



CSI Communications

Knowledge Digest for IT Community

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COVER STORY on

» **Digital Revolution in Speech and Language Processing for Efficient Communication and Sustaining Knowledge Diversity**

ARTICLES on

- » **Social Media Analytics**
- » **Energy Efficiency in Software Defined Networks : A Survey**
- » **Speech, Language Disorder Detection and Altered Auditory Feedback: A Practitioner Approach**
- » **Research Challenges and Need of Question Answering system in present era**
- » **Application of Hybrid Clustering Techniques: Subtractive Clustering and Artificial Neural Network Approach**
- » **The Agents Role in Negotiation in E-Commerce**
- » **Hyperspectral remote sensing: Emerging technology for Agricultural Application**



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ICACCP' 19 **3rd Cover**

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Editorial



Prof. (Dr.) S. S. Agrawal
Chief Editor

Dear Fellow CSI Members,

Language shapes the way we think and determines what we can think about.

Communication must continue and CSI Communication is the best means of keeping linkage among the CSI members at large. There was a lapse of one issue after July, 2018 issue. This issue is a combined issue for August & September 2018. The major theme of articles in this issue are on "Digital Revolution in Speech and Language Processing for Efficient Communication and sustaining knowledge diversity". The cover story article on this theme is written by Dr. A.R. Revathi, Associate Professor in Deptt. of IT, SRMV Engg. College.

Speech and Language processing technology is advancing at a very fast pace and it is necessary that such technologies are developed for Indian Languages also. India has about 780 languages out of which only 22 are official languages for communication.

In fact, there are many important and day to day applications of speech & NLP. These include:

- Transcription
Dictation, information retrieval
- Command and control
Data entry, device control, navigation, call routing
- Information Access
Airline schedules, stock quotes, directory assistance
- Problem Solving
Travel planning, logistics etc.

All these languages needs preservation of their culture associated with them. It is necessary that they should be preserved, digitized, processed and technology developed for their efficient communication. Some articles on this theme were published in the July 2018 issue. Continuing with this theme one more article mentioned below have been published in this issue:

- Speech Language disorder Detection used Altered Auditory Feedback: A Fraction as Approach.

Three other articles of research and general information in this issue include:

- Social Media Analytics
- Application of Hybrid Clustering techniques: Subtractive Clustering and Artificial Neural Network Approach
- Energy Efficiency in software Defined Network: A survey.
- Research Challenges and Need of Question Answering system in present era
- The Agent Role in Negotiation in E-Commerce.
- Hyperspectral Remote Sensing : Emerging Technology for Agricultural Application.

This issue also gives detailed information about CSI 53rd Annual Convention 2018 hosted by Udaipur Chapter to be held on December 14th -16th, 2018 at the Hotel Inder Residency Udaipur – Rajasthan. We encourage you to prepare for the same and actively participate in it. Information about the activities that have taken place at various regions, Divisions, Chapters and the students chapters is also given.

We are thankful to all the contributors and look forward to receive your valuable articles in future also. We express our gratitude to all the ExecCom members and the CSI Officials. We look forward to receive constructive feedback and suggestions from our esteemed members and reader of CSI fraternity. Please log on to <http://www.csi-india.org/> and email to csic@csi-india.org.

With kind regards,

Prof. (Dr.) S. S. Agrawal
Chief Editor



Message from the Vice President cum President Elect

From : Vice President, Computer Society of India

Date : 01 September, 2018

Email : vp@csi-india.org / Cell : (91) 82106 93239



It gives me immense pleasure to greet you all and convey my respect & gratitude to all the Fellows as well as my best wishes to Senior Members, Members, Associate Members, Members of the Managing Committee of the Chapters, Corporate Members, Academic Institute Members and young student members of CSI as the Vice President Cum President Elect. of Computer Society of India.

I am honored to have the opportunity to serve the Members as CSI Vice President for the year 2018-19. Together with the Executive, NC members, I would like to say thank you for giving us a chance to bring the Society forward and working with the responsibility to propel the profession to the next level. With your continued support, I am positive that we can achieve our vision to be a globally recognised professional body, bringing values to our members, the profession and the wider community.

With having the experience of 8 years in Chapter Managing Committee, 11 years of experience as an elected member of National ExecCom & Nomination Committee & several years of experience as Chief Editor of CSIC, CSI Adhyayan, Publisher of CSI Magazines & Journals, Chairman & member of several committees, I got a long experience in CSI for successfully managing all the assignments. CSI has witnessed a growth of 7000+ students members & 1000+ voting members in last year with the significant financial growth.

CSI is having 100,000+ members including student members. It is the main responsibility of Executive Committee of CSI, Managing Committee of Chapters, SIGs and Student Branch Coordinators to serve the members by conducting effective & quality conferences, seminars and workshops to fulfill the objective of the society. I shall try with my level best for promoting the research activities, collaboration with other professional & research bodies along with the efforts for the exponential growth of membership with the best effort for the inclusive growth of the society,

I seek the active & kind support of the Members to make CSI more Dynamic, Vibrant, Productive & sustainable to achieve the height of excellence.

I sincerely request all the Office Bearers, Executive Members, CSI office staffs to kindly work with responsibility for the Society (CSI)

to serve honestly for the cause of every Division, Region, Chapter, SIG, Student Branch & every Individual Members including Student Members

The 53rd Annual Convention of Computer Society of In India, CSI- 2018 is being organized by CSI Udaipur Chapter from 14-16, December 2018 at Hotel Inder Residency, Udaipur for which the preparation is going in full swing under the dynamic leadership of a group of Young & Visionary Professionals Mr. Amit Joshi, Chairman, Dr. Bharat Singh Deora, Vice Chairman, Dr. Dinesh Sukhwal, Hony. Secretary & Mr. Gaurav Kumawat MC member of Udaipur Chapter. The call for papers, registrations, Exhibition & other related activities has been placed in this issue for the Members in particular & the IT Communities in general for their active participation & presentation in the great event. I request each of the valued members to come forward for their active participation in the great event in terms of participation as Panelists, Speakers, Delegates & Sponsoring to bring this event to height of excellence.

Chapters are the backbone of our Society. All efforts are being made to make them more active & Vibrant. Their Chapter shares are due for which efforts are being made to release the same at the earliest to enable them to work with more innovative & quality programmes within the Chapter.

CSI has made the inclusive growth & having vast network of activities due to it's large number of Student Branches. For providing the better services to the student community more & more numbers of activities are to be planned. I shall try my level best with sincere effort to explore the possibilities by the advice & guidance of the seniors & mentors to do my best in this direction.

Let us come forward to make Clean CSI & Green CSI with transparent activities & visions to make it Swachh, Pardarshi & Hara Vara.

Prof. Akshaya Nayak
Vice President, CSI

Digital Revolution in Speech and Language Processing for Efficient Communication and Sustaining Knowledge Diversity

▶ **A. R. Revathi**
Associate Professor, Dept. of IT, SRM - Valliammai Engg. College

▶ **Deepthi Palani Kumar & Vasanthi Palani Kumar**
UG Students, Department of IT,
SRM - Valliammai Engineering College

Introduction

The Digital Revolution popularly known as the Third Revolution is the adaptation to the computers and digital records. The digital revolution encompasses diverse sectors inclusive of NLP, ASR and AI. These schemas form a semantic network which solves and eases out major user tasks. The term speech recognition is a riddle wrapped in an enigma closely tied to the world of technology. The introduction of the concept was fascinating for all and the most complicated for technicians. Communicating with the technology is actually maintained to be so natural which was its ultimate motivation too. The history of the speech processing systems and its fast growth is tracked as shown in the Fig. 1. Natural Language Processing is done in a variety of languages. This in turn also increases the complexity.

The Automatic Speech Recognition is subset of NLP. The latter is divided into Natural Language Understanding (NLU) and Natural Language Generation

(NLG). This structure is motivated by tags, graphs or trees, FOL, etc. It is a way to analyze, understand and derive human language by computers. NLP considers the hierarchical structure of language. There are two advantages of this hierarchical representation. They are

- Topology is maintained
- Simulation of human brain in computer is accomplished.

The aim of the NLP is to build an intelligent system that can interact with human beings as like human beings. NLP is a range of computational techniques used for representing and analyzing the naturally occurring speech and texts. This concept is applied in a variety of Computing Platforms and Services [1].

The user requirement is analyzed and made to design. The evaluation process includes measurement, appreciation calculation and the summary drafting. Coherence criteria for measurement schemes help to

enhance the process. Computers have now started to play the Imitation game. It has evolved to mimic human and their thought process even on their absence or without any specific end-to-end command. The language was the one that could not be easily comprehended by the machines so far. There are three levels of analysis involved in linguistic.

They are syntax, semantics and pragmatics. Various linguistic relation such as antonyms, synonymy, presuppositions, hyponymy can be processed by recent systems. These relationships are critical to perform the task of textual entailment and recognition.

The major challenges to the NLP are vagueness, ambiguity and in today's digitalized world, it is made possible by experts to break down the sentences and infer the precise intention through NLP/NLU and can be categorized into

- Distributional
- Frame-based
- Model-theoretical

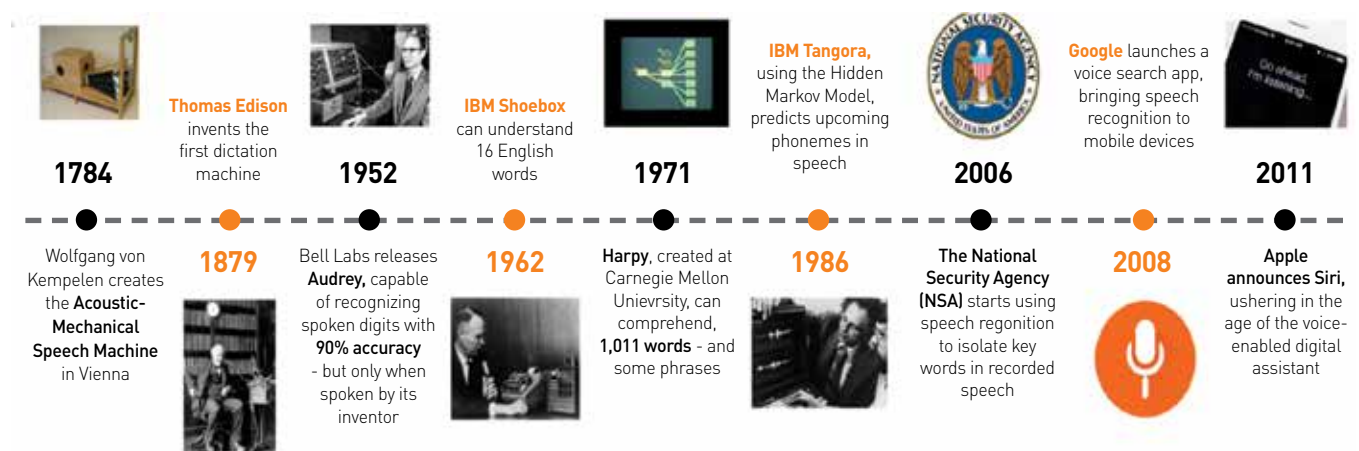


Fig. 1 : Evolution of ASR



Fig. 2 : Natural Language Processing

- Interactive learning

Distributional approach

This encompasses machine learning and deep learning. This technique performs dependency parsing, part of speech tagging, mathematical analysis using word vectors so as to extract the relationship between the words themselves. The semantics involved are

- **Latent semantics** - This includes dimensionality reduction and is most used for information retrieval.
- **Skip - gram model** with negative sampling- It is a contextual matrix of a sentence that uses nearest neighbor logic which is a part of regression logistic.

These models leverage the huge amount of raw text.

Frame based approach

The major task is to channelize the input and produce an output to represent a stereotyped situation. The subtasks are frame identification i.e.

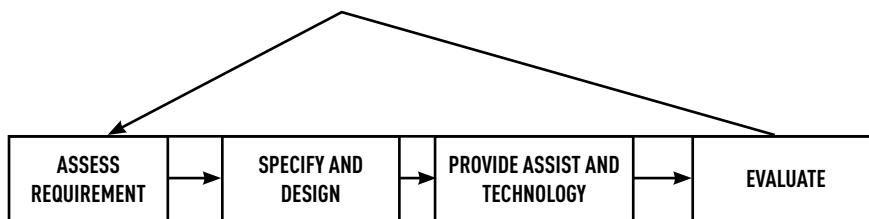


Fig. 3 : NLP work flow

predicate and argument identification.

Model theoretical approach

The linguistic concepts closely tied to this is the model theory and the compositionality. They refer to the idea that the words indicate the world and the meanings of the parts frame the semantics of the sentence respectively. This involves executable parsing, deep learning which represents language as programs.

Interactive learning

The current state of the art indeed requires human intervention in order to rectify the outputs of the NLP engines. This is majorly involved in machine translation, cross-language processing and speech recognition. The complete categorization of NLP is shown in the Figure4.

Speech recognition & speech understanding

The digital revolution has transformed the technology and the communications of today's world. These revolutions continue to reshape our cell phones, Internet, computers and the world we view. The promise of naturally speaking and naturally listening machines is an ever-growing reality. This revolution experienced the greatest number of changes in Speech Recognition [2].

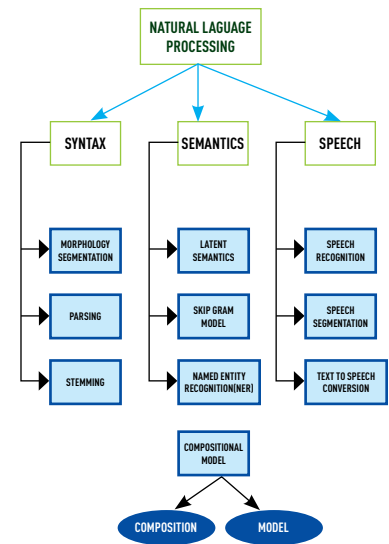


Fig. 4 : NLP categorization

Speech Recognition stands as a communication ambassador between computerized machines and people and it promises to deliver "NATURAL SPEECH". Speech recognition has made the computers to perform dictation, command recognition, improved analysis of personal accents. The speech recognition, in its early stage has faced many obstacles, from Semantics to understanding its meaning. The challenges of speech recognition are shown in Figure5. They are:

- Homophones
- Synonyms
- Homonyms
- Collocations
- Idioms and phrases

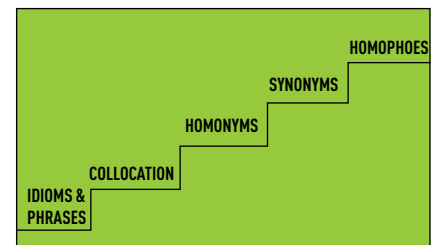


Fig. 5 : Challenges in speech recognition

The Natural Language Processing and Artificial Intelligence came to its rescue. Its incorporation into the speech recognition engines dealt with the language paradox. **Example:** The Speech Recognition engine hears the below sentence

"WHERE IS MY CELL?"

It could read it as 1)Where is my sell? Or 2)Where is my cell?. Obviously (2) is correct since (1) doesn't make any sense in that sentence. However, the next set of queries that arise are, does the "cell" mean

- i. the living tissue, an element of human body
- ii. the cell phone
- iii. a group

From the above, most suitable sentence would be options (ii) or (iii). To solve this realistic ambiguity, the computer interacts with the speaker through queries such as, "DID YOU MEAN CELL AS PHONE OR A GROUP OF PEOPLE?" This way the AI and NLP helps in recognizing speech and language.

Trends in Speech Recognition

(a) ALEXA

The build for today is ASR (Automatic Speech Recognition).It can make educated decisions, makes the surrounding work smarter. Amazon allows people to talk to the device with the wake word "alexa". Alexa enabled products are compatible with home devices and gadgets. It is made by Amazon and responds to the requesting speaker well.

(b) SIRI

SIRI involve a number of technologies, NLP, question analysis, data analysis and machine learning. Its working is shown in Figure6. It uses the ASR technique to transfer speech into text and the former uses data-mashup technology to interface with web services such as OpenTable to perform various other operations. The TTS-Text To Speech transforms the NLP into synthesized speech.

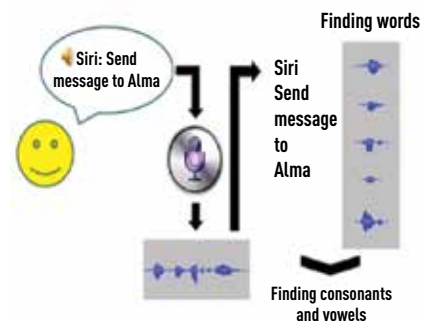


Fig. 6 : SIRI working

(c) Cortana

Cortana is a virtual assistant created by Microsoft. Cortana has the capability to recognize natural voice, allows setting reminders and voice over commands without the requirement for the keyboard input, and answer questions using information from the Bing search engine.

(d) GOOGLE ASSISTANT

The Google assistant can engage in a two-way conversation efficiently. It is available in mobiles and smart home devices.

(e) BIXBY

It is a voice-powered digital assistant introduced by Samsung. It represents a major reboot for S-Voice. It also has an inbuilt vision embedded as part of the camera app and can see and identify objects. It is made available with a simple user interface.

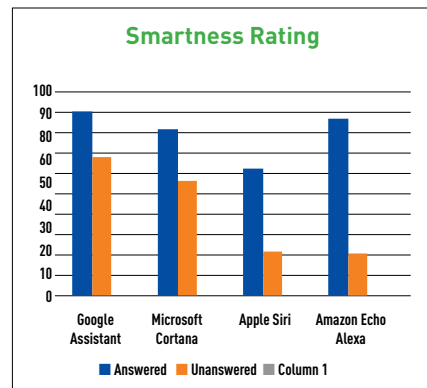


Fig. 7 : NLP categorization

(f) Speech recognition is also implemented in medical field and it proves to be a helping hand for Autism patients.

The smartness rating of various trends is depicted in the Fig. 7.

Applications of NLP

1) Machine Translation

The challenging task of making the information accessible to everyone, across language barriers has outgrown the capacity of human translation. The challenge with machine translation is preserving the meaning of complex sentences. This issue is at the heart of NLP application.

2) Automotive

NLP offers automotive virtual

assistants. This is achieved by hybrid voice and natural language technologies derived from deep neural networks. This application enables drivers to access apps and services embedded in the car through voice commands. The navigation, music, message dictation, weather and car information can be fed and obtained through voice commands.

3) Healthcare

The NLP provides various solutions for healthcare. Some of them are CAPD-Computer Assisted Physician Documentation, CDI-Clinical Document Improvement solutions, virtual healthcare assistance, information discovery and retrieval, image classification, report generation. CDI is the process of improving healthcare records to ensure improved outcomes, better data quality and accurate reimbursement.

4) Information Extraction

A major task of NLP has become to take important decisions. The plain text announcements are taken by the NLP engines and then the pertinent information is extracted in a format that can be factored into an algorithmic decision. Example is Algorithmic trading.

5) Spam Filters

The false-positive and false-negative issues of spam filters are the heart of NLP. The Bayesian spam filters is one such instance.[4]

Business applications of NLP

a) Customer Service

The primary use of NLP is to keep customers happy. The interactions between a company and their customers contain a lot of details and intricacies to be observed and noticed. The interaction may cause discontent or satisfaction, it depends on the interaction only. Thus the statistical methods of NLP are used to simulate a behavior that resembles human interaction. The deployment of CHATBOTS and automated online assistants are done for immediate response to the customer needs. Also the

- Speech recognition: conversion of spoken language to texts
- Question Answering: answering to questions posed by humans

are the relevant tasks included to improve customer service by NLP.

b) Reputation Monitoring

The reputation monitoring and its management has become the top priorities for business. This determines what the people says about one. It includes pattern matching in the NLP processing to make better decisions. The related tasks are:

- Sentiment analysis:

Determination of the emotional state, attitude and others of the user.

- Conference Resolution:

Connecting pronouns to the correct objects.

c) Market Intelligence

Wanting to know the status of a company or an industry is very essential

to develop an effective strategy. The NLP tasks for this application are event extraction and sentence classification. [5]

Future of NLP

- Attempt to make AI more human like.
- Proliferate existing AI technologies.

Advantages

- Integrated with AI and Database systems
- Advanced Analysis
- Contextual understanding
- Identify clusters and collection of similar processing
- Incremental and evolution constantly involved.
- Get solutions from the text.
- More mining results in more data

Disadvantages

- Machine translation is complex
- Dependency on huge computing power
- Precision is a problem
- Slows the processing at times

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About the Authors



Dr. A. R. Revathi [I1502200] is currently working as Associate Professor in Department of Information Technology at SRM Valliammai Engineering College. She has completed Ph.D in Anna University, MIT campus, Chennai. Her research interests are mainly focused on motion detection, human detection, vision and IoT.



Deepthi Palani Kumar [01382604] is currently pursuing B.Tech in SRM Valliammai Engineering College. She is also an Oracle Certified Associate and her areas of interest include coding, cloud computing and IoT.

Social Media Analytics

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Social media is the most commonly used application on Internet, where people discuss and share their emotions with community. Twitter has been one of the most popular social media applications and has witnessed a wider reach. Social media has been popularly used in the political campaign across world. Researchers have provided analysis for various political campaigns prior to election process and post election as well. In this paper, Twitter has been used as a forum to understand the sentiments of citizens of India towards various political parties viz. BJP, Congress and AAP, during pre-election process. Municipal Corporation of Delhi elections were held on 23rd April 2017 and we have analyzed the tweets originating in India few days prior to election date. The emotions of public in terms of anger, anticipation, disgust, fear, joy, sadness, surprise have been extracted based on their live opinion. These emotions have been related to the elections results and it has been observed that tweets are a valid indicator of political sentiments and it is feasible to use social media to predict electoral results.

Keywords: Twitter, Wordcloud, Frequent terms, associations, Sentiment analysis, BJP, AAP, Congress.

I. Introduction

Twitter is a massive social networking site used by millions of people to share their voice and reach out to community. The huge volume of data has opened new arena for analysis of data. Twitter data analytics now allows user to express their information in the form of short "Tweets" of 280 words. Twitter has played role in socio-political events such as victory of Barack Obama's in the Presidential election is correlated with the sentiment expressed by USA Twitter users during that period, Occupy Wall Street movement, Arab Spring etc.

In any Democratic Country the Elections are the means of representing the people's choice for electing their Leaders. India being one of biggest democracy, people have profound interest in elections. There always has been curiosity to predict an election outcome. The Electronic Media conducts exit polls to predict the Election outcomes. Lately, it is observed that Exit Polls fail to make an accurate prediction. Furthermore, traditional polls are too costly, and are based on limited amount of data collected after interviewing people. People often hesitate in disclosing the vote cast information in person.

The scientific community has been successful in predicting the outcomes of many complex real life situations. The accuracy of prediction model depends purely on the data. Recent years have witnessed the explosive growth of the usage of social media to share their voice and information using Internet. There are many micro-blogging websites like Twitter, Facebook, and Tumbler etc. Twitter has been widely used Social media tool amongst all age groups of Internet users. Social media generates abundance of data every minute thus provides enormous opportunity to mine the information and get relevant knowledge. These social media data related to politics can be explored to provide some useful outcomes. Lots of successful research work had been done in the area of predicting election outcome based on people voice on social media.

Twitter is one of the widely used social media website amongst users on internet. It allows users to send 280-character messages using their twitter account in the form of short message expressing their thought or following someone's tweet. Tweets related to some political parties or some event may provide valuable

information and can be used to know their sentiment towards some event or political party as a whole.

According to Statista.com website as referred on 15 May 2017 the number of active user in India were approximately 11.5 million in the year 2013 and has shown a tremendous growth of 101.75% and reached 23.2 million Twitter users in the year 2016 [1]. Most recently, the UK general election of 2016 referendum appeared on Twitter's posts.

In this paper we present an analysis of the twitter data for Municipal Corporation of Delhi election, 2017. We gathered Twitter data using the streaming API to extract tweets related to MCD Elections. In the process data is collected in Pre-Poll category.

II. Related Research Work

Social media has been explored to estimate the popularity of politicians [2], to find out the political interest of social media users [3][4]. Social networking websites are prominently used by entertainment media and political parties to know about people's choice for political preferences [5]. Social media data can be analyzed on hourly basis during an election campaign or party meetings so as to get a detailed insight about the emotions of voters [6]. The real time monitoring and analysis

sno	text	favorited	favoriteCo	replyToSN	created	truncated	replyToSID	id
1	MCD Election 2017: 'The Child Is Dead,' Says Top Delhi Congress Leader	FALSE	2	NA	4/18/2017 22:36	FALSE	NA	8.54464
2	Arvinder Lovely As He Joins BJP - NDTV https://t.co/uPHm7KwNL	FALSE	0	NA	4/18/2017 22:11	TRUE	NA	8.54457
3	Our Leaders Being Intimidated, Says Maken After Congress Leader Joins BJP: Delhi Congress chief Ajay Maken accused... https://t.co/flx6al0mT	FALSE	0	NA	4/18/2017 21:53	FALSE	NA	8.54453
4	Our Leaders Being Intimidated, Says Maken After Congress Leader Joins BJP https://t.co/koqCOVo4Xa https://t.co/SWNvrch7VN	FALSE	0	NA	4/18/2017 21:49	FALSE	NA	8.54452
5	RT @manjuadhav : MCD Election 2017: Will Close Delhi Landfills If We Win, Says Congress https://t.co/ys9jXGL3j via @ndtv	FALSE	0	NA	4/18/2017 21:14	FALSE	NA	8.54443
6	RT @manjuadhav : MCD Election 2017: Will Close Delhi Landfills If We Win, Says Congress https://t.co/ys9jXGL3j via @ndtv	FALSE	0	NA	4/18/2017 21:06	FALSE	NA	8.54441
7	MCD Election 2017: 'The Child Is Dead,' Says Top Delhi Congress Leader	FALSE	0	NA	4/18/2017 20:42	FALSE	NA	8.54435
8	Arvinder Lovely As He Joins BJP https://t.co/NdZj6pA1y via @ndtv	FALSE	0	NA				
9	RT @ndtv: 'The child is dead,' says top Delhi Congress leader Arvinder Singh							
10	7 Lovely as he joins BJP https://t.co/DQ5KY2Jf88 https://t.co/7Y...							
11	RT @abpnewstv: EXCLUSIVE: @ajaymaken tells Congress' plan of							

Fig. 3 : Tweets of Congress

sentiments related to political party. Though the message comprises of certain characters, symbol etc, hence it needs to be cleaned before processing. Using library function from twitterR, Rcurl, ROAuth package provide in R language, the twitter feeds are processed through cleaning step. The word corpus thus generated is clean and finally all words are converted to lowercase characters.

IV. Technique Applied

In this study we have developed a module in R language to analyze the twitter data related to three major political parties contending for Delhi MCD Elections.

The analysis of Frequent terms and their associations for all three sets of tweets has been accomplished. This has been carried out to understand which terms are more frequently used while discussing about a particular political party.

The frequently used words are plotted in Word Cloud which represents the most talked word in the communication.

We have also done sentiment analysis of these 3000 tweets to understand the emotions of public towards all three mentioned political parties and tried to relate the extracted emotions prior to elections' date with the polling results. We have used many packages viz. syuzhet, lubridate, ggplot2, scales, reshape2, dplyr to facilitate understanding of emotions and plotting the same.

V. Results and Discussion

All tweets mentioning "AAP", "BJP", "Congress" have been analyzed

from the following perspective:-

- Word cloud generation
- Document matrix of frequent terms
- Sentiment analysis

The Word Cloud has been generated corresponding to tweets mentioning "aap" and it has been found from the size of word that "aap" has been discussed less in comparison of the keyword "mcd elections" as shown in Fig. 4.



Fig. 4 : Word cloud "aap"

The Word Cloud has also been generated corresponding to tweets mentioning "bjp" and it has been found from the size of word that "bjp", "mcd" and "elect" has been discussed almost in same count as shown in Fig. 5.



Fig. 5 : Word cloud "bjp"

Similarly, the Word Cloud has been generated corresponding to tweets mentioning "congress" and it has been found from the size of word that "congress" has been talked about the most in the tweets. This is shown in Fig. 6.

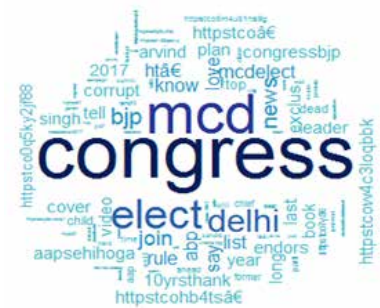


Fig. 6 : Word cloud "congress"

The generation of bar plot showing frequent terms with frequency no less than 100 have been done. The most talked words have been plotted as shown in Fig. 7,8,9 for "aap", "bjp" and "congress" tweets respectively. The order of terms by frequency is "mcd", "elections", "aap", "delhi", "kejriwal" and so on in decreasing order for "aap" tweets.

The order of terms by popularity is "bjp", "mcd", "elect", "delhi" and so on in decreasing order for tweets mentioning "bjp". For the tweets mentioning "congress", the order of terms by decreasing order of popularity is "congress", "mcd", "elect", "delhi".

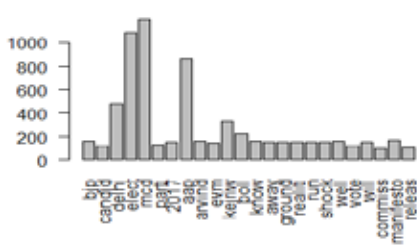


Fig.7 Bar plot showing frequent terms from "aap" tweets

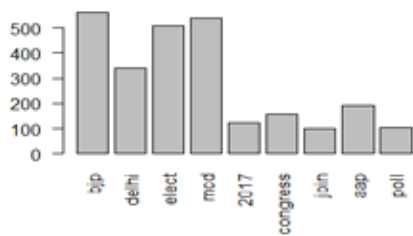


Fig.8 Bar plot showing frequent terms from "bjp" tweets

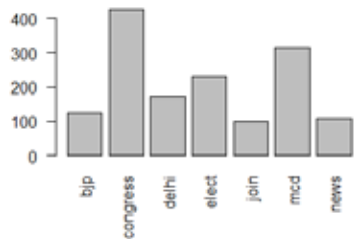


Fig.9 Bar plot showing frequent terms from "congress" tweets

Finally, the sentiment analysis of all three sets of tweets has been done to understand the emotions of public prior to day of mcd elections. The `get_nrc_sentiment()` function from `syuzhet` package is used to express sentiments of tweets in eight different sentiments anger, anticipation, disgust, fear, joy, sadness and surprise. From the sentiment analysis of "aap" tweets it is very clear that there is enough Anger and anticipation for "aap" party and the same was visible in the results of elections where "aap" suffered a huge loss. As was also apparent from the results that "bjp" had won by great margins and in great numbers, same is clearly observed in sentiments of people. There is too much of Joy and anticipation for "bjp" in the tweets.

As was observed from the results of mcd elections that "congress" was defeated badly, so is the sentiment prior to elections. There is Disgust and

anticipation for "congress". The three barplots showing sentiment analysis for "aap", "bjp" and "congress" have been shown in Fig. 10, 11, 12 respectively. It was inferred from the Sentiment analysis graph that people have expressed more joyous sentiment for BJP as compared to other parties. The anticipation is higher for all the political parties and anger is expressed more for Aap party.

Finally, after analyzing the word cloud, bar chart and sentiment analysis graph we conclude that people are talking positive about BJP party as compared to other two parties. Hence it is a clear indication of people choice that they will prefer BJP for MCD Election 2017.

The final results of MCD polls are given below in Table I that verifies the sentiments of public concluded from our study.

Table I MCD election results

Party name	Number of seats won
AAP	47
BJP	184
Congress	30

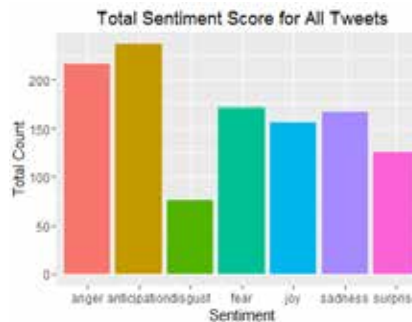


Fig. 10 : Graph of Sentiment analysis for "aap" party

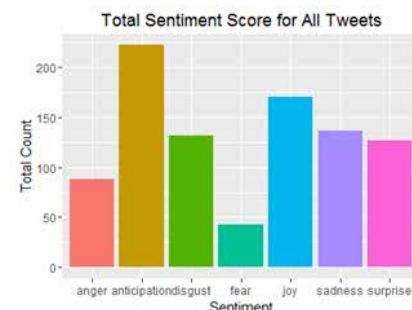


Fig. 11 : Graph of Sentiment analysis for "bjp" party

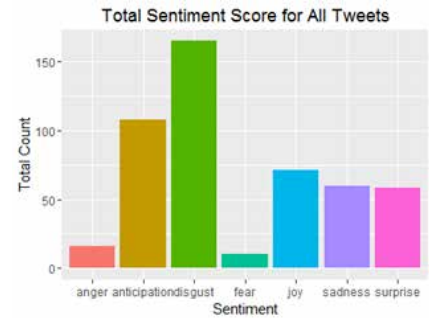


Fig. 12 : Graph of Sentiment analysis for "congress" party

VI. Conclusion and Future Directions

Social media is a platform used by people to express and share their emotions in public. This has resulted in a new direction where researchers can analyze the social media data for finding some useful results. This study has focused on similar exploration where people voice can be collected and analyzed for success of political events and election outcomes.

In our study we have gathered and analyzed over 3,000 twitter messages with words viz. "AAP", "BJP", "Congress" two days prior to MCD elections in New Delhi in April 2017. We made the following observations that social media is gaining popularity as medium for discussion related to any social event or political deliberations by Indian society. In the years to come we will be witnessing a prominent role being played by social media in electoral campaign and getting insight about the people voice in India.

The discussions on twitter are equivalent to traditional discussions and are capable enough to give a fair idea of standing of contesting political parties. We have also done sentiment analysis of emotions of people which shows there is consistent correlation between social media results and the traditional declared results. Hence we can strongly mention social media population is a representative of population of a nation and social media is capable enough to capture emotions of the people prior to elections and has ability to forecast the electoral results.

In future, we plan to convert this analysis in real time corresponding to tweets arriving on temporal scale.

Also we can geographically divide and analyze the tweets according to home town or constituency of candidates. We can also do deeper analysis based on names of different contestants. The American Mechanical Turks (AMT) approach can also be made use of so as to eliminate any sarcasm which could not be picked by functions of "R" package and comparison can be done between AMT analysis and analysis by "R" software.

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Energy Efficiency in Software Defined Networks : A Survey

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Software defined networks has been attracting the attention of several researchers these days, especially in the arena of cloud based intelligent communications. Network control is decoupled from physical forwarding of data and therefore control function of SDN can be directly controlled through programs. A set of APIs (application programming interfaces) are provided to perform routing, security and access control functions for achieving desired standard of performance. SDN is extensively used in data centers these days. Like all other networks, energy efficiency in SDN is a real issue because this significantly contributes to performance efficiency of the underlying network. Certain energy efficiency mechanisms have been proposed for SDN. The present article focuses on discussing these techniques.

Keywords: Software-defined networking; energy optimization; ternary content addressable memory; rule placement.

I. Introduction

Software defined networking (SDN) is a newly developed network framework that differentiates between implementation of control and data plane. The network consists of three identities – a centralized controller, hosts and switches. Certain switches connect host-host pair or a host-switch pair or a switch-switch pair. These different network components host, switch and controller communicate using application programming interfaces or APIs. The centralized controller takes care of forwarding in data plane. It stores flow rules according to which network switches forward packets in different paths. Primarily, connectivity in ad hoc networks look like fig. 1.

Utility of SDN is enormous in different types of networks – like local, metropolitan and wide area networks, data center networks etc. The advantages are ease of supervising network functionality with high throughput, ease of deployment, maintenance and lots of possibilities of decreasing energy consumption. Resources of SDN have to be utilized in an energy efficient manner to reduce cost. Flow rules are stored in TCAM which costs high due to its high speed memory. So, if its size can be reduced then it will greatly contribute to reduce energy consumption in the software

defined network. Also, keeping certain switches in off mode significantly preserves energy. In this paper, we concentrate over surveying of many different strategies to preserve energy in SDN.

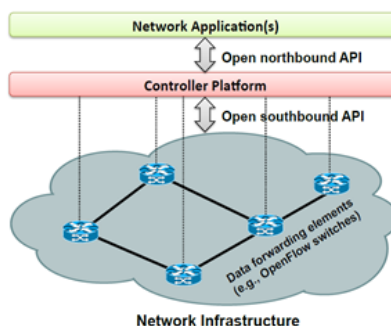


Fig. 1 : Structure of a SDN

Storing energy through decreasing energy expense per session is an important aspect of efficiency in SDN. Both in the context of ordinary SDN and data centers, energy efficient schemes need to be developed. Based on the strategy of energy efficiency in SDN, SDNs are classified as Topology-aware-SDN, TCAM-based-SDN and Rule-placed-efficient-SDN. Again, Topology-aware-SDNs can be classified as single-controller-SDN and multi-controller-SDN.

As far as organization of the

article is concerned, section II deals with overview of these strategies. Section III illustrates Topology-aware-SDN approach while sections IV and V discuss TCAM-based-SDN and Rule-placed-efficient-SDN, respectively. Section VI discusses the applications of SDN in wireless ad hoc and sensor networks while section VII summarizes points in the paper.

II. Overview of Energy efficiency strategies in SDN

Classification of energy-efficient SDNs, is presented as a block diagram in fig. 2.

Topology-aware-SDNs are inspired by the fact that certain network switches are often not used to half of their capacity while some others get exhausted soon. Based on various communication paths between a pair of hosts, some switches can be turned off. When a very small number of packets flow in the network that is, significantly less messages are exchanged (especially at night) then the present technique can save great amount of energy. This approach can be again divided into single and multi-controller approach. In multi-controller approach, a pool of controllers is available. Among them, one or more than one may be selected at a time depending upon the communication load. This will increase reliability and performance effectiveness of the

system at some extra cost of deploying the pool of controllers.

Full form of TCAM is ternary content addressable memory. It is a fast acting memory that performs an entire memory search in a single clock cycle. This is embedded in switches that perform forwarding activity using TCAM. It is evident that being a very high speed memory, TCAM is really expensive. Certain energy efficient schemes in literature try to reduce size of TCAM to reduce energy consumption in the network. TCAM can perform searches not only using 0 or 1, but also provision of a wildcard state 'X' is there. 'X' allows searched using pattern matching too. TCAM eats us a lot of energy. Therefore, its size must be cut short for energy efficiency.

As far as placement of rules is concerned, factors that are mainly considered are, splitting of large flow tables into smaller components, designing suitable endpoint, routing and rule-placement policies for the underlying network.

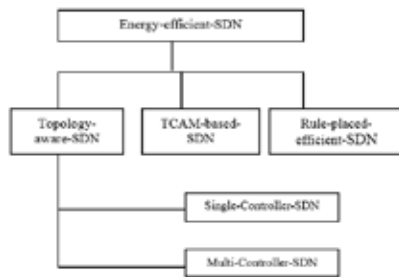


Fig. 2 : Block Diagram of energy efficient approaches in SDN

III. Topology-Aware SDNs

A. Single-controller Approach

ElasticTree[7] is concerned about saving energy particularly in data center networks. Data centers aim at providing reliable and scalable computing infrastructure for massive internet services, although its capacity is not used to the fullest most of the time, especially when traffic load is very low. For eg., at night we have fewer communication sessions. Under that situation, ElasticTree recommends turning off certain switches to save energy. ElasticTree employs three optimizers – formal model, greedy bin-packing and topology-control

heuristic. Role of the optimizer is to find out smallest power consuming set of switches that can serve current traffic requirements. It takes as input topology of the network, current set of active source and destination hosts along with the switches through which they are communicating, etc. Power control toggles the power status of network components like ports, line cards and switches. On the other hand, routing module is concerned with paths allocated to different flows. Rules of switches are generated accordingly.

Looking into the details of an optimizer, first comes the formal model. Then we have greedy bin-packing and topology aware heuristic. Formal model is similar to a multi-commodity flow problem of MCF with the constraints being strength of a link, flow maintenance and demand satisfaction. To optimize power consumption, flows along each link are passed through switch of the power optimized network. Greedy bin-packing tries to improve scalability of the formal model. It applies a greedy approach for satisfying flow assignment. Among various possible paths between each pair of hosts, the leftmost one with good capacity is chosen. But it does not guarantee optimal assignments for all the flows, because optimal assignment will require investigating all possible paths and current flow has to be assigned to the one having minimum load. Definitely, this will require knowledge of entire traffic matrix.

Topology aware heuristic optimizer aims at splitting flows to fully utilize available links in order to reduce TCP bandwidth. It is computationally efficient because it typically benefits from the popular fat-tree structure and requires only port counters to find out the set of minimum required links.

CoRelation-aware Power Optimization [CARPO [8]] is also topology-aware i.e., it, too, tries to deactivate certain network switches when load is low. This time, the selection of essential/non-essential switches, is performed using correlation analysis among multiple flows. Along with that, CARPO also considers data rates in individual links. If data rate of a link is high, then it is already busy and not

suitable for being assigned a new flow. CARPO concentrates on assigning flows to suitable ports. A close to perfect solution is found out in initial step with linear programming approach and then a heuristic algorithm is used to find a suitable solution with tolerable complexity. The heuristic is expected to reduce computational complexity.

REsPoNse [9] is a framework that detects energy critical paths in the network. Preferring paths with low energy consumption over high energy ones, produces close-to-optimal energy flow-assignment in the network. It takes as input traffic matrices and stores them in routing tables. Status of each network device can be classified into, always-on, on-demand or fail-over. Accordingly, a simple, scalable on link traffic engineering mechanism is used to deactivate and reactivate switches. Carrier Grade is a similar technique [10]. Along with optimal flow assignment, certain local energy optimization techniques are also applied. These are adaptive controlling of line rates in Openflow switches and handling failures in the SDN controller or forwarding switches.

GreenDCN [24] is an energy conservation mechanism framework that works really well especially in data center networks. It works based on the logic of traffic engineering and models the flow-assignment problem as a two-step NP hard one. The solution is time aware. Virtual machines are assigned to servers to reduce the amount of traffic in a particular link, generating a favorable situation to apply principles of traffic engineering. The authors claim that GreenDCN can achieve 50% energy savings. Moreover, it is scalable which is very important from the perspective of data center networks.

B. Multi-controller Approach

Two heuristic path establishment algorithms are presented in [25]. The first one corresponds to static network configuration algorithm (SNETCA) while the other one is dynamic energy aware routing algorithm (DESRA). SNETCA is a topology aware solution that prunes all possible links. Each switch is associated to one controller so that load on controllers can be balanced and energy efficiency can be achieved. Also

links are identified whose deactivation will not partition the network graph. DESRA, on the other hand, is invoked when a new traffic demand arrives. With its arrival, the current host sends a routing request to the associated controller using the path established by SNETCA. The controller determines the most suitable path to the destination host whose identifier is mentioned in the resource request message. Based on knowledge of the global networking topology, the controller elects a path with minimum number of links to be activated. Accordingly, flow forwarding rules are designed.

E³MC (Improving Energy Efficiency via Elastic Multi-Controller SDN in Data Center Networks) [28] works in an environment where there is a pool of controllers as well as switches. These pools can dynamically grow and shrink making the structure scalable and elastic. The system contains four logical components: Information Database (IDB), Energy Optimizer (EO), State Converter for Switches (SCS) and State Converter for Controllers (SCC). IDB is responsible for gaining knowledge about network topology along with estimated traffic demands in a certain span of time. These information are sent to EO as input. Using these topological inputs, EO assigns flows to the paths containing the least possible devices for making and breaking the connection in an electric circuit along with communication points. Then it runs the energy preserving technique in control plane to compute minimum subsets of controllers. Based on the output produced by EO, SCS and SCC transform the energy status (i.e. activate/ deactivate as necessary) of network elements like ports, switches and controllers. If underutilized network elements can be switched off, then that will certainly enhance energy efficiency of the system.

A multiple controller sleep management strategy is proposed in [29] for green software defined networking. This work also advocates for more than one controllers to realize a control plane that centralizes a distributed network structure, to take care of explosion of traffic in peak time. With increase in number of controllers, energy efficiency

becomes a real issue to handle. In [29], a technique called HybridFlow is proposed where redundant controllers can be deactivated when few traffics are exchanged in the network. The authors claim that the proposed M-N policy multiple controllers achieve significantly high energy efficiency in SDN. This scheme is also topology dependent.

IV. TCAM-based SDNs

Rectilinear [12] emphasizes on the fact that, along with flow control using SDN controller, facilities of programming switches are also there in SDN that enable dynamic on the spot decision to take action for each flow. Flows are identified using one particular flow-id. Switches can modify packet headers to embed flow-id. It is an information that is utilized by other switches in the path. Flow-id will be helpful for classifying packets by switches. Literature has shown that on an average, 80% TCAM power can be reduced using this scheme.

TCAM-RAZOR [13] applies packet classification which is extremely important for network service monitoring. It is performed using some rules termed as packet classification rules. These rules have to be converted to TCAM-compatible rules and this conversion has a great disadvantage – that is, abnormally hike in the cardinality of TCAM rules set. A big set of rules denote more energy consumption. TCAM-Razor tries to convert one packet classifier to another one so that the solution becomes energy efficient and practicable. In TCAM-Razor, initially a reduced decision diagram is created from a given packet classifier. Through the technique of dynamic programming, the technique decreases cardinality of the set of prefixes corresponding to each non-leaf node in decision diagram as much as possible, so that number of rules can be minimized. Rules are then generated from this decision diagram. Removing redundant rules greatly reduce energy consumption in the TCAM. On real packet classifiers, on an average, TCAM-Razor can achieve 3.9% compression ratio which is very applicable one and competitive too.

Bit weaving technique [14] investigates similarity between

predicates along with their decisions. If two predicates differ by only one bit ('0' in one entry and '1' in other) but lead to the same decision, then those two differing '0' and '1' can be merged to X which is a wildcard state. Two techniques are primarily used by Bit weaving – one is bit swapping and the other one is bit merging. Initially bits in certain predicates are swapped to make them look similar and then corresponding rules are merged together. Main advantage of this technique is that it looks simple, easy to implement and it runs fast.

Compact TCAM [15] applies dynamic programming for translating large flow identification numbers to shorter tags. Packets are transferred from source host to destination host using these tags. This reduces power dissipation per flow along with significant reduction in required TCAM space. Less TCAM space automatically implies less cost and more energy saving. The authors claim that in both real world and synthetic traffic scenario, compact TCAM can reduce power consumption on an average by 80% in SDN switches corresponding to a specific set of flows supported by an SDN switch.

Another energy optimization technique is proposed in [27] for cloud data centers in SDN. It proposes an algorithmic approach to minimize energy consumption at data centers by primarily deactivating the switches whose TCAM size is zero, i.e. the switches that are not currently assigned to any flow. Each switch is equipped with a TCAM of predefined size and a flow demand matrix is loaded with possible flows among multiple hosts. Once a flow arrives at a switch, it explores its TCAM to find out the applicable forwarding rule that will demonstrate flow handling action of the switch. Once a switch is activated, aim of the SDN controller is to ensure that TCAM utilization goes close to 100%. Similarly, the switches whose TCAM utilization is 0, are deactivated. Deactivation of such switches greatly reduces energy consumption.

MINNIE [30] is another technique for reducing size of TCAM. It defines each routing triplet as (s, t, p) where s is the initiator of a communication

session, t is its goal and p specifies the output port. Wildcard rules are applied, wherever possible, to merge rules by source and destination. For eg., in the following tables 1, 2, 3 and 4, we see the full set of rules, compressed view by source and destination and the minimal solution.

Table 1: No compression

Flow	Output port
(0,4)	4
(0,5)	5
(0,6)	5
(1,4)	6
(1,5)	4
(1,6)	6
(2,4)	4
(2,5)	5
(2,6)	6

Table 2: Compression by source

Flow	Output port
(0,4)	4
(1,5)	4
(2,4)	4
(2,5)	5
(0,*)	5
(*,*)	6

Table 3: Compression by destination

Flow	Output port
(1,4)	6
(1,5)	4
(0,6)	5
(*,4)	4
(*,5)	5
(*,*)	6

Table 4: Minimal Solution

Flow	Output port
(1,5)	4
(2,6)	6
(1,*)	6
(*,4)	4
(*,*)	5

In table 1, we can see that the source destination pair (0,5) and (0,6) correspond to output port 5. These two

entries have been merged to (0,*) with the corresponding output port being 5. This can be found in table 2. Please note that in table 2, (0,*) appears after (0,4) because output port for (0,4) is not 5, it is 4. Therefore, if source host is 0 and destination host is 4, then output port 4 should be used, instead of the generalized port 5. In order to implement that, specific entries (where source and destination ids are explicitly specified) are placed before generalized entries. Similarly table 3 can be obtained, where compression by destination is performed whereas the minimal solution appears in table 4. In this way, nine entries of table 1 are squeezed to 5 entries in table 4. In this way, compression is performed in MINNIE.

V. Rule placement-based SDNs

Two most important approaches in this context are palette distribution framework [16] and big switch approach [17]. Routing table stored in SDN controller cannot grow very big because of its memory expense and power consumption limits. Large SDN tables are split into smaller tables by palette distribution framework and smaller tables are distributed across multiple switches and hosts in the network. It helps to balance sizes of tables in the network maintaining all strategic characteristics of SDN. Distribution of sub tables across multiple network elements requires traversing all edges of the network. Each sub tree is assigned an unique colour and each connection visits a particular type of colour only once. Palette distribution applies rainbow problem formulation, techniques and experience based methods of graph theory.

The big switch approach, to some extent, is based on network topology. SDN controller is expected to have knowledge about topology of the entire network as if the network is a big switch having multiple hosts connected to it. These hosts can behave as source or destination in different communication session. SDN controller is equipped with three different policies – endpoint policy, routing policy and rule-placement policy. Endpoint connectivity policy is defined on big switch abstraction; SDN infrastructure layer decides on routing

policy taking note of user defined restrictions and resource utilization requirements along with constraints of network hardware components. Based on these information, a compiler designs the minimized set of forwarding rules and places them in switches.

VI. Applications of Energy Efficient SDN in ad hoc and SenSor Networks

Energy efficient SDNs are of great utility in ad hoc and sensor networks. As far as the authors know, SDNSN [31] is the first technique that implements software defined architecture over a wireless ad hoc network. It is implemented in a modular fashion so that network management can be performed easily and maintained and extended through software. A separate interface is provided so that third party applications can access the ad hoc network without much program complexity. The design is simple and development time is reduced upto a great extent.

Energy efficient SDN can also be applied to identify selfish nodes in ad hoc networks [32]. An energy efficient centralized controller is applied to keep track of residual energies of nodes. If residual energy of a node is above a predefined threshold but still it shows unwillingness to forward packets of others, then it is identified as a selfish one.

Energy efficient techniques of SDN can also be extended to wireless sensor networks [33]. Specifically for industrial applications, IWSN or industrial wireless sensor networks has become need of the hour. Nodes in WSN are battery powered and therefore preserving energy is extremely important to increase lifetime of the network. SDN is equipped with pretty matured techniques of controlling network topology as well as node mode, which are a pre-requisite in IWSN. In [33], an energy efficient technique named M-SPEECH is proposed for IWSN that utilize the energy efficient techniques of network function virtualization (NFV).

Conclusion

This article discusses the utility of energy preservation approaches in the context of SDN. Categorically these approaches has been provided along

with certain examples. In future, our aim will be to conduct a comprehensive study of these techniques that will show experimental comparisons.

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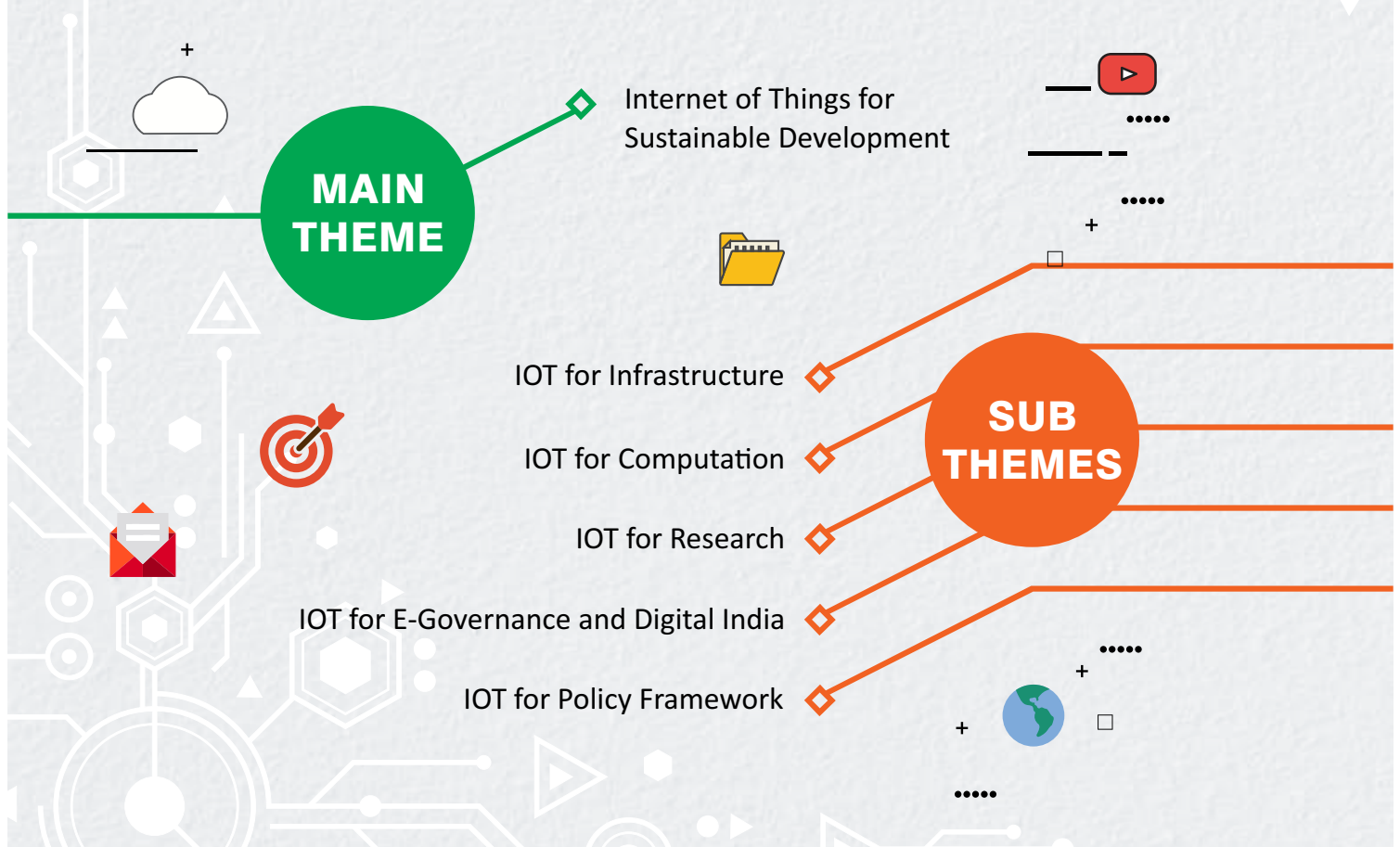
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About

53rd Annual Convention of Computer Society of India (CSI 2018) will be held at Udaipur, India during 14th December 2018 to 16th December 2018. The CSI Annual Conventions are held in different cities across India. The CSI Annual Conventions, usually attracting 2000 plus participants have been held since 1965. Apart from technical sessions, tutorials, panel discussions, Exhibitions, various functions for awards are main features of the convention. This will be first ever CSI Annual Convention Hosted by CSI Udaipur Chapter. The theme of the CSI 2018 is "IOT for Sustainable Development". It will cover all aspects of digital significance from governance to providing basic amenities to the citizens. This convention will provide a platform to the participants to share their views and ideas on latest technological developments in an inter- and intra-disciplinary perspective.

Convention Objective and Theme

The Internet of Things (IOT) is emerging as a powerful enabler in many application domains, such as water and energy management, environmental monitoring, health, smart cities, smart industry and supply chain management. The IoT has the potential to address some of the most acute human, economic and environmental needs. It can also directly contribute to achieving the targets in the Sustainable Development Goals (SDGs). Accordingly, the emerging IoT paradigm has the potential to create an efficient, effective and secure ecosystem taking advantage of connected devices for managing the major global challenges faced by this, and future generations. Moving time is now from - IOT - IOE (Internet of Everything)





Conference

PREAMBLE

The proposed International Thematic Conference under CSI 2018 will be held at Udaipur, India during 14 - 16 December 2018. It will target state-of-the-art as well as emerging topics pertaining to IOT and other theme areas and effective strategies for its implementation for Engineering and Managerial Applications. The objective of these parallel International thematic conferences is to provide an opportunity for the Researchers, Academicians, Industry persons and students to interact and exchange ideas, experience and expertise in the current trend and strategies for Information and Communication Technologies. Besides this, participants will also be enlightened about vast avenues, current and emerging technological developments in the field of IOT and Related themes in this era of Sustainable development and its applications, will be thoroughly explored and discussed.

OBJECTIVES

- The conference is anticipated to attract a large number of high quality submissions and stimulate the cutting-edge research discussions among many academic pioneering researchers, scientists, industrial engineers, students from all around the world and provide a forum to researcher.
- Propose new technologies, share their experiences and discuss future solutions for design infrastructure for IOT and related themes.
- Provide common platform for academic pioneering researchers, scientists, engineers and students to share their views and achievements.
- Enrich technocrats and academicians by presenting their innovative and constructive ideas.
- Focus on innovative issues at international level by bringing together the experts from different countries.



1 International Thematic Conference on Big Data Analytics and Data Mining [Data CSI 2018]



3 International Thematic Conference on IOT and Engineering Applications [IOT CSI 2018]



2 International Thematic Conference on Cyber Security and Smart Computing [CYBER CSI 2018]



4 International Thematic Conference on E-governance and Digital Initiatives [Egov CSI 2018]

Exhibition

Digital Sustainable Development Leadership Summit & Digital Bharat Exhibition 2018 Co-Located with 53rd National Convention of CSI

The Digital Sustainable Development Summit calls to action policy makers and industry leaders from around the nation and world to define modernization road maps across key sectors in light of the sustainable development goals set for today's digital society and global economy.

The Sustainable Development Leadership Summit is a unique opportunity to reach a global audience of sustainability influencers and showcase your commitment to our shared vision. Join us as we let the world know that business leaders are taking action for a more sustainable and Digital future and inspiring many others to act.

The Digital Bharat Exhibition aims to bring together stakeholders including academia, industry, government, to showcase digital connectivity enhancements and make governance Systems. The Exhibition will showcase the developments being made over the nation in different sectors after the launch of the Digital India Mission by Government of India led by the Hon'ble Prime Minister Shri Narendra Modi.

Topics to be debated on and show cased in form of Models and Reports

- New Frontiers of Digitization (Big Data; artificial intelligence; predictive models; automatic processing, trading and control; ubiquitous connectivity)
- Digital Identity of the Consumer (Profiling audiences and users; social media; consumerization; universal customisation; analytical tools; new business models)
- Next Generation Mobile Applications (online security and authentication, mServices, mCommerce, advanced contactless solutions, developments in near field communications)
- Banking and Transactions (cashless society, finance transparency, secure identification in payments, mobile money, trust models, innovative auto ID programs for payments and entitlement)
- Government Planning (Population statistics; National registration and databases, government-issued IDs; secure identity authentication; cross-border migration)
- Citizen-centric Services (digital inclusion and secure credentialing for eGovernment, healthcare, education, labor social relief and financial inclusion programs; postal services)
- Border Control and Transportation Security (facilitating trade and travel, global migration, hub security, eGates, passenger control, baggage screening, immigration/visitor monitoring, shipping and cargo security)
- Urban Security and Efficiency (smart buildings, industrial and corporate security, stadium and infrastructure security, monitoring and controlling public areas, video surveillance, urban mobility, ticketing and fare collection)
- IOT and Asset Tracking (unique identification and traceability, object-to-object communications, industrial automation, smart supply chains, inventory management, maintenance, real-time location systems)
- Product Security and Anti-Counterfeiting (transparency and accountability, fighting illicit trade, endeavors to protect authenticity from secure documents to pharmaceuticals and luxury goods, securing ID documents)
- Advanced Technologies (cards, biometrics, data collection, RFID, RTLS, NFC)
- Hot Vertical Markets (energy & resources; travel & transport, healthcare & pharma, banking & finance, postal & supply chains, retail & distribution)
- Sustainable Development Roadmaps (Public and private sector initiatives; Strengthening regulations; Design for sustainability; The ROI of sustainable development)

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- Technology suppliers & users
- R & D institutions
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- IT Security Professionals
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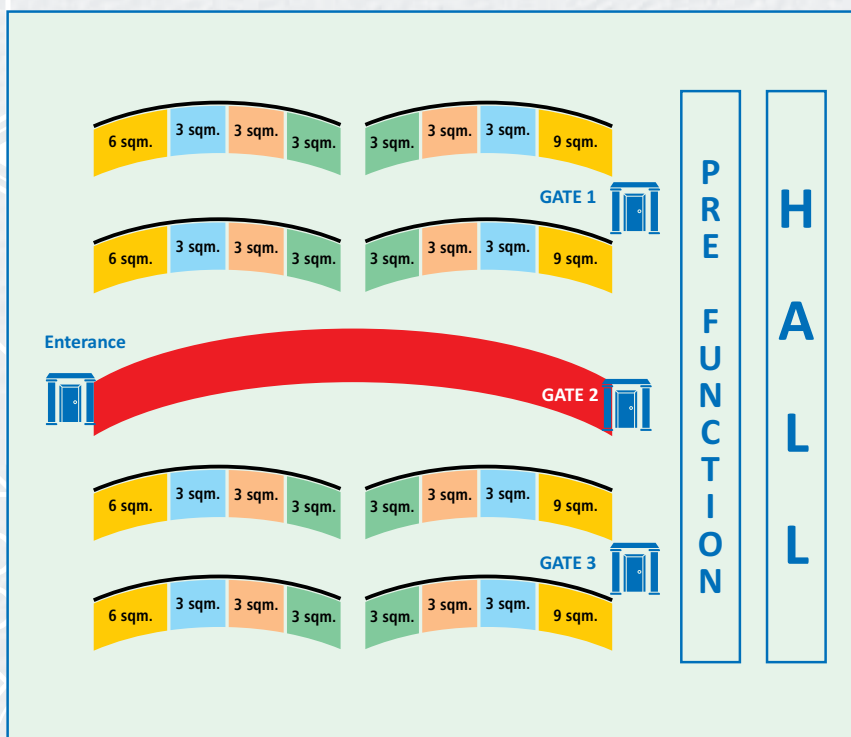
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Speech, Language Disorder Detection and Altered Auditory Feedback: A Practitioner Approach

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Introduction

Human beings can easily understand, transfer and express their ideas, feelings and thoughts via verbal or non-verbal communication. Speech is one of the developed and effective biological tool for interpersonal verbal communication in the social contact to convey the message. For effective interpersonal and social communication, it's essential that speaker(sender) and listener(receiver) will recognized it. Speech is being made up of articulation, voice and fluency pattern. Production of fluent speech is requiring combination of cognitive, linguistic, motor processes, emotional state and intension. Sometime speech is not in fluent manner; it is interrupted by etiological speech disorder. These disorders will directly or indirectly have an effect on the overall working of Automatic Speech Recognition (ASR) System. Study and analysis of these speech disorders has acquired considerable attention in various fields including healthcare, military, biomedical speech application, security and machine learning scenarios. The categorization of speech disorders includes numerous varieties of interference. Accurate recognition, identification of these holds a vital significance for the selection of medical care methods. Fig 1 shows the types of disorder. This article is focus on important issues in biomedical applications of speech technology.

Language Disorder:

Language Disorder is consisting Cluttering disorder. It is also known

as *tachyphemia* or *tachyphrasia*. Cluttering is fluency disorder in which rate of speech is perceived abnormally, irregular and rapid or syllable rate is not exceeding normal limits.

Speech Disorder:

Speech disorder is categorised into three sub folds:

- 1. Apraxia:** It is learnt as an oral motor speech disorder which affect the speech production system. Due to serious deficiency of development of oral-motor coordination, patient has problem to frame speech sound into words and affects muscle movement patterns. The individual knows what they want to convey, but there is a disruption in the part of the brain that sends the signal to the muscles for the specific movement.

- 2. Articulation:** It can be considered as Speech Sound Disorder, it's also known as *artic* disorder. Pronouncing of speech sound is below its mental age and it's difficult for others to understand, the cause of these impairments in the phonological representation of speech sounds and speech segments. In which the child produces set patterns of sound errors they might replace some sounds in words with another words
- 3. Stuttering:** Stuttering also identified as *stammering* in United Kingdom (UK). It carries three inter and intra heterogeneous individual kinds of symptoms i.e. *linguistic* (disturb and fluctuate standard rhythms and speech

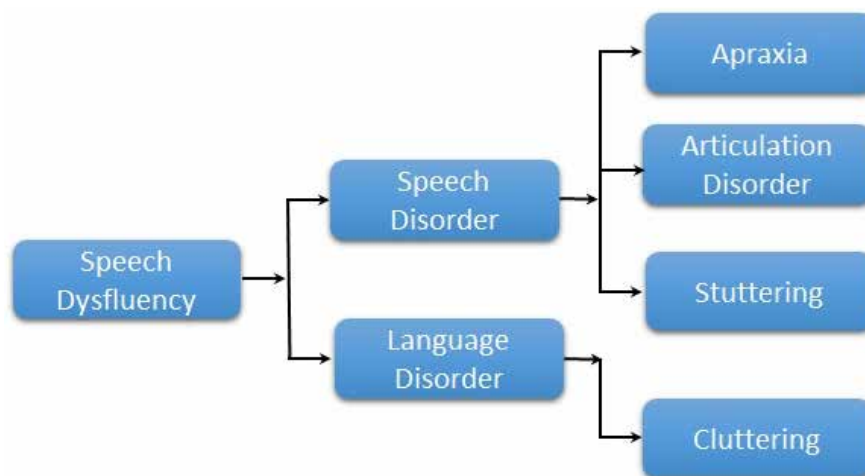


Fig 1. Types of Speech Dysfluency

flow) *psychological* (fear to speak in surrounding, deficiency of interest, reluctance in speaking, also identified as *logophobia*) *neurophysiological* (lack of coordination in various articulation, respirator and phonetic muscles). Cluttering and Stuttering shows polar symptoms.

4. World Health Organization (WHO) identify that Stuttering is very serious communication disorder under the international code F98.5, and comes up with a firm universal definition as a speech carries *frequent repetition or prolongation of sounds or syllables or words, or by frequent hesitations or pauses that disrupt the rhythmic flow of speech*. According to the worldwide situation it happens in around 1% of the whole populace and has discovered that it influences 1:3 or 4 times in female to male proportion. It is obvious from the past and simultaneous writing review that, stammering can be assessed a hereditary spotted since 1930s. According to previous study it is found that there are following types of stuttering.

Developmental Stuttering:

Developmental Stuttering is extremely normal in children, they can't get summon on verbal ability as their discourse and dialect forms are immature stage, their speech and language processes are under development phase.

Neurogenic Stuttering

Individuals dealing with fluency disorders tend to have a voice that sounds fragmented or halting, with frequent interruptions and effort or struggle is seen while producing words. In most of the cases, neurogenic stuttering occurs due to some sort of injury or disease to the central nervous system i.e. the brain and spinal cord,

including cortex, sub cortex, cerebellar, and also the neural pathway regions.

Psychogenic Stuttering

Psychogenic stuttering is straightforwardly associated with patients' psychological pressure and talking practices.

All these types of stuttering engage several different dysfluencies including interjection, revision, repetition, prolongations, and blocks. Traditionally, Speech Language Pathologists (SLP) are utilized to tally the dysfluencies, to estimate seriousness and arrange the scene of stammering physically, to keep the track of enhancement in treatment. Accordingly, it may be better if stuttering assessment should be possible naturally and get more time for the treatment session. One of the important parts of dysfluency identification in speech technology is to mount up the Automatic Speech Recognition (ASR) System framework to decrease the recognition error. In recent decades attributable to forefront present-day electronic sight and sound framework can be valuable to numerous scientists to created target techniques, methodology and standards for disfluencies acknowledgment, distinguish qualities discourse parameters and voice blend and furthermore create distinctive faltering gadgets in view of Altered Auditory Feedback to be specific are: Delayed Auditory Feedback (DAF), Frequency Shifted Auditory Feedback (FAF), and Masked Auditory Feedback (MFA) and furthermore Digital Speech Aid (DSA) are broadly used to rehabilitation the stammering and to encourage the SLP treatment.

The frequently utilized methods of encouraging speech fluency are Fluency Shaping and Stuttering Modification.

Fluency Shaping: Fluency shaping spotlights speech motor control of speaker capacities and works on

different ways to facilitate new speech production patterns. A disadvantage of this technique is that it doesn't fuse to person's emotions and responses to the disorder.

Stuttering Modification: Objective of stuttering modification is to decrease speech related evasion practices, negative dispositions, and distress. This has to be skilfully done by decreasing battle practices, pressure, and the rate of stuttering. The World Health Organization (WHO) might in this manner not consider the treatment viable in light of the fact that it doesn't decrease the impedance level.

In this article, we put on some light on the speech-related disorder to encourage the researchers to develop robust speech recognition, identification and modification system for these speech disfluency people.

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Congratulation



Professor (Dr.) Manoranjan Kumar Singh, (Life Member No. 11501831), Computer Society of India and Head of the Department of Mathematics, Magadh University, Bodhgaya has been awarded the prestigious “**OUTSTANDING FACULTY Award**” for the year 2018. This award recognizes futuristic, and outstanding best practices in the field of education held at International Conference on Interdisciplinary Research Technology and Innovation at Baan Sukhawadee, Pattaya, Thailand from Dr. Pariyaporn Itsaranunwat, Mahasarakham University, Thailand, the Convener of ICIRTI-2018, during 07-09 April 2018. At this conference, he chaired a technical session, delivered an invited talk and also presented a research paper.

Dr. M.K.Singh also got a **DISTINGUISHED PROFESSOR AWARD AIRFA 2017** for the year 2017 at Madras.

Application of Hybrid Clustering Techniques: Subtractive Clustering and Artificial Neural Network Approach

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Integration Fuzzy Inference system with backpropagation technique, results in a very useful integrated system called ANFIS. Mamdani and Sugeno fuzzy model are example of fuzzy inference system which can be implemented. Technically Sugeno fuzzy model is more compact and computationally least expensive than a Mamdani Fuzzy Inference model. These qualities makes Sugeno model an ideal model to be used in adaptive techniques for constructing the fuzzy inference models. Fig. 1 shows the Architecture of Subtractive Clustering Neuro Fuzzy Inference System (SC-ANFIS).

Learning Process: Learning process an approximation of fuzzy model is launched by the system which improvises itself through an "iterative adaptive learning process". ANFIS utilizes a hybrid technique combining mean least squares optimization and Gradient Descent Backpropagation which takes initial fuzzy model as input to improvise further. At every cycle (epoch) the error measure is reduced. It can be defined as "the sum of the squared difference between actual and desired output". The stopping criteria for training, either the predefined cycle number (epoch) or error rate is reached. The hybrid learning process for "ANFIS" involves two passes. Consequent parameters are identifying by applying Least Square Estimation technique when functional signals go forward, in the "forward pass of the hybrid learning algorithm". Gradient descent updates the premise parameters when error rate propagate backward in the backward pass of hybrid learning algorithm. Linear combination of consequent parameters can be expressed as the overall output (f), when the values of the

premise parameters are learned:

$$f = \frac{w_1}{w_1+w_2}f_1 + \frac{w_2}{w_1+w_2}f_2 = w_1f_1 + w_2f_2$$

$$= (w_1X_1)m_1 + (w_1X_2)n_1 + (w_1)q_1 + (w_2X_2)m_2 + (w_2X_2)n_2 + (w_2)q_2.$$

It is linear in the consequent parameters m_1, n_1, q_1, m_2, n_2 and q_2 .

Learning rules used in hybrid learning process for ANFIS is quite similar to the backpropagation learning used in "feed forward neural networks". The overall output can be expressed as linear combination of consequent parameters provided the values of the premise parameters. A feasible set of

antecedent and consequent parameters can be obtained by employing a hybrid rule which combines the least-squares and the gradient descent. The Artificial Neural Networks (ANN) employs the basic technique of error minimization by training the initial SC-ANFIS which acquires the difference between the target (desired output) and the FIS output between the data set (details) which has been given to the ANN to acquire the final SC-ANFIS. The final SC-ANFIS recognized the effectiveness of "SC-ANFIS Expert System model"

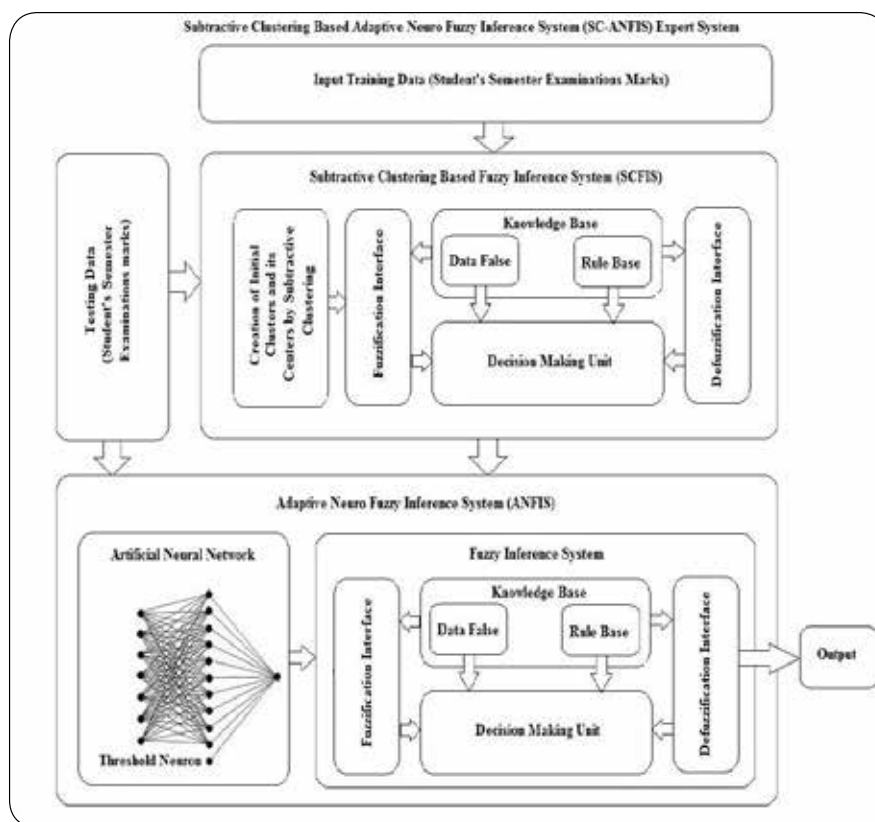


Fig. 1 : Architecture of Hybrid SC-ANFIS Method

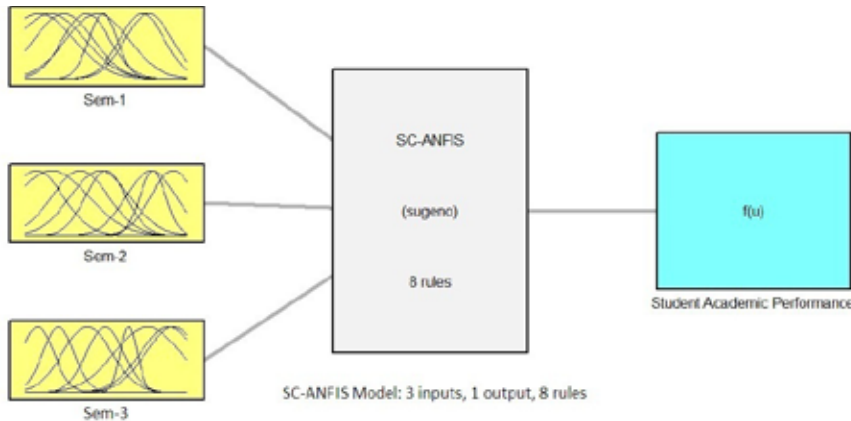


Fig. 2 : Subtractive Clustering Based Neuro Fuzzy Inference System

of “student academic performance evaluation” by testing signals as input of the final “SC-ANFIS”.

Hybrid SC-ANFIS Method

Training data set consist of 2000 data point out of total 2050 selected randomly in SC-ANFIS method for the purpose of parameter adjustment. The Fuzzy inference system some time need arises to cross validate the input data using test data set because of lots of noise in data measurement streams (garbage data). Fuzzy inference system can be generalized using test data set. Post training of academic performance methodology the remaining fifty set can be utilize for the verification of predicted performance level. The diagrammatic structure SC-FIS used in present study in visualized in Fig. 2.

In this model marks in semester-1, semester-2 and semester-3 have been used as input and the maximum values of the classification of marks have been considered as outputs. Input variable used by membership function distribution provides Gaussian shapes to output (Fuzzification). TSK fuzzy inference system (first order) has been utilized in the present study. Three inputs (semester-1, semester-2 and semester-3) distribute into eight fuzzy sets and correspondingly eight fuzzy rules in TSK fuzzy inference system (first order). Twenty episode of learning using fifty sets experimental data set is conducted during training SC-ANFIS. ANFIS learning numbers for predicting academic performance are as follows: (a) Numbers of nodes = 70 (b) Number of linear parameters = 32 (c) Number

of non-linear parameters = 48 (d) Total number of parameters = 80 (e) Number of training data pairs = 2000 (f) Number of checking data pairs = 50 (g) number of fuzzy rules = 8.

With the help of Sugeno fuzzy inference system (first order) a SC-ANFIS have been used to evaluate the student academic performance in semester examinations. SC-ANFIS can optimize its performance in Gaussian membership function of fuzzy system utilizing learning algorithm (hybrid or back-propagation) (Fig. 3, 4 and 5).

RMSE of SC-ANFIS can be determined by comparing and contrasting the student academic

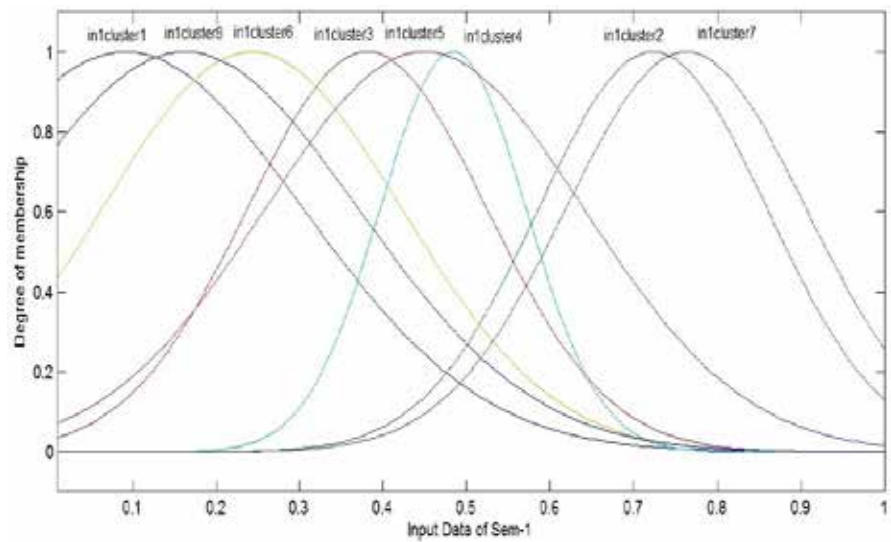


Fig. 3: Membership Function of Semester-1 Marks

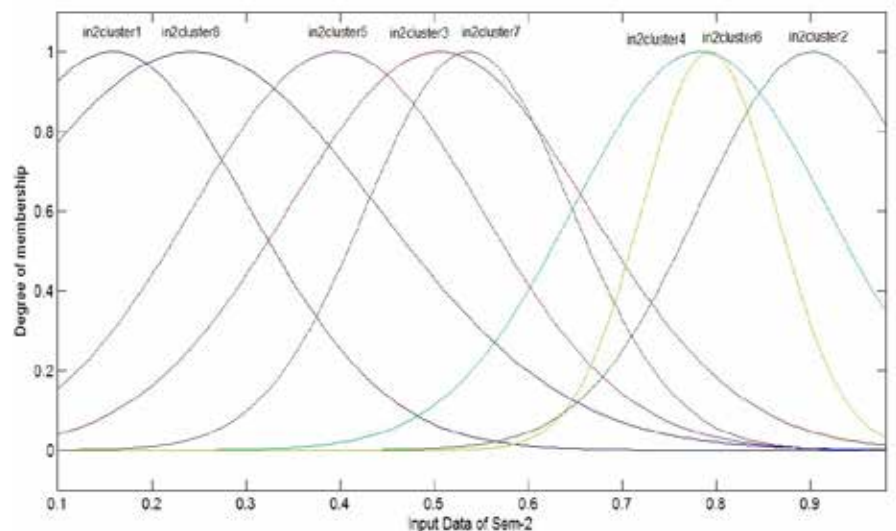


Fig. 4: Membership Function of Semester-2 Marks

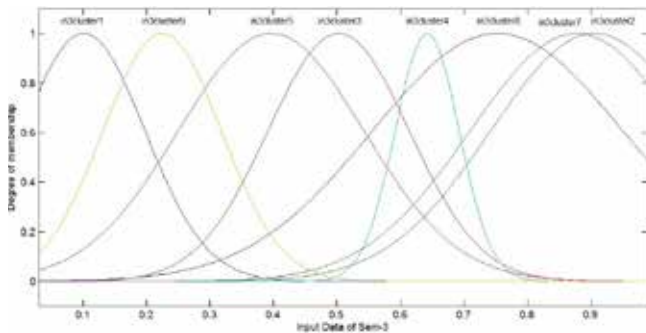


Fig. 5: Membership Function of Semester-3 Marks

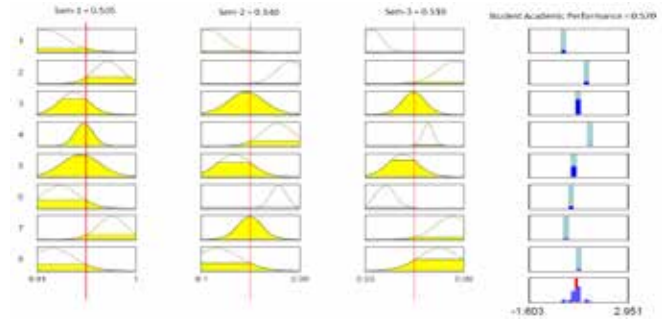


Fig. 6: Rule Viewer for SC-ANFIS Method

performance value obtained by SC-ANFIS technique. RMSE of student academic performance values used by SC-ANFIS is 0.0203 for training and 0.0874 for testing data. The comparison indicates that combination of Subtractive clustering and ANFIS achieved greater satisfaction than SC-FIS method. The SC-ANFIS showed slightly higher accuracy. The RMSE of testing and checking data sets of SC-ANFIS showed that the RMSE of

training and testing data sets have been reduced. Thus, SC-ANFIS is better compared to other classical techniques model for academic performance evaluation.

The rule viewer of SC-ANFIS has been shown in Fig. 7.

The output and testing data for SC-ANFIS model have been shown in Fig. 7 shows. Fuzzy Inference system (constructed by SC-ANFIS utilizing a given input/output data set) membership

function parameters can be tuned using either by Back-propagation algorithm alone or in combination with least squares technique (LSE). Rules generated utilizing clustering method are more customized to the input data stream as compare to rules generated using fuzzy inference system (FIS). Application of the above methods narrows the problem of bidirectional propagation of rules with n-dimension ($n > 500$).

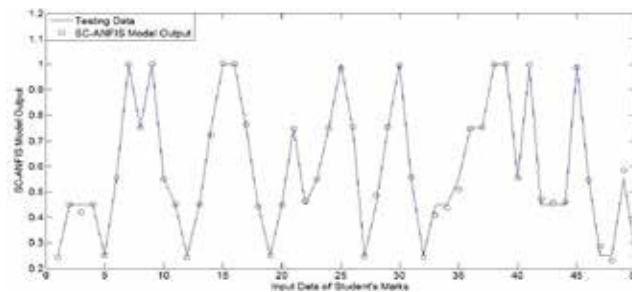


Fig. 7 : Model Output and Testing Data for SC-ANFIS

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Research Challenges and Need of Question Answering system in present era

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1. Question Answering System

Question Answering systems are in big demand due to its need in this era in variety of interdisciplinary application, let be from search engine, FQA, online examination to mining. The simplicity in Question Answering is the toughest to resolve automatically. If we observe what is required in Question Answering system, it's asking a question/query and expecting an correct, relevant and easy to understand response. From the above description it becomes clear that any Question Answering system encompasses of basic three components: Question, answer and the knowledge base [to understand the question and provide the response]. The next section provides the detail processing and issues encountered during the design and implementation of QA systems.

2. Question:

Question can be generally defined as a sentence worded in a sense to express the need for information, relevant context, to argue, to discuss, to know more, to make things understand, remove conflicts/confusion, [interview/exam] to examine ones knowledge, to resolve. Question thus is a very vital information to represent, what is required to get a measurable understanding for producing an response. The major challenges about question relies in:

- How to frame a question?
- What is expected form of a question in a given context?
- In automated QA systems this three natural occurring information turns more complex like it is expected the question should be somewhat similar to a question generated naturally nor like any SQL query. The major concerns for question generation or question understanding are

a) Question generation

- In which natural language the question is to be generated (English, Marathi etc.). As every language has its own way of asking question, even the simplest factoid based question to be asked vary due to linguistic aspects. To understand this we will consider factoid question to be generated in English and Marathi. In English factoid question can be classified in six types according to blooms taxonomy: what, who, where, how[many/much], when and why. The same level of factoid questioning process applied to Marathi leads to basic 46 types of classes as shown in table below.
- Is the question to be auto-generated based on given text or manually the questions to be feed directly to the system?

- The question to be generated is on a structured or unstructured text.
- Whether the question generated is purely wh-type(factoid based) or in an assertive manner(non-factoid based), example :
Factoid based (Wh-type): who doesn't wish to be happy?
Non-factoid based (Assertive manner) Is there anyone who doesn't wish to be happy?
- Is there any restriction in an application on length of the questions?

b) Question processing/ understanding:

Question generated can be classified in following manner to understand the information need present in the question for understanding and producing responses:

- Descriptive type question: Required

कशाला	कुदून	कती	कशी
कशा	कसा	कसे	का
काय	कोण	कधी	कॅव्हा
कुठे	कोठे	कोणाला	कोणी
कशाने	कशामुळे	कोणाकडे	कोणाचे
कोणाचा	कोणाच	कोणाच्या	कशाच
कशाचं	कशाच्या	कशाचे	कोणता
कोणती	कोणते	कती	कोणते
कोणत्या	कोणाबाबत	कशाबाबत	कोणाबरोबर
कतिव्या	कोणाची	कशाची	कशाजवळ
कोणासारखी	कोणासारखे	कोणकोणत्या	कोणामुळे
कशासारखी	कशात	कधीपासून	

Table : Showing Marathi based factoid Questions

to find definition or explanation of the asked term.

- Fuzzy question: does not properly convey what is required exactly from the question.
- Relation based: Normally encashes the relative information like family relationship, occupation etc. Tries to covers aspects related to NER, co-reference resolution, relationship extraction etc.
- Dialog questions
- List type
- Hypothetical questions
- Causal questions: Mainly needing explanations like how, why.
- Confirmative question

The whole objective of processing is identifying the focus present in question, as it is that important piece of information which drives the process to the ultimate aim of finding correct, accurate, understandable, simple response.

3. Knowledge base:

In Question answering based system we presume that knowledge base is acting as a ground for providing relevant information as well as an inference engine to extract answer/generate answer. It can be a closed or open system. Closed means it is domain specific and offline. Open means it may or may not be domain specific but its online [web based].

4. Answer:

Answer is that piece of relative information extracted/generated in the form of response to the identified focus unit of a given question. Responses generally depend on the type and need presented in a question.

- Confirmative answer: Here the answers are expected to be yes/no. It seems simple to human to answer it, but machine response in confirmative requires various NLP activity, basically understand the text, extract relevant information for the given question, process the semantics/get the meaning out of it, then summarize and finally take a decision to say Yes/No. In brief we require to do natural language understanding, semantic analysis, summarization and decision

making to reach to a response.

- If we consider Wh-type question: The 'How' and 'Why' are most difficult one to as 'How' can be a hypothetical question, thus may have many answers and each one is correct. Similar case is with 'Why'. Not only this it's more difficult to generate response for both.
- Paraphrasing is one more challenge as the same question may be asked in number of ways but expects same answer, while a single question may have different answer too, plus the expressive vocabulary may generate different responses with correct meaning, making difficult to choose the perfect response from many generated response. This leads to another component to answer module i.e. development of ranking system to decide the best matched response.

This paper presented basic challenges encountered during development of question answering system. There are many more challenges according to the application and performance of system. It is not the focus of this paper still these challenges are explain in brief with the help of two examples. If we consider :

- In an online subjective(Descriptive) examination system, evaluation and provide marks to the specific answer is another difficult task.
- Generally considered performance measures like accuracy, recall, F-measure are not sufficient for evaluating the QA system to understand this first we consider simple words with same synonym like "difficult" and "complicated" which are used as a response to show how hard it is solve some problem, can the degree of complexity be able to judge by such words for a response. Secondly can users be satisfied by the response achieved as every individual has different level of understanding, as in real time same explanation if needed to be provided to two different persons. Many times humans present the same information to both but in

different style of presentation, vocabulary used and explanation if provided to those person , which humans are good to do due to earlier experiences, but such personalized response generation is one more challenging aspect in QA systems.

This article was intended to provide an overview of QA systems still covering the major insights of QA systems to showcase the buzzing need of question answering in numerous domain and application in the present globalized communicative world.

5. Conclusion:

Question answering systems are the most important research area in NLP. The need of Question answering system can be seen in academics to corporate. The main three components of QA are Question module, knowledge base and answer module. The application and module wise research challenges have been discussed in detail. Automated QA system are leading steps for better linguistic understanding for mimic the most simplest form of conversation humans have.

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The Agents Role in Negotiation in E-Commerce

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Negotiation is one of the well-known methods for collaboration between a buyer and a seller to reach at the settlement stage where both buyer and seller are at profitable state of business. Many number of standard as well as modern intelligent computing methods such as knowledge based systems (KBS), case based reasoning (CBR), artificial neural nets (ANN) and genetic algorithm (GA) have been arranged to implement the various stages in a negotiation process. In multi agent system (MAS) buyer and seller have been represented as agents and broker represented as a coordinator agent. The negotiation process have implemented by only limited numbers of researchers. They have focused to the cognitive parameter such as preference, desire, intention, commitment, capability, trust etc. as cognitive parameters for the negotiation of buyer and seller agents. In the literature several different methodologies for the negotiation based selection of buyer agent have been reported. These methodologies are differ in procedures, technologies and methods.

Keywords: Multi agent, cognitive, buyer, seller.

1. Introduction:

1.1 Negotiation:

Negotiation is one of the well-known processes for collaboration between a buyer and a seller to reach at the agreement stage where both of them are at profitable state of business. Many number of standard as well as modern intelligent computing methods such as knowledge based systems (KBS), case based reasoning (CBR), artificial neural nets (ANN) and genetic algorithm (GA) have been arranged to implement the various stages in a negotiation process [1, 2]. In multi agent system (MAS) buyer and seller have been represented as agents and broker represented as a coordinator agent. The buyer agent restrictions are associated with price, quality, quantity, brand, payment mode etc. The seller agent restrictions are associated with the price and quality [Jennings 2003]. The negotiation process have implemented by only limited numbers of researchers. They have focused to the cognitive parameter such as preference, desire, intention, commitment, capability, trust

etc. as cognitive parameters for the negotiation of buyer and seller agents. In the literature several different methodologies for the negotiation based selection of buyer agent have been reported. These methodologies differ in procedures, technologies and methods. The model will try to describe in this work basically provides collaboration between buyer agents and seller agents by the broker agent and customer orientation based choice of potential buyer agent for appreciated seller agent for negotiation in e-commerce. We will define the application of cognitive parameters based agent choice for negotiation in the purchase domain in a cooperative system. In this area the buyer agent has a set of requirements and set of seller agent fulfill the buyer agent's requirements through supportive negotiation mechanism. We will further describe customer orientation based Multi-agent system in negotiation process.

2. Agents Types:

Agents are persons who signify the interests of the major decision makers. The interests of the major decision making are represented by the Agents. These persons (Agents) act on the principal's behalf with unpredictable degrees of ability. They are employed in negotiations exactly because of their skill, dedicated knowledge, and understanding.

2.1 Independent Agents:

Independent agents are rewarded for their services. These types of independent agents receive their profits through commissions. The agent how much sells, then according to their sell they receive in their commission [5]. This is not an easy task for an independent agent to expand the sale for increase their commission. These types of agents are also want to enhancement of their status in e-Commerce markets. These types of the independents aims are, not only attract more and more clients but

they want to find the best and valuable clients for e-commerce [1,3]. The real estate agents are best examples of the independents agents.

2.2 Non Independent Agents:

These types of agents are performing their jobs for particular Organization. The union leader is the best example of the non-independent agents, who works on behalf of the union. These types of non-independent agents are well known that who are they and why they are hired by the decision makers to best signify their interests. On another hands these types of the non-independent have their self-centred interest for self. Therefore The aim of the non-independent agents conflict through this opposing interest, who are involve in their services. The other side of the coin reveals that agents may have other self-centred interests of their own. These contrary interests might be in conflict with the aims of the people who involve their services.

2.3 Intelligent Agents:

The aim of the intelligent agents is to reach one to many negotiation through various coordinated concurrent one-to-one negotiations. The prior version of the intelligent agents focused one to one multi-attributes negotiations [5,6]. In this existing model, various numbers of agents, who are working for the same party and negotiate independently with the other party. A straight negotiation conducted by every intelligent agent with a forthcoming seller or buyer and these intelligent agents are informed to their co-ordinating agents after every single negotiating cycle. Further, these co-ordinating agents assess and confirm that how well individual agent conforms and completes the negotiation as per generated new orders and their performance executed. A restriction based techniques are used to make logically the best by an individual agent while assessing and evaluating all existing offers. Here intelligent agents independently negotiate with multi-attributable terms dealings with e-commerce that likely to be tested through electronic trading with the

particular software as required.

2.4 Interface Agents:

An interface agent as a program may affect the object with direct operational boundary without specific instruction of users [6]. Here an interface agent reads required necessary inputs that user put within the boundary. It may make some deviational change the concerned entity that consumer finds on the screen, but necessarily not one to one with user action. In fact these agents observe multi-user inputs very courteously, during a long period time, prior to deciding to take a action. A single user input may begin and provide a series of action on the particular agent over the stretched duration. Interface agent may possibly be speculate as a "robot" whose sensor and result interfaced. For that reasons it also considered as "softbots". As interface agents are treated as part of intelligent tutoring system and contexts sensitive supports these type of systems. Such system, the user supervise that interface with overall disdain for agents, and when agents are called, these agents may offer denotation, or abide direct- operating actions on the object in presented interface through useful inputs congestive from the users. Other type of interface agent may review the consumer behaviour, or supplement the consumer direct operational action with extraneous knowledge which would be useful.

2.5 Autonomous Agents:

Autonomous agents are also a program that serve with user in the parallel. According to autonomy agents are conceptual and always running. An agent may explore a stste that might spadity the user and freely settle to intimate him [8]. The agent may active based on the prior input after the consumer has appered other order or has turned the computer off. An auxiliary may not be much usual helps if he and/ or she much very clear instruction all time and stagnant observation while carry out actions. Auxilliary can be time saver when they are allow to act freely and also parallel. Allow to interface

agent to runs off line and also in parallel with the consumer direct regards to other commotion enable to the user truly representative task to agent.

3. Conclusion:

There are many views for the discourse based choice of purchaser agent has been indirect in literature. This type of views different in process, technology and prescript.

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Dr. Subhash Chandra Yadav, having 20 years of teaching and IT industry experience. He is a young and dynamic academician in the field of Computer Science and Technology. Apart from carrying academic responsibility he has contributed to CSI a founder chairman (Varanasi Chapter) and Sectional president of ICT / Computer Science in ISCA.

Kind Attention: Prospective Contributors of CSI Communications

Please note that Cover Theme for **October 2018 issue is Business Intelligence**. Articles may be submitted in the categories such as: Cover Story, Research Front, Technical Trends, Security Corner and Article. Please send your contributions by 20th September, 2018.

The articles should be authored in as original text. Plagiarism is strictly prohibited.

Please note that CSI Communications is a magazine for members at large and not a research journal for publishing full-fledged research papers. Therefore, we expect articles written at the level of general audience of varied member categories. Equations and mathematical expressions within articles are not recommended and, if absolutely necessary, should be minimum. Include a brief biography of four to six lines, indicating CSI Membership no., for each author with high resolution author photograph.

Please send your article in MS-Word format to Chief Editor, **Dr. S. S. Agrawal** in the email ids **csic@csi-india.org** (Issued on the behalf of Editorial Board CSI Communications)

Dr. S. S. Agrawal
Chief Editor

Hyperspectral remote sensing: Emerging technology for Agricultural Application

► **Pooja Vinod Janse**
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► **Ratnadeep R. Deshmukh**
Dept. of CS & IT, Dr. B. A. M. University, Aurangabad

1. Hyperspectral Remote Sensing

Hyperspectral remote sensing have been widely used now a days in many application areas. Hyperspectral sensors provides us many narrow and continuous bands of information with significant improvement over broadband. Application areas of remote sensing are shown in following figure.

2. Agriculture in India:

Agriculture in India is considered as primary sector. More than 50% of total population from India is depend on agriculture for their survival. But agriculture sector contributes very less in Gross Domestic Product (GDP) of India as compared to industrial and service sector. Following figure shows different sectors of economy.

As we see in above figure, 53% of population depends on agriculture but comparatively it contributes only 17-18% in GDP. Why it is so? The answer for this question is there are many problems which we are facing in agriculture sectors.

2.1 Problems in Agriculture Sectors:

- Fragmented and small land holding by individuals
- Intensively cultivated and densely populated states like Kerala, UP and Bihar are facing the problem of fragmented and small holding of land. Irrigation becomes difficult on such small and fragmented fields. Further, for providing boundaries lots of fertile land is wasted. Under such situations, the farmer cannot focus on enhancement.
- Quality of seeds which are distributed

The basic input for increasing crop yield is good quality of seed distributed. Estimation of guaranteed quality seed is as serious as the production of such seeds. Unfortunately, good quality seeds are not available to the majority of farmers.



Fig. 1 : Application areas of Hyperspectral Remote Sensing

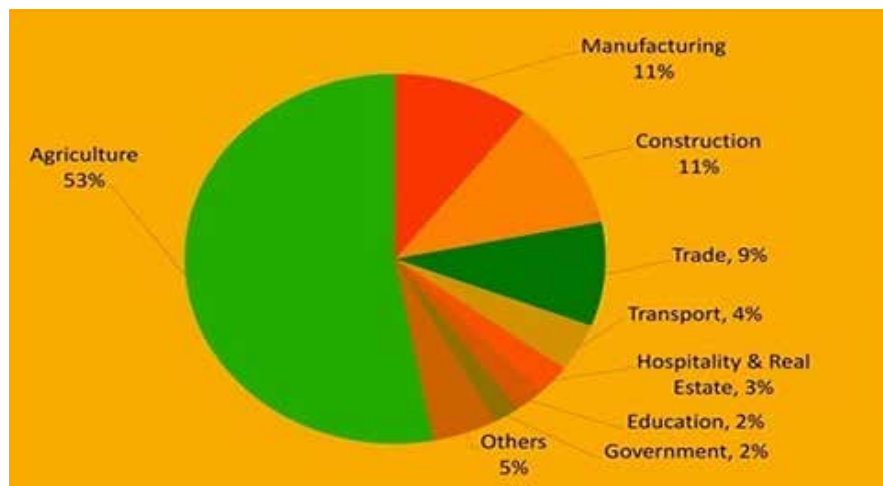


Fig. 2 : Different sectors in Indian Economy

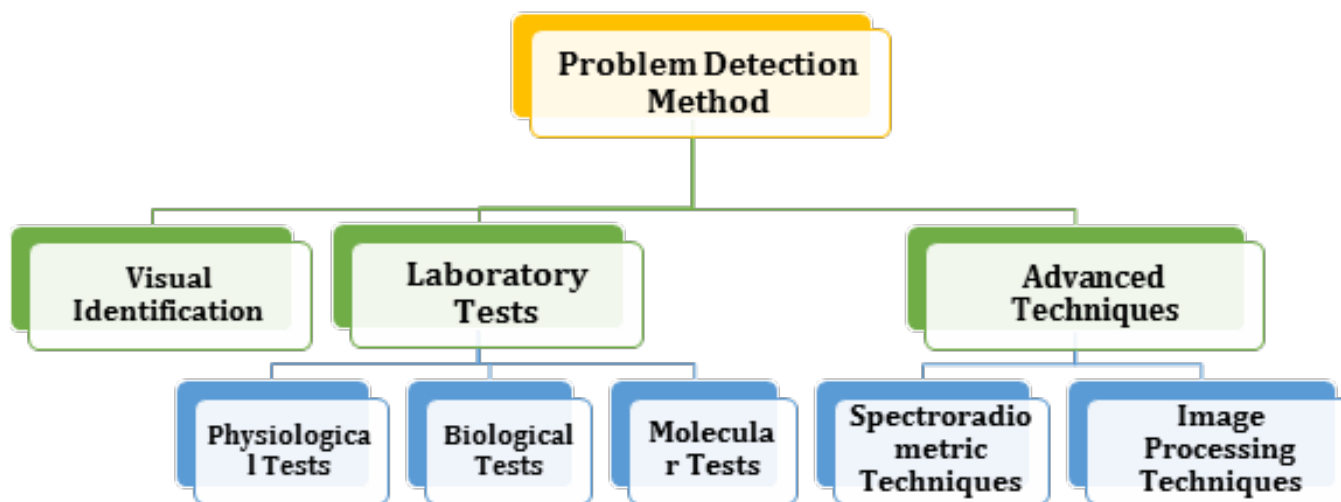


Fig. 3 : Methods of Problem Detection in Agriculture

Composts, Biocides and fertilizers plays very important role in increasing productivity. But many farmers will not use fertilizers and composts in proper proportion according to soil properties. They are taking continuous production in soil without caring about replenishing of soil condition.

- Proper irrigation
- Lack of mechanization
- Soil
- Marketing of agricultural product
- Insufficient storage facility
- Transport

2.2 Risk to Agriculture:

- Agriculture struggles to support the rapidly growing global population.
- About 30-35% of the annual crop yield in India gets wasted because of disease (Ref. Indian Council of Agricultural Research)
- Diseases emerged as a major threat to crops in the country and they caused loss of 60 million tonnes of crops annually

2.3 Which technology can contribute to problems of Agriculture?

There are many problem detection techniques. Some are traditional and some are advance. Visual identification and lab test are widely used for detecting problem but these methods have

some disadvantages. These traditional methods requires large manpower for wide area, also these methods are time consuming and costly in terms of labor cost, destructive in nature etc. Even we cannot state severity of affected disease by visual interpretation. So to overcome these problems of traditional methods researchers are using some advanced techniques for agriculture. One of the important technology is spectroradiometric technique. Estimation of biochemical properties of plant indicates us plant productivity, nutrients available and different types of stress.

3. Advantages Hyperspectral Remote Sensing for Agriculture

Hyperspectral remote sensing has been increasingly used in different applications for agriculture. Some of the applications are listed below.

- Estimation of chlorophyll and nitrogen content will specifies plant productivity of plant and available nutrients.
- We can do early detection of plant diseases and insect incursion so that we can reduce the economic damage due to this threat.
- Yield estimation of crop is one of the significant issue in agriculture. Effective crop monitoring system and land management system,

implementing precision farming techniques are possible with Hyperspectral remote sensing.

- Determining soil properties such as soil nutrient content, concentration of Nitrogen, other soil properties, water stress and present insect pests which affects directly on crop can be possible.
- Classification of agricultural crops

4. Conclusion

Hyperspectral remote sensing have shown number of application related with agriculture. This techniques have number of advantages over existed traditional methods in terms of cost and time. Early detection of problem faced in agriculture will definitely increase the production of crop which will be sufficient for growing population of India and contributes more in GDP.

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 an individual.

 2 are friends.

 3 is company.

 more than 3 makes a society. The arrangement of these elements makes the letter 'C' connoting 'Computer Society of India'.

 the space inside the letter 'C' connotes an arrow - the feeding-in of information or receiving information from a computer.



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CHENNAI CHAPTER



Chennai Chapter Organized a Workshop on 23rd June 2018 on the topic Change Management by Mr. Venkatarangan Thirumalai, Founder & Former CEO of Vishwak Solutions, India, UK & USA and Mr G Sankaranarayanan, Consultant on Organizational Growth, and Creator, C6 Change Management Ideation Framework.



The Chapter hosted a Special Session on 29th June 2018 on the topic Technology Innovation [Covering Innovation, Design Thinking, Disruptive Technologies, Internet of Things (IoT), Patents, Licensing and Intellectual Property] by Mr. Haja Mohideen, President and CEO, Rocheston LLC, New York.



Ms. L Priya and Ms. Priya Vijay from CSI Chennai Chapter have been invited as a resource person for handling a session on Introduction to IoT and IoT Projects development on 28th & 29th June 2018 in the FDP on Internet of Things organized by CSI Student Branch of NBKR Institute of Science and Technology, Vidhyanagar, Nellore, Andhra Pradesh.

COIMBATORE CHAPTER

Coimbatore Chapter organized free orientation programme

for students/parents on “Anna University Engineering Counselling Guidelines”. It is the 14th consecutive year of this programme and it is held on 1st July 2018 at PSG College of Technology, Coimbatