Verify RFID Tag against the Central Server

As shown in figure 4, during this stage the information inside the RFID tag will be displayed against the centrally stored bio-data which is accessed using the passport number of the bearer. Under ideal circumstances, the information centrally stored must be identical to the information extracted from the RFID tag.
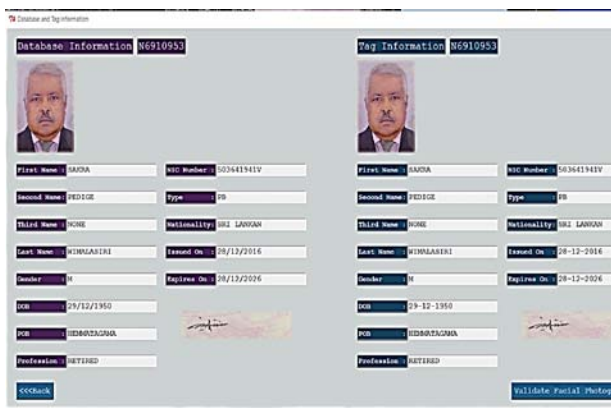
Figure 4: Verifying the RFID tag against central database

b) Facial Verification

During this stage, the facial image contained in the scanned bio-data page is compared against the centrally stored image template of the passport bearer. As shown in figure 5 if the two images share a satisfactory number of identical key-points the porotype would declare them as authenticated.

Figure 5: Facial Image Verification

But as depicted in figure 6 if the two images do not contain a substantial number of similar key-points, i.e., the number of matching key-points are less than the desired threshold, the prototype will display an 'Image Mismatch' warning to the user.

Figure 6: Facial Image Mismatch

c) Signature Verification

Correspondingly, during signature verification, the system will successfully authenticate if the two signatures, the scanned signature, and the centrally-stored signature template, share the necessary number of similar key-points in between. But, if the system fails to detect the required number of similar key-points between the two images, then the system will warn the user that the signatures are a mismatch. The results are displayed in figures 7 and 8 respectively.
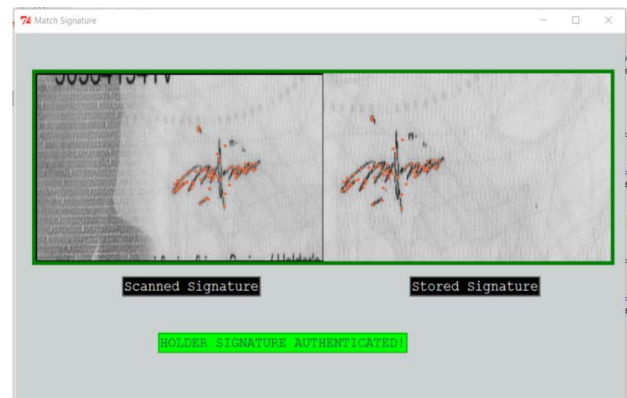
Figure 7: Signature Verification

Figure 8: Signature Mismatch

d) *Watermark Verification*

During this final stage of verification, the watermark for the respective passport will be recalculated and compared against the centrally stored watermark and the watermark embedded inside the image stored in the RFID tag. If all three comparisons are identical, the system will conclude the verification process.
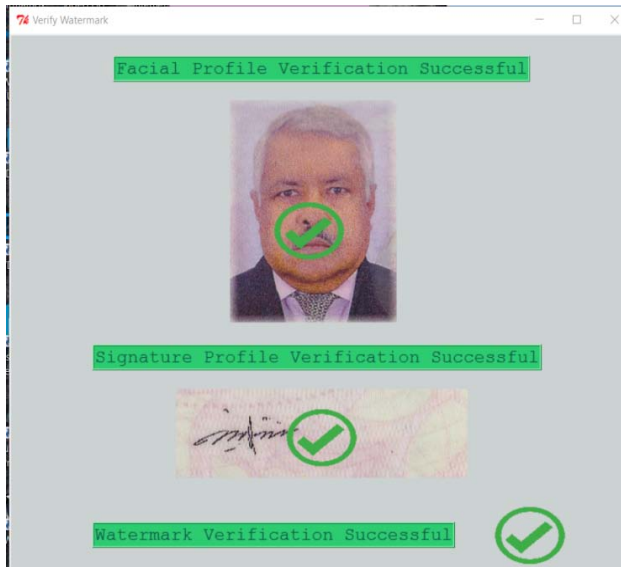
Figure 9: Watermark Verification & Authentication Completion

Table 1: Test Result Summarization

Passport	RFID Information Verification	Facial Image Verification	Signature Verification	Watermark Verification
1	✓	✓	✓	✓
2	✓	✓	✓	✓
3	✓	✓	✓	✓
4	✓	✓	✓	✓
5	✓	✓	✓	✓
6	✓	✓	✓	✓
7	✓	✓	✓	✓
8	✓	✓	✓	✓

VI. Conclusion

In this paper we propose a novel multi-stage authentication scheme that incorporates verification of data stored inside the RFID tag, watermarking, facial and signature authentication for e-passports. Information embedded within the RFID tag is first compared against the centrally stored bio-data to determine their similarity. The printed facial image and signature on the passport are compared against centrally stored items to validate their authenticity. As the final stage of the verification, the watermark embedded in the image stored inside the RFID tag will be recalculated and compared to establish owner identity as well prevent tag-cloning. All the information stored inside the RFID tag is encrypted to eliminate skimming attacks. The experimental results reflect the functionality of the proposed solution at each stage.

References Références Referencias

1. A. H. Al-Hamami and M. A. A. Alhafez, "Enhancing Security to Protect E-Passport against Photo Forgery," Glob. J. Comput. Sci. Technol., vol. 16, no. 6, 2016.
2. V. Mehan, R. Dhir, and Y. S. Brar, "Secure Electronic Passport Certification using Re-water Marking," vol. 16, pp. 371–375, 2013.
3. Y. Liu et al., "The study of recent technologies used in E-passport system," 2014 IEEE Glob. Humanit. Technol. Conf. - South Asia Satell. GHTC-SAS 2014, vol. 3, no. July, pp. 141–146, 2014.
4. M. Q. Saeed, A. Masood, and F. Kausar, "Securing ePassport System : A Proposed Anti-Cloning and Anti-Skimming Protocol," pp. 2–6, 2004.
5. R. Peeters, J. Hermans, and B. Mennink, "Speedup for European ePassport Authentication / Shattering the Glass Maze," vol. 1, no. September, pp. 1–2, 2014.
6. V. M. Viswanatham, G. S. Reddy, P. Jagadeesh, and M. D. Reddy, "An Improved Authentication Scheme for Passport Verification Using Watermarking Technique," vol. 9, no. 2, pp. 106–112, 2012.
7. A. Juels, A. Molnar, and D. Wagner, "Security and Privacy Issues in ePassports," Secur. Priv. Emerg. Areas Commun. Networks, 2005., pp. 74–88, 2005.
8. B. Miodrag, S. David, and S. Ivan, Rfid Systems Research Trends and Challenges, vol. 53, no. 9. 2013.

Construction of Large Scale Isolated Word Speech Corpus in Bangla

By Md. Farukuzzaman Khan & M. Abdus Sobhan

Islamic University

Abstract- A new speech corpus of isolated words in Bangla language has recorded including high frequent words from a text corpus BdNC01. It has designed specifically for various research activities related to speaker-independent Bangla speech recognition. The database consists of speech of 100 speakers, each of them speaking 1081 words. Another 50 new speakers were employed to speak all the list of words to construct a test database. Every utterance was repeated five times in different days to avoid time variation of speaker property. The total 375 hours of original recording makes the corpora largest in its type, size and language domain. This paper describes the motivation for the corpora and the processes undertaken in its construction. The paper concludes with the usability of the corpus.

Keywords: Bangla, speech corpora, BDNC01, vocabulary, isolated word, speech recognition.

GJCST-G Classification: H.2.0

CONSTRUCTIONOFLARGESCALEISOLATEDWORDSPEECHCORPUSINBANGLA

Strictly as per the compliance and regulations of:

Construction of Large Scale Isolated Word Speech Corpus in Bangla

Md. Farukuzzaman Khan [α] & M. Abdus Sobhan [σ]

Abstract- A new speech corpus of isolated words in Bangla language has recorded including high frequent words from a text corpus BdNC01. It has designed specifically for various research activities related to speaker-independent Bangla speech recognition. The database consists of speech of 100 speakers, each of them speaking 1081 words. Another 50 new speakers were employed to speak all the list of words to construct a test database. Every utterance was repeated five times in different days to avoid time variation of speaker property. The total 375 hours of original recording makes the corpora largest in its type, size and language domain. This paper describes the motivation for the corpora and the processes undertaken in its construction. The paper concludes with the usability of the corpus.

Keywords: Bangla, speech corpora, BDNC01, vocabulary, isolated word, speech recognition.

I. Introduction

Rapid globalization of technology has made the world in society and cultural diversity of most populations is rapidly changing. This situation demands support to linguistic and cultural integration and hence needs an accurate, appropriate and robust language technology. It is also desirable for these technologies to be reproducible in new languages within limited time, expertise and monetary constraints. Fortunately, there are enormous and ever growing technologies to process digital text and speech freely available for many languages of the world [1]. But there are still needs for more tools and techniques to improve theory and practice of spoken language technologies in multiple language environments as the demand for opportunities to communicate with people speaking different languages are increasing. It is observed from contemporary texts and literature that the research interest in corpus-based techniques is growing steadily in the global environment during past decades. Corpus-based methods are found as seed point in almost all language and speech processing systems. The construction of standard speech database or corpus now becomes an obligatory necessity for the progressive development of speech processing, recognition and understanding systems.

With the continuous development of Speech corpora, it becomes one of the key issues in speech technology development like text to speech and speech to text systems. Often read speech is used since it seems to be the easiest way to obtain a recorded speech corpus with highest control of the content [2]. From 1990 to 2000, several speech corpora were developed for various dimension of speech research. The OGI Multi-language Telephone Speech Corpus (1992) [3] and The Switchboard Telephone Speech Corpus (1990-2001) [4] were two important development of speech corpora. In 1993, the most popularly used speech corpora TIDIGITS and TIMIT are published. TIMIT [5] was commissioned by DARPA and worked on by many sites, including Texas Instruments (TI) and Massachusetts Institute of Technology (MIT), hence the corpus name. The TIMIT corpus of read speech is designed to provide speech data for acoustic-phonetic studies and contains broadband recordings of 630 speakers of eight major dialects of American English. TIDIGITS [6] also designed and collected at Texas Instruments, Inc. (TI) for the purpose of designing and evaluating algorithms for speaker-independent recognition of connected digit sequences. The Buckeye Corpus including complete 2000 recording of conversational speech is created by a team of linguists and psychologists at Ohio State University, contains high-quality recordings from 40 speakers in Columbus, Ohio conversing freely with an interviewer [7]. A noisy speech corpus (NOIZEUS) was developed in 2007 to facilitate comparison of speech enhancement algorithms among research groups [8]. In the past several years, it is seen an explosion in corpus based methods in language technology development over the horizon. Incremental computing power and invention of several efficient modeling techniques makes this research effort as popular field of natural language processing as well as artificial intelligence. Beyond of British and American English, corpora are creating frequently and using to design speech based technologies in all influential languages including Arabic, Chinese, Japanese and Indian languages.

Bangla is the seventh most spoken native language in the world by population [9]. In present days Bangla speakers are spread around the world, but majority of Bangla speakers are located in the countries of Bangladesh and India with a diversity of cultural and linguistic traditions. Though it is one of the influential world languages, the history of corpus generation and corpus based Bangla speech recognition are limited

Author α: Professor, Dept. of Computer Science and Engineering, Islamic University, Kushtia-7003 Bangladesh.
e-mail: mfkhanbd2@gmail.com
Author σ: Professor, Prime University, Darus Salam Road, Mirpur, Dhaka, Bangladesh. e-mail: sobhan30@gmail.com

within few years. Probably the first instance was Bangla Katha Bhandar, created and released by Center for Development of Advanced Computing (CDAC) of India in 2005 [10]. Another step of similar work was done by the Center for Research on Bangla Language Processing of Bangladesh in 2010 [11]. In between these two, a research project financed by the MOSICT of Bangladesh was completed in June, 2008. Under this project a large scale speech corpora was recorded in SIPL of Islamic University [12]. The distinction of The SIPL speech corpora from other two is that it was designed especially for Bangla speech recognition. As the continuation of the project results organizing, labeling and similar other processing is still ongoing. This paper describes the design and recording processes of Isolated word speech corpora. After the basics of speech corpora, a short description of BdNC01 text corpus has been discussed to understand the selection of words for speech database design. In the next subsections, speech recording, editing processes and final outcome are discussed. Possible benefits, limitation and extension possibilities of this work are discussed at the end of this article.

II. Basics of Speech Corpus

Speech corpus is a large collection of audio recordings of spoken language. Most speech Corpora also have additional text files containing transcriptions of the words spoken and the time each word occurred in the recording. In a sense, Speech Corpora may be viewed in two types. Read Speech includes Book excerpts, Broadcast news, Lists of words, Sequences of numbers and Spontaneous Speech includes Dialogs, Narratives, Map-tasks, Appointment-tasks etc. Speech corpus is the basis for both analyzing the characteristics of speech signal and developing speech synthesis and recognition systems. The corpus content becomes more and more complicated and the size larger and larger with the development of computation power and the speech technology. To build a large scale speech corpus, the first task is to identify a large text corpus that has broadly representative distributions of words of the target language. Potential sources include online versions of news papers, web contents and books. For example, a speech corpus of British English WSJCAM0 has been recorded at Cambridge University from the Wall Street Journal text corpus [13]. Before recording a speech corpus, careful selection of vocabulary is important since on average each out-of-vocabulary word causes errors usually between 1.5 and 2 [14]. The recognizer vocabulary is usually designed with the goal of maximizing lexical coverage for the expected input. A straight forward approach is to choose the N most frequent words in the training data which means that the usefulness of the vocabulary is highly dependent upon the representativeness of the training data [15].

There are different features to characterize a speech corpus. Some of the influential features are speech types, speaker dependency, vocabulary size, etc. As the main application area of speech corpora is in the design process of speech recognition system, the importance of these parameters is based upon the typical design considerations of a recognition system, which may be closely related to a specific application. In terms of speech types, speech content of corpora may be isolated, connected or continuous speech. Isolated or discrete speech requires a significant pause between words, may be 250 milliseconds. A single utterance may consist of a single word or a short string of isolated words may contain ten words in best estimate. In continuous speech recognition systems, fluent or continuous speech flows with a normal rhythm and the words bump into each other thus making recognition harder. Speech recognition systems can also be classified further as either speaker-dependent or speaker-independent systems. The system may be designed to tolerate a large variety of speaker variability. In this case the system is speaker independent and has to deal with a large population of users, mainly from the general public. Other systems may be tuned to the voice of a particular speaker and thus the system is speaker-dependent. We may also have a system that is adapted to the voice of a particular set of speakers called multi-speaker system. Thus the speech corpora design varies with speaker condition for different context or application area. Another important consideration to design a speech corpus is its vocabulary size. The number of words that are recognized by a system may consist of a small set of words with small vocabulary of about ten words, a medium-size set with 10 to 100 words, a large set of words with 100 to 1000 words or very large set with over 1000 words [16]. The study of Gould, Conti, and Hovanyecz [17] to determine the feasibility of a limited capability automatic dictation machine which was simulated along with isolated and connected speech modes using various vocabulary sizes. In their experiment users composed and edited letters with the simulated voice recognizer which had either a 1000 word vocabulary or an unlimited vocabulary. The 1000 word vocabulary was composed of the 1000 most frequently used English words. An analysis afterward indicated that roughly 75% of the words used in the letter writing task were available in the 1000-word vocabulary. In another experiment with a 5000-word vocabulary, it was found that approximately 90% of words used by the letter writing tasks fall in the vocabulary. The result of the experiment indicates that large vocabulary increase the language coverage, but the most limiting problem of larger vocabulary sizes is the corresponding decrease in recognizer accuracy. Thus as a compromise, an Isolated Word corpus of 1000 words may be satisfactorily applicable to evaluate a speech recognition system.

III. Word Selection and Database Design

BdNC01 corpus is a text corpus collected during 2005-2011. A large amount of Bangla text was compiled in BdNC01 from several influential Bangla newspapers including more than 11 million word tokens. To exploit the ease of collection, web editions of the dailies was used as the source of texts. For statistical processing of the corpus required software tools were developed using C Language. The output of the sorting function of the program was a list of words with their frequency of occurrence in the text. The objective of this processing was to select a list of high frequent 1000 or more words so that it becomes a good representative of the language in consideration to construct a significant large scale isolated speech database. A part of the list is shown in Table-1. Thus from this list high frequent 1081 words were separated and rearranged in the alphabetic order to finalized the database of isolated words.

Table 1: Words are organized with their Frequencies

Rank	words	Frequencies
1	ও	151919
2	করে	98271
3	এ	85107
4	থেকে	69838
5	কর	68858
6	না	67453
7	হয়	63512
8	এবং	59724
9	হয়েছে	52701
10	হবে	48345
11	জন্য	47501
12	এই	43988
13	বলেন	40123
14	করে	35992
15	একটি	34197
16	করেন	34172
17	এক	32298
18	সঙ্গে	29507
19	হয়ে	29490
20	মধ্যে	29223

IV. Speaker Selection

The first step in this level is to select good speakers. Because the corpus was planned to use in speaker independent system, it was required to select speakers as required in number and quality. Therefore a notice was published among the departments of Islamic University inviting speakers in this regard. Huge amount of interested students both male and female were come with interest to do the job. So an audition was arranged to check their comparative efficiency of correct utterance or pronunciation of Bangla. Depending on their performance, 75 male and 75 female speakers were selected to finalize the speaker list. The list was included speakers from almost all dialect regions of Bangladesh but with an influence of majority of local students from Kushtia and Jhinaidah as shown in table-2. The selected speakers were very young in the age range of 18-25 years. Finally selected speakers were attended a two day workshop. The objective of the workshop was to concern the speakers about the theory, methods and work plan of the project. The speakers were given practical training of speech acquisition such as headset setting, loudness and accuracy of utterance etc.

Table 2: Distribution of speakers according to dialect regions

Districts	No. of Speakers	Districts	No. of Speakers	Districts	No. of Speakers
Kushtia	30	Dhaka	4	Dinazpur	7
Jhenaidah	20	Manikganj	2	Nilphamari	3
Chuadanga	11	Mymensingh	2	Gaibandha	2
Meherpur	6	Jamalpur	3	Rangpur	3
Jessore	6	Faridpur	3	Kurigram	2
Magura	3	Madaripur	3	Rajshahi	4
Khulna	4	Gopalganj	2	Natore	3
Bagerhat	3	Razbari	4	Bogra	4
Satkhira	2	Jhalokati	3	Pabna	3
Cox's Bazar	2	Bhola	2	Sirazganj	4

V. Speech Acquisition

Speech data were recorded in Laboratory environment by close-talking microphone directly connected to the computer. The speakers were asked to read the text in standard pronunciation as well as possible and the whole recording process was done under the supervision of theses authors. Every speaker was explained the purpose of the project and instructed to start the recording when she/he was ready to read. The recorded speech data were taken with 8 kHz sampling with 8 bit quantization. The recorded speech was stored as *wav* file format in various lengths depending on the speaker's ability to speak over a length of continuous time. Isolated Words were uttered one after another with a minimum pause between two consecutive words to avoid overlapping. The time to speak 1081 isolated words once was more than 30 minutes for each speaker and the total recording time for all 150 speakers to repeat all words in five different sessions was about (150x30x5) minutes or 375 hours.

VI. Speech Editing and Labelling

It is necessary to check the recorded data from the following points: difference between the utterance and the utterance list, degree of dialectal accent, speech rate, clarity of pronunciation, recording level, noise, etc. Especially, we found some speakers speak with very low speech level and it was possible to magnify the amplitude of such speech data to a suitable level. However, the recording was carried out in an environment, which was not truly noiseless. The recoding instruments were also produced a little noise in some cases. All types of problems were identified and corrected during editing phase. Noiseless clean speech files were separated from the noisy speech files. Noisy files were cleaned using various filters and tagged with a

comment. As the HMM Toolkit developed by Cambridge University Engineering Department was already proved its efficiency and using frequently by most of the research workers, the database was labeled by following the specified format of speech data to make it ready for use in HMM Toolkit [18] for evaluation. For isolated word list, recorded files are divided to make files of equal number of words. In our work, ten words were decided to store as a *wav* file in isolated word database. A 300 ms pause on start and end positions of each file and 250 ms pause between two consecutive words were added. The time length of each file was 10-16 seconds or in average 13 seconds. The total time length of all the files in isolated words database was about (150x108x5x13) seconds or 292 hours after editing and labeling. Three edited and finalized files are shown in figure-1.
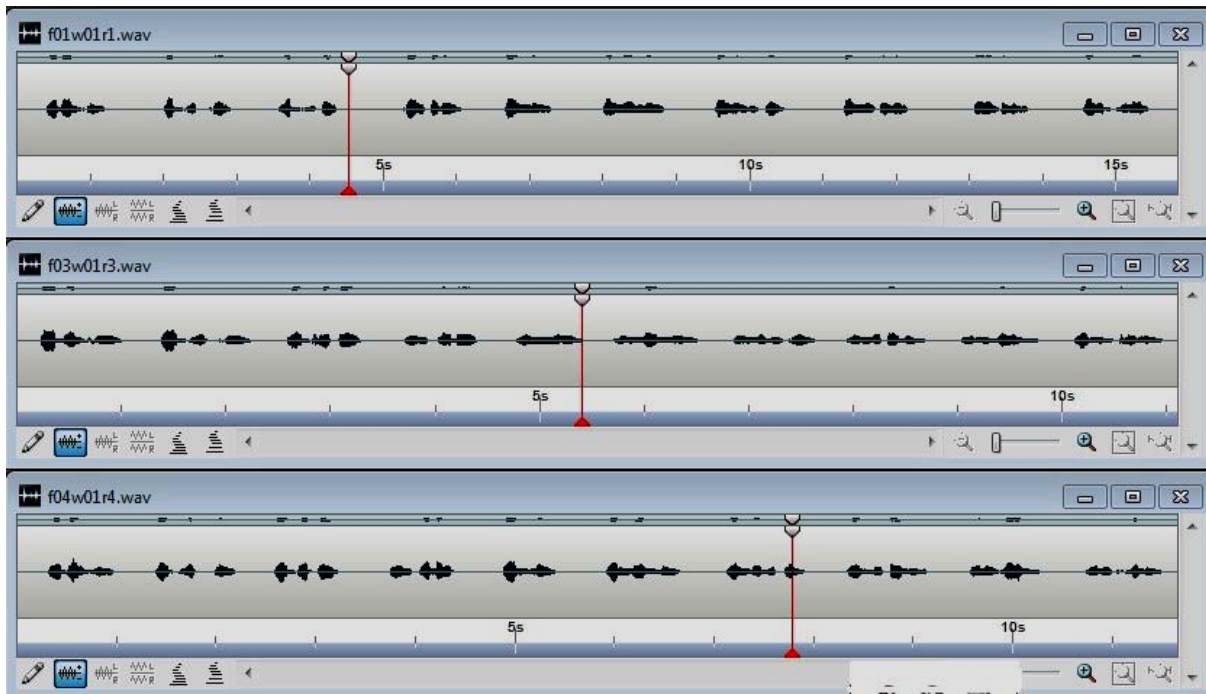
Figure 1: Speech contents of three edited and finalized file with ten isolated words

VII.   Resulting Corpora

Four types of speech corpus resulting from the text corpus were recorded and the summary of the developed speech corpora are given below table-2.

Table 3: Corpus Description

Contents	Vocabulary	No. of words in each file	No. of Training Files	No. of Test Files	Total no. of Files	Total recording time (Approx.)
Connected Words	1081	10	54000	27000	81000	292 hours
				Total Recording		

Test Speakers: 50 Male and 50 Female Students of 18-25 ages

Training Speakers: 25 Male and 25 Female Students of 18-25 ages

Recording environment: Recorded in a laboratory environment with a close talking microphone.

Recording media: Recorded on computer HDD (8 kHz sampling, 8 bit quantization), Copied later into CD's and DVD's for distribution.

VIII.   Discussion and Conclusion

A standard ASR system is based on a set of so-called acoustic models that link the observed features of the voice signal to the expected phonetics of the hypothesis sentence. The most typical implementation of this process is probabilistic, namely Hidden Markov Models (HMM). Our database was not evaluated but ready to do the work because it has been formatted as required for using with HMM toolkit. One of the advantages of newspaper corpus is that it reflects the current tradition of a language. Therefore the speech database with most frequent words from BdNC01

corpus is reasonably representative and covered the current tradition of Bangla language uses. With the best of our knowledge these are the first speech corpora in Bangla language in its size, type and coverage. The evaluation of these corpora using HMM toolkit is left for future scope. We hope that the achievement from this work will construct a fundamental base in speech recognition research in Bangla especially in dictation and command processing.

References Références Referencias

1. Gopala Krishna Anumanchipalli, Kishore Prahallad and Alan W Black, "Festvox: Tools for Creation and Analyses of Large Speech Corpora", In Workshop on very large scale phonetic research, UPenn(2011), Retrieved on 25th October, 2017, available at: https://www.cs.cmu.edu/~awb/papers/vlsp2011_festvox.pdf.
2. Baris Bozkurt, Özlem Ozturk, Thierry Dutoit and Multitel ASBL, "Corpus Building Using A Modified Greedy Selection", EUROSPEECH 2003 – GENEVA.
3. Yeshwant K. Muthusamy, Ronald A. Cole , Beatrice T. Oshika The Ogi Multi-Language Telephone

Speech Corpus, 1992, CiteSeerX, available at: http://citeseerx.ist.psu.edu/viewdoc/summary, retrieved on 28th Dec., 2010.

4. John J. Godfrey and Edward Holliman, Switchboard-1 Release 2, Linguistic Data Consortium, Philadelphia, 1997, retrieved on 28th Dec. 2010, available at: http://www.ldc.upenn.edu/ Catalog/CatalogEntry.jsp?catalogId=LDC97S62.

5. John S. Garofolo, et al, TIMIT Acoustic-Phonetic Continuous Speech Corpus, Linguistic Data Consortium, Philadelphia, 1993, retrieved on 6th Jan. 2011, available at: http://www.ldc.upenn.edu/ Catalog/ CatalogEntry.jsp?catalogId=LDC93S1.

6. R. Gary Leonard and George Doddington, TIDIGITS, Linguistic Data Consortium, Philadelphia, 1993, retrieved on 6th Jan. 2011, available at: http://www.ldc.upenn.edu/Catalog/CatalogEntry.jsp ?catalogId=LDC93S1.

7. Buckeye Corpus Collection and Recording, retrieved on 6th Jan., 2011, available at: http://buckeyecorpus.osu. edu/php/corpus.php.

8. Hu, Y. and Loizou, P. (2007). "Subjective evaluation and comparison of speech enhancement algorithms," Speech Communication, 49, 588-601.

9. Wikipedia, retrived on 25th October, 2017, available at: https://en.wikipedia.org/wiki/List_of_languages_ by_number_of_native_speakers.

10. Center for Development of Advanced Computing, India, April, 2005, available at: http://www.cdac. in/html/ press/2q05/prs_rl165.aspx, retrieved on 24th January, 2011.

11. Firoj Alam, S. M. Murtoza Habib, Dil Afroza Sultana and Mumit Khan, "Development of Annotated Bangla Speech Corpora", Spoken Language Technologies for Under-resourced language (SLTU'10), Universiti Sains Malaysia, Penang, Malasia, May 3 - 5, 2010.

12. Md. Farukuzzaman Khan, Md. Babul Islam and Md. Mizanur Rahman, Construction and Analysis of Large-Scale Bangla Corpus for Bangla Speech Recognition, Project Report, Ministry of Science and Information and Communication, Bangladesh, 2008.

13. Tony Robinson, Jeroen Fransen, DavidPye, Jonathan Foote and Steve Renals, "WSJCAM0: A British English Speech Corpus For Large Vocabulary Continuous Speech Recognition", In Proc. of ICASSP 95, Detroit, Michigan, 1995.

14. Lean-Lac Gauvain and Lori Lamel, "Large Vocabulary Speech Recognition Based on Statistical Methods", Pattern recognition in speech and language processing, CRC press, New York, USA, 2003.

15. D.S. Pallett, J.G. Fiscus, W.M. Fisher, J.S. Garofolo, B.A. Lund, A.F. Martin and M.A. Przybocki, "1994 Benchmark Tests for the ARPA Spoken Language Program, Proc. ARPA Spoken Language System Technology Workshop, 5-36, Austin, TX, January 1995.

16. Dafydd Gibbon, Roger Moore, Richard Winski, "Spoken Language System and Corpus Design", ISBN 978-3-11-015365-1, 38, Walter de Gruyter, 1998.

17. Sherry P. Casali, "The Effects of Recognition Accuracy and Vocabulary Size of A Speech Recognition System on Task Performance and User Acceptance", M.Sc. Thesis, Virginia Polytechnic Institute and State University, pp. 5, May 1988. Retrieved on 20th October, 2017. https://vtechworks. lib.vt.edu/bitstream/handle/10919/43383/LD5655. V855_1988.C382.pdf

18. HTK Speech Recognition Tool, website: http://htk.eng.cam.ac.uk/, retrieved on 9th March 2018.

Global Journals Guidelines Handbook 2018

www.GlobalJournals.org

FELLOW OF ASSOCIATION OF RESEARCH SOCIETY IN COMPUTING (FARSC)

Global Journals Incorporate (USA) is accredited by Open Association of Research Society (OARS), U.S.A and in turn, awards "FARSC" title to individuals. The 'FARSC' title is accorded to a selected professional after the approval of the Editor-in-Chief/Editorial Board Members/Dean.

> The "FARSC" is a dignified title which is accorded to a person's name viz. Dr. John E. Hall, Ph.D., FARSC or William Walldroff, M.S., FARSC.

FARSC accrediting is an honor. It authenticates your research activities. After recognition as FARSC, you can add 'FARSC' title with your name as you use this recognition as additional suffix to your status. This will definitely enhance and add more value and repute to your name. You may use it on your professional Counseling Materials such as CV, Resume, and Visiting Card etc.

The following benefits can be availed by you only for next three years from the date of certification:

FARSC designated members are entitled to avail a 40% discount while publishing their research papers (of a single author) with Global Journals Incorporation (USA), if the same is accepted by Editorial Board/Peer Reviewers. If you are a main author or co-author in case of multiple authors, you will be entitled to avail discount of 10%.

Once FARSC title is accorded, the Fellow is authorized to organize a symposium/seminar/conference on behalf of Global Journal Incorporation (USA).The Fellow can also participate in conference/seminar/symposium organized by another institution as representative of Global Journal. In both the cases, it is mandatory for him to discuss with us and obtain our consent.

You may join as member of the Editorial Board of Global Journals Incorporation (USA) after successful completion of three years as Fellow and as Peer Reviewer. In addition, it is also desirable that you should organize seminar/symposium/conference at least once.

We shall provide you intimation regarding launching of e-version of journal of your stream time to time. This may be utilized in your library for the enrichment of knowledge of your students as well as it can also be helpful for the concerned faculty members.

The FARSS can go through standards of OARS. You can also play vital role if you have any suggestions so that proper amendment can take place to improve the same for the benefit of entire research community.

As FARSS, you will be given a renowned, secure and free professional email address with 100 GB of space e.g. johnhall@globaljournals.org. This will include Webmail, Spam Assassin, Email Forwarders,Auto-Responders, Email Delivery Route tracing, etc.

The FARSS will be eligible for a free application of standardization of their researches. Standardization of research will be subject to acceptability within stipulated norms as the next step after publishing in a journal. We shall depute a team of specialized research professionals who will render their services for elevating your researches to next higher level, which is worldwide open standardization.

The FARSS member can apply for grading and certification of standards of their educational and Institutional Degrees to Open Association of Research, Society U.S.A. Once you are designated as FARSS, you may send us a scanned copy of all of your credentials. OARS will verify, grade and certify them. This will be based on your academic records, quality of research papers published by you, and some more criteria. After certification of all your credentials by OARS, they will be published on your Fellow Profile link on website https://associationofresearch.org which will be helpful to upgrade the dignity.

The FARSS members can avail the benefits of free research podcasting in Global Research Radio with their research documents. After publishing the work, (including published elsewhere worldwide with proper authorization) you can upload your research paper with your recorded voice or you can utilize chargeable services of our professional RJs to record your paper in their voice on request.

The FARSS member also entitled to get the benefits of free research podcasting of their research documents through video clips. We can also streamline your conference videos and display your slides/ online slides and online research video clips at reasonable charges, on request.

The FARSS is eligible to earn from sales proceeds of his/her researches/reference/review Books or literature, while publishing with Global Journals. The FARSS can decide whether he/she would like to publish his/her research in a closed manner. In this case, whenever readers purchase that individual research paper for reading, maximum 60% of its profit earned as royalty by Global Journals, will be credited to his/her bank account. The entire entitled amount will be credited to his/her bank account exceeding limit of minimum fixed balance. There is no minimum time limit for collection. The FARSS member can decide its price and we can help in making the right decision.

The FARSS member is eligible to join as a paid peer reviewer at Global Journals Incorporation (USA) and can get remuneration of 15% of author fees, taken from the author of a respective paper. After reviewing 5 or more papers you can request to transfer the amount to your bank account.

MEMBER OF ASSOCIATION OF RESEARCH SOCIETY IN SCIENCE (MARSS)

The ' MARSS ' title is accorded to a selected professional after the approval of the Editor-in-Chief / Editorial Board Members/Dean.

The "MARSS" is a dignified ornament which is accorded to a person's name viz. Dr. John E. Hall, Ph.D., MARSS or William Walldroff, M.S., MARSS.

MARSS accrediting is an honor. It authenticates your research activities. After becoming MARSS, you can add 'MARSS' title with your name as you use this recognition as additional suffix to your status. This will definitely enhance and add more value and repute to your name. You may use it on your professional Counseling Materials such as CV, Resume, Visiting Card and Name Plate etc.

The following benefitscan be availed by you only for next three years from the date of certification.

MARSS designated members are entitled to avail a 25% discount while publishing their research papers (of a single author) in Global Journals Inc., if the same is accepted by our Editorial Board and Peer Reviewers. If you are a main author or co-author of a group of authors, you will get discount of 10%.

As MARSS, you will be given a renowned, secure and free professional email address with 30 GB of space e.g. johnhall@globaljournals.org. This will include Webmail, Spam Assassin, Email Forwarders,Auto-Responders, Email Delivery Route tracing, etc.
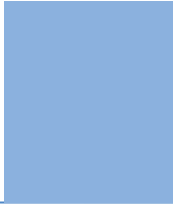
We shall provide you intimation regarding launching of e-version of journal of your stream time to time. This may be utilized in your library for the enrichment of knowledge of your students as well as it can also be helpful for the concerned faculty members.

The MARSC member can apply for approval, grading and certification of standards of their educational and Institutional Degrees to Open Association of Research, Society U.S.A.

Once you are designated as MARSC, you may send us a scanned copy of all of your credentials. OARS will verify, grade and certify them. This will be based on your academic records, quality of research papers published by you, and some more criteria.

It is mandatory to read all terms and conditions carefully.

Auxiliary Memberships

Institutional Fellow of Open Association of Research Society (USA)-OARS (USA)

Global Journals Incorporation (USA) is accredited by Open Association of Research Society, U.S.A (OARS) and in turn, affiliates research institutions as "Institutional Fellow of Open Association of Research Society" (IFOARS).

The "FARSC" is a dignified title which is accorded to a person's name viz. Dr. John E. Hall, Ph.D., FARSC or William Walldroff, M.S., FARSC.

The IFOARS institution is entitled to form a Board comprised of one Chairperson and three to five board members preferably from different streams. The Board will be recognized as "Institutional Board of Open Association of Research Society"-(IBOARS).

The Institute will be entitled to following benefits:

The IBOARS can initially review research papers of their institute and recommend them to publish with respective journal of Global Journals. It can also review the papers of other institutions after obtaining our consent. The second review will be done by peer reviewer of Global Journals Incorporation (USA) The Board is at liberty to appoint a peer reviewer with the approval of chairperson after consulting us.

The author fees of such paper may be waived off up to 40%.

The Global Journals Incorporation (USA) at its discretion can also refer double blind peer reviewed paper at their end to the board for the verification and to get recommendation for final stage of acceptance of publication.

The IBOARS can organize symposium/seminar/conference in their country on behalf of Global Journals Incorporation (USA)-OARS (USA). The terms and conditions can be discussed separately.

The Board can also play vital role by exploring and giving valuable suggestions regarding the Standards of "Open Association of Research Society, U.S.A (OARS)" so that proper amendment can take place for the benefit of entire research community. We shall provide details of particular standard only on receipt of request from the Board.

The board members can also join us as Individual Fellow with 40% discount on total fees applicable to Individual Fellow. They will be entitled to avail all the benefits as declared. Please visit Individual Fellow-sub menu of GlobalJournals.org to have more relevant details.

We shall provide you intimation regarding launching of e-version of journal of your stream time to time. This may be utilized in your library for the enrichment of knowledge of your students as well as it can also be helpful for the concerned faculty members.

After nomination of your institution as "Institutional Fellow" and constantly functioning successfully for one year, we can consider giving recognition to your institute to function as Regional/Zonal office on our behalf.

The board can also take up the additional allied activities for betterment after our consultation.

The following entitlements are applicable to individual Fellows:

Open Association of Research Society, U.S.A (OARS) By-laws states that an individual Fellow may use the designations as applicable, or the corresponding initials. The Credentials of individual Fellow and Associate designations signify that the individual has gained knowledge of the fundamental concepts. One is magnanimous and proficient in an expertise course covering the professional code of conduct, and follows recognized standards of practice.

Open Association of Research Society (US)/ Global Journals Incorporation (USA), as described in Corporate Statements, are educational, research publishing and professional membership organizations. Achieving our individual Fellow or Associate status is based mainly on meeting stated educational research requirements.

Disbursement of 40% Royalty earned through Global Journals : Researcher = 50%, Peer Reviewer = 37.50%, Institution = 12.50% E.g. Out of 40%, the 20% benefit should be passed on to researcher, 15 % benefit towards remuneration should be given to a reviewer and remaining 5% is to be retained by the institution.

We shall provide print version of 12 issues of any three journals [as per your requirement] out of our 38 journals worth $ 2376 USD.

Other:

The individual Fellow and Associate designations accredited by Open Association of Research Society (US) credentials signify guarantees following achievements:

➢ The professional accredited with Fellow honor, is entitled to various benefits viz. name, fame, honor, regular flow of income, secured bright future, social status etc.

- ➢ In addition to above, if one is single author, then entitled to 40% discount on publishing research paper and can get 10%discount if one is co-author or main author among group of authors.
- ➢ The Fellow can organize symposium/seminar/conference on behalf of Global Journals Incorporation (USA) and he/she can also attend the same organized by other institutes on behalf of Global Journals.
- ➢ The Fellow can become member of Editorial Board Member after completing 3yrs.
- ➢ The Fellow can earn 60% of sales proceeds from the sale of reference/review books/literature/publishing of research paper.
- ➢ Fellow can also join as paid peer reviewer and earn 15% remuneration of author charges and can also get an opportunity to join as member of the Editorial Board of Global Journals Incorporation (USA)
- ➢ • This individual has learned the basic methods of applying those concepts and techniques to common challenging situations. This individual has further demonstrated an in–depth understanding of the application of suitable techniques to a particular area of research practice.

Note :

"
- ➢ In future, if the board feels the necessity to change any board member, the same can be done with the consent of the chairperson along with anyone board member without our approval.

- ➢ In case, the chairperson needs to be replaced then consent of 2/3rd board members are required and they are also required to jointly pass the resolution copy of which should be sent to us. In such case, it will be compulsory to obtain our approval before replacement.

- ➢ In case of "Difference of Opinion [if any]" among the Board members, our decision will be final and binding to everyone.
"

Preferred Author Guidelines

We accept the manuscript submissions in any standard (generic) format.

We typeset manuscripts using advanced typesetting tools like Adobe In Design, CorelDraw, TeXnicCenter, and TeXStudio. We usually recommend authors submit their research using any standard format they are comfortable with, and let Global Journals do the rest.

Alternatively, you can download our basic template from https://globaljournals.org/Template.zip

Authors should submit their complete paper/article, including text illustrations, graphics, conclusions, artwork, and tables. Authors who are not able to submit manuscript using the form above can email the manuscript department at submit@globaljournals.org or get in touch with chiefeditor@globaljournals.org if they wish to send the abstract before submission.

Before and during Submission

Authors must ensure the information provided during the submission of a paper is authentic. Please go through the following checklist before submitting:

1. Authors must go through the complete author guideline and understand and *agree to Global Journals' ethics and code of conduct,* along with author responsibilities.
2. Authors must accept the privacy policy, terms, and conditions of Global Journals.
3. Ensure corresponding author's email address and postal address are accurate and reachable.
4. Manuscript to be submitted must include keywords, an abstract, a paper title, co-author(s') names and details (email address, name, phone number, and institution), figures and illustrations in vector format including appropriate captions, tables, including titles and footnotes, a conclusion, results, acknowledgments and references.
5. Authors should submit paper in a ZIP archive if any supplementary files are required along with the paper.
6. Proper permissions must be acquired for the use of any copyrighted material.
7. Manuscript submitted *must not have been submitted or published elsewhere* and all authors must be aware of the submission.

Declaration of Conflicts of Interest

It is required for authors to declare all financial, institutional, and personal relationships with other individuals and organizations that could influence (bias) their research.

Policy on Plagiarism

Plagiarism is not acceptable in Global Journals submissions at all.

Plagiarized content will not be considered for publication. We reserve the right to inform authors' institutions about plagiarism detected either before or after publication. If plagiarism is identified, we will follow COPE guidelines:

Authors are solely responsible for all the plagiarism that is found. The author must not fabricate, falsify or plagiarize existing research data. The following, if copied, will be considered plagiarism:

- Words (language)
- Ideas
- Findings
- Writings
- Diagrams
- Graphs
- Illustrations
- Lectures

- Printed material
- Graphic representations
- Computer programs
- Electronic material
- Any other original work

AUTHORSHIP POLICIES

Global Journals follows the definition of authorship set up by the Open Association of Research Society, USA. According to its guidelines, authorship criteria must be based on:

1. Substantial contributions to the conception and acquisition of data, analysis, and interpretation of findings.
2. Drafting the paper and revising it critically regarding important academic content.
3. Final approval of the version of the paper to be published.

Changes in Authorship

The corresponding author should mention the name and complete details of all co-authors during submission and in manuscript. We support addition, rearrangement, manipulation, and deletions in authors list till the early view publication of the journal. We expect that corresponding author will notify all co-authors of submission. We follow COPE guidelines for changes in authorship.

Copyright

During submission of the manuscript, the author is confirming an exclusive license agreement with Global Journals which gives Global Journals the authority to reproduce, reuse, and republish authors' research. We also believe in flexible copyright terms where copyright may remain with authors/employers/institutions as well. Contact your editor after acceptance to choose your copyright policy. You may follow this form for copyright transfers.

Appealing Decisions

Unless specified in the notification, the Editorial Board's decision on publication of the paper is final and cannot be appealed before making the major change in the manuscript.

Acknowledgments

Contributors to the research other than authors credited should be mentioned in Acknowledgments. The source of funding for the research can be included. Suppliers of resources may be mentioned along with their addresses.

Declaration of funding sources

Global Journals is in partnership with various universities, laboratories, and other institutions worldwide in the research domain. Authors are requested to disclose their source of funding during every stage of their research, such as making analysis, performing laboratory operations, computing data, and using institutional resources, from writing an article to its submission. This will also help authors to get reimbursements by requesting an open access publication letter from Global Journals and submitting to the respective funding source.

PREPARING YOUR MANUSCRIPT

Authors can submit papers and articles in an acceptable file format: MS Word (doc, docx), LaTeX (.tex, .zip or .rar including all of your files), Adobe PDF (.pdf), rich text format (.rtf), simple text document (.txt), Open Document Text (.odt), and Apple Pages (.pages). Our professional layout editors will format the entire paper according to our official guidelines. This is one of the highlights of publishing with Global Journals—authors should not be concerned about the formatting of their paper. Global Journals accepts articles and manuscripts in every major language, be it Spanish, Chinese, Japanese, Portuguese, Russian, French, German, Dutch, Italian, Greek, or any other national language, but the title, subtitle, and abstract should be in English. This will facilitate indexing and the pre-peer review process.

The following is the official style and template developed for publication of a research paper. Authors are not required to follow this style during the submission of the paper. It is just for reference purposes.

Manuscript Style Instruction (Optional)

- Microsoft Word Document Setting Instructions.
- Font type of all text should be Swis721 Lt BT.
- Page size: 8.27" x 11'", left margin: 0.65, right margin: 0.65, bottom margin: 0.75.
- Paper title should be in one column of font size 24.
- Author name in font size of 11 in one column.
- Abstract: font size 9 with the word "Abstract" in bold italics.
- Main text: font size 10 with two justified columns.
- Two columns with equal column width of 3.38 and spacing of 0.2.
- First character must be three lines drop-capped.
- The paragraph before spacing of 1 pt and after of 0 pt.
- Line spacing of 1 pt.
- Large images must be in one column.
- The names of first main headings (Heading 1) must be in Roman font, capital letters, and font size of 10.
- The names of second main headings (Heading 2) must not include numbers and must be in italics with a font size of 10.

Structure and Format of Manuscript

The recommended size of an original research paper is under 15,000 words and review papers under 7,000 words. Research articles should be less than 10,000 words. Research papers are usually longer than review papers. Review papers are reports of significant research (typically less than 7,000 words, including tables, figures, and references)

A research paper must include:

a) A title which should be relevant to the theme of the paper.
b) A summary, known as an abstract (less than 150 words), containing the major results and conclusions.
c) Up to 10 keywords that precisely identify the paper's subject, purpose, and focus.
d) An introduction, giving fundamental background objectives.
e) Resources and techniques with sufficient complete experimental details (wherever possible by reference) to permit repetition, sources of information must be given, and numerical methods must be specified by reference.
f) Results which should be presented concisely by well-designed tables and figures.
g) Suitable statistical data should also be given.
h) All data must have been gathered with attention to numerical detail in the planning stage.

Design has been recognized to be essential to experiments for a considerable time, and the editor has decided that any paper that appears not to have adequate numerical treatments of the data will be returned unrefereed.

i) Discussion should cover implications and consequences and not just recapitulate the results; conclusions should also be summarized.
j) There should be brief acknowledgments.
k) There ought to be references in the conventional format. Global Journals recommends APA format.

Authors should carefully consider the preparation of papers to ensure that they communicate effectively. Papers are much more likely to be accepted if they are carefully designed and laid out, contain few or no errors, are summarizing, and follow instructions. They will also be published with much fewer delays than those that require much technical and editorial correction.

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

FORMAT STRUCTURE

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

All manuscripts submitted to Global Journals should include:

Title

The title page must carry an informative title that reflects the content, a running title (less than 45 characters together with spaces), names of the authors and co-authors, and the place(s) where the work was carried out.

Author details

The full postal address of any related author(s) must be specified.

Abstract

The abstract is the foundation of the research paper. It should be clear and concise and must contain the objective of the paper and inferences drawn. It is advised to not include big mathematical equations or complicated jargon.

Many researchers searching for information online will use search engines such as Google, Yahoo or others. By optimizing your paper for search engines, you will amplify the chance of someone finding it. In turn, this will make it more likely to be viewed and cited in further works. Global Journals has compiled these guidelines to facilitate you to maximize the web-friendliness of the most public part of your paper.

Keywords

A major lynchpin of research work for the writing of research papers is the keyword search, which one will employ to find both library and internet resources. Up to eleven keywords or very brief phrases have to be given to help data retrieval, mining, and indexing.

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

Choice of the main keywords is the first tool of writing a research paper. Research paper writing is an art. Keyword search should be as strategic as possible.

One should start brainstorming lists of potential keywords before even beginning searching. Think about the most important concepts related to research work. Ask, "What words would a source have to include to be truly valuable in a research paper?" Then consider synonyms for the important words.

It may take the discovery of only one important paper to steer in the right keyword direction because, in most databases, the keywords under which a research paper is abstracted are listed with the paper.

Numerical Methods

Numerical methods used should be transparent and, where appropriate, supported by references.

Abbreviations

Authors must list all the abbreviations used in the paper at the end of the paper or in a separate table before using them.

Formulas and equations

Authors are advised to submit any mathematical equation using either MathJax, KaTeX, or LaTeX, or in a very high-quality image.

Tables, Figures, and Figure Legends

Tables: Tables should be cautiously designed, uncrowned, and include only essential data. Each must have an Arabic number, e.g., Table 4, a self-explanatory caption, and be on a separate sheet. Authors must submit tables in an editable format and not as images. References to these tables (if any) must be mentioned accurately.

Figures

Figures are supposed to be submitted as separate files. Always include a citation in the text for each figure using Arabic numbers, e.g., Fig. 4. Artwork must be submitted online in vector electronic form or by emailing it.

PREPARATION OF ELETRONIC FIGURES FOR PUBLICATION

Although low-quality images are sufficient for review purposes, print publication requires high-quality images to prevent the final product being blurred or fuzzy. Submit (possibly by e-mail) EPS (line art) or TIFF (halftone/ photographs) files only. MS PowerPoint and Word Graphics are unsuitable for printed pictures. Avoid using pixel-oriented software. Scans (TIFF only) should have a resolution of at least 350 dpi (halftone) or 700 to 1100 dpi (line drawings). Please give the data for figures in black and white or submit a Color Work Agreement form. EPS files must be saved with fonts embedded (and with a TIFF preview, if possible).

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

Color charges: Authors are advised to pay the full cost for the reproduction of their color artwork. Hence, please note that if there is color artwork in your manuscript when it is accepted for publication, we would require you to complete and return a Color Work Agreement form before your paper can be published. Also, you can email your editor to remove the color fee after acceptance of the paper.

TIPS FOR WRITING A GOOD QUALITY COMPUTER SCIENCE RESEARCH PAPER

Techniques for writing a good quality computer science research paper:

1. Choosing the topic: In most cases, the topic is selected by the interests of the author, but it can also be suggested by the guides. You can have several topics, and then judge which you are most comfortable with. This may be done by asking several questions of yourself, like "Will I be able to carry out a search in this area? Will I find all necessary resources to accomplish the search? Will I be able to find all information in this field area?" If the answer to this type of question is "yes," then you ought to choose that topic. In most cases, you may have to conduct surveys and visit several places. Also, you might have to do a lot of work to find all the rises and falls of the various data on that subject. Sometimes, detailed information plays a vital role, instead of short information. Evaluators are human: The first thing to remember is that evaluators are also human beings. They are not only meant for rejecting a paper. They are here to evaluate your paper. So present your best aspect.

2. Think like evaluators: If you are in confusion or getting demotivated because your paper may not be accepted by the evaluators, then think, and try to evaluate your paper like an evaluator. Try to understand what an evaluator wants in your research paper, and you will automatically have your answer. 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.

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

4. Use of computer is recommended: As you are doing research in the field of computer science then this point is quite obvious. Use right software: Always use good quality software packages. If you are not capable of judging good software, then you can lose the quality of your paper unknowingly. There are various programs available to help you which you can get through the internet.

5. Use the internet for help: An excellent start for your paper is using Google. It is a wondrous search engine, where you can have your doubts resolved. You may also read some answers for the frequent question of how to write your research paper or find a model research paper. You can download books from the internet. If you have all the required books, place importance on reading, selecting, and analyzing the specified information. Then sketch out your research paper. Use big pictures: You may use encyclopedias like Wikipedia to get pictures with the best resolution. At Global Journals, you should strictly follow here.

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

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

8. Make every effort: Make every effort to mention what you are going to write in your paper. That means always have a good start. Try to mention everything in the introduction—what is the need for a particular research paper. Polish your work with good writing skills and always give an evaluator what he wants. Make backups: When you are going to do any important thing like making a research paper, you should always have backup copies of it either on your computer or on paper. This protects you from losing any portion of your important data.

9. Produce good diagrams of your own: Always try to include good charts or diagrams in your paper to improve quality. Using several unnecessary diagrams will degrade the quality of your paper by creating a hodgepodge. So always try to include diagrams which were made by you to improve the readability of your paper. Use of direct quotes: When you do research relevant to literature, history, or current affairs, then use of quotes becomes essential, but if the study is relevant to science, use of quotes is not preferable.

10.Use proper verb tense: Use proper verb tenses in your paper. Use past tense to present those events that have happened. Use present tense to indicate events that are going on. Use future tense to indicate events that will happen in the future. Use of wrong tenses will confuse the evaluator. Avoid sentences that are incomplete.

11. Pick a good study spot: Always try to pick a spot for your research which is quiet. Not every spot is good for studying.

12. Know what you know: Always try to know what you know by making objectives, otherwise you will be confused and unable to achieve your target.

13. Use good grammar: Always use good grammar and words that will have a positive impact on the evaluator; use of good vocabulary does not mean using tough words which the evaluator has to find in a dictionary. Do not fragment sentences. Eliminate one-word sentences. Do not ever use a big word when a smaller one would suffice.

Verbs have to be in agreement with their subjects. In a research paper, do not start sentences with conjunctions or finish them with prepositions. When writing formally, it is advisable to never split an infinitive because someone will (wrongly) complain. Avoid clichés like a disease. Always shun irritating alliteration. Use language which is simple and straightforward. Put together a neat summary.

14. 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 for your topic. You may also maintain your arguments with records.

15. Never start at the last minute: Always allow enough time for research work. Leaving everything to the last minute will degrade your paper and spoil your work.

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

17. Never copy others' work: Never copy others' work and give it your name because if the evaluator has seen it anywhere, you will be in trouble. Take proper rest and food: No matter how many hours you spend on your research activity, if you are not taking care of your health, then all your efforts will have been in vain. For quality research, take proper rest and food.

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

19. Refresh your mind after intervals: Try to give your mind a rest by listening to soft music or sleeping in intervals. This will also improve your memory. Acquire colleagues: Always try to acquire colleagues. No matter how sharp you are, if you acquire colleagues, they can give you ideas which will be helpful to your research.

20. Think technically: Always think technically. If anything happens, search for its reasons, benefits, and demerits. Think and then print: When you go to print your paper, check that tables are not split, headings are not detached from their descriptions, and page sequence is maintained.

21. Adding unnecessary information: Do not add unnecessary information like "I have used MS Excel to draw graphs." Irrelevant and inappropriate material is superfluous. Foreign terminology and phrases are not apropos. One should never take a broad view. Analogy is like feathers on a snake. Use words properly, regardless of how others use them. Remove quotations. Puns are for kids, not grunt readers. Never oversimplify: When adding material to your research paper, never go for oversimplification; this will definitely irritate the evaluator. Be specific. Never use rhythmic redundancies. Contractions shouldn't be used in a research paper. Comparisons are as terrible as clichés. Give up ampersands, abbreviations, and so on. Remove commas that are not necessary. Parenthetical words should be between brackets or commas. Understatement is always the best way to put forward earth-shaking thoughts. Give a detailed literary review.

22. Report concluded results: Use concluded results. From raw data, filter the results, and then conclude your studies based on measurements and observations taken. An appropriate number of decimal places should be used. Parenthetical remarks are prohibited here. Proofread carefully at the final stage. At the end, give an outline to your arguments. Spot perspectives of further study of the subject. Justify your conclusion at the bottom sufficiently, which will probably include examples.

23. Upon 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 for 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 of 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 criteria peer reviewers will use for grading the final paper.

Final points:

One purpose of organizing a research paper is to let people interpret your efforts selectively. The journal requires the following sections, submitted in the order listed, with each section starting on a new page:

The introduction: This will be compiled from reference matter and reflect the design processes or outline of basis that directed you to make a study. As you carry out the process of study, the method and process section will be constructed like that. The results segment will show related statistics in nearly sequential order and direct reviewers to similar intellectual paths throughout the data that you gathered to carry out your study.

The discussion section:

This will provide understanding of the data and projections as to the implications of the results. The use of good quality references throughout the paper will give the effort trustworthiness by representing an alertness to 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 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 avoid:

- Insertion of a title at the foot of a page with subsequent text on the next page.
- Separating a table, chart, or figure—confine each to a single page.
- Submitting a manuscript with pages out of sequence.
- In every section of your document, use standard writing style, including articles ("a" and "the").
- Keep paying attention to the topic of the paper.
- Use paragraphs to split each significant point (excluding the abstract).
- Align the primary line of each section.
- Present your points in sound order.
- Use present tense to report well-accepted matters.
- Use past tense to describe specific results.
- Do not use familiar wording; don't address the reviewer directly. Don't use slang or superlatives.
- Avoid use of extra pictures—include only those figures essential to presenting results.

Title page:

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

Abstract: This summary should be two hundred words or less. It should clearly and briefly explain the key findings reported in the manuscript and must have precise statistics. It should not have acronyms or abbreviations. It should be logical in itself. Do not cite 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 approaches 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. Use comprehensive sentences, and do not sacrifice readability for brevity; you can maintain it succinctly by phrasing sentences so that they provide more than a 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 limit the initial two items to no more than one line each.

Reason for writing the article—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 for this; results of any numerical analysis should be reported. Significant conclusions or questions that emerge from the research.

Approach:

- Single section and succinct.
- An outline of the job done is always written in past tense.
- Concentrate on shortening results—limit background information to a verdict or two.
- Exact spelling, clarity 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 of comprehending and calculating the purpose of your study without having to refer to other works. The basis for the study should be offered. Give the most important references, but avoid making a comprehensive appraisal of the topic. Describe the problem visibly. If the problem is not acknowledged in a logical, reasonable way, the reviewer will give no attention to your results. Speak in common terms about techniques used to explain the problem, if needed, but do not present any particulars about the protocols here.

The following approach can create a valuable beginning:

o Explain the value (significance) of the study.
o Defend the model—why did you employ this particular system or method? What is its compensation? Remark upon its appropriateness from an abstract point of view as well as pointing out sensible reasons for using it.
o Present a justification. State your particular theory(-ies) or aim(s), and describe the logic that led you to choose them.
o Briefly explain the study's tentative purpose and how it meets 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 for every section. If you make the four points listed above, you will need at least four paragraphs. Present surrounding information only when it is necessary to support a situation. The reviewer does not desire to read everything you know about a topic. Shape the theory 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 soundly written procedures segment allows a capable scientist to replicate 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 to give the least amount of information that would permit another capable scientist to replicate 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 section, mention the specific item describing the way, but draw the basic principle while stating the situation. The purpose is to show 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:

Materials may be reported in part of a section or else they may be recognized along with your measures.

Methods:

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

Approach:

It is embarrassing to use vigorous voice when documenting methods without using first person, which would focus the reviewer's interest on the researcher rather than the job. As a result, when writing up the methods, most authors use third person passive voice.

Use standard style in this and every other part of the paper—avoid familiar lists, and use full sentences.

What to keep away from:

o Resources and methods are not a set of information.
o Skip all descriptive information and surroundings—save it for the argument.
o 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 as 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. Use statistics and tables, if suitable, to present consequences most efficiently.

You must clearly differentiate material which would usually be incorporated in a study editorial from any unprocessed data or additional appendix matter that would not be available. In fact, such matters should not be submitted at all except if requested by the instructor.

Content:

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

What to stay away from:

- o   Do not discuss or infer your outcome, report surrounding information, or try to explain anything.
- o   Do not include raw data or intermediate calculations in a research manuscript.
- o   Do not present similar data more than once.
- o   A manuscript should complement any figures or tables, not duplicate information.
- o   Never confuse figures with tables—there is a difference.

Approach:

As always, use past tense when you submit 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 section.

Figures and tables:

If you put figures and tables at the end of some details, make certain that they are visibly distinguished from any attached appendix materials, such as raw facts. Whatever the position, each table must be titled, numbered one after the other, and include a heading. All figures and tables must be divided from the text.

Discussion:

The discussion is expected to be the trickiest segment to write. A lot of papers submitted to the journal are discarded based on problems with the discussion. There is no rule for how long an 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 implications of the study. The purpose here is to offer an understanding of your results and support all of your conclusions, using facts from your research and generally accepted information, if suitable. The implication of results should be fully 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 the prospect, and let it drop at that. Make a decision as to whether each premise is supported or 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.

- o You may propose future guidelines, such as how an experiment might be personalized to accomplish a new idea.
- o Give details of all of your remarks as much as possible, focusing on mechanisms.
- o Make a decision as to whether the tentative design sufficiently addressed the theory and whether or not it was correctly restricted. Try to present substitute explanations if they are sensible alternatives.
- o One piece of 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?
- o Recommendations for detailed papers will offer supplementary suggestions.

Approach:

When you refer to information, differentiate data generated by your own studies from other available information. Present work done by specific persons (including you) in past tense.

Describe generally acknowledged facts and main beliefs in present tense.

The Administration Rules

Administration Rules to Be Strictly Followed before Submitting Your Research Paper to Global Journals Inc.

Please read the following rules and regulations carefully before submitting your research paper to Global Journals Inc. to avoid rejection.

Segment draft and final research paper: You have to strictly follow the template of a research paper, failing which your paper may get rejected. You are expected to write each part of the paper wholly on your own. The peer reviewers need to identify your own perspective of the concepts in your own terms. Please do not extract straight from any other source, and do not rephrase someone else's analysis. Do not allow anyone else to proofread your manuscript.

Written material: You may discuss this with your guides and key sources. Do not copy anyone else's paper, even if this is only imitation, otherwise it will be rejected on the grounds of plagiarism, which is illegal. Various methods to avoid plagiarism are strictly applied by us to every paper, and, if found guilty, you may be blacklisted, which could affect your career adversely. To guard yourself and others from possible illegal use, please do not permit anyone to use or even read your paper and file.

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

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

INDEX

save our planet

Global Journal of Computer Science and Technology

9   2

70116 58698   6 1 4 2 7 >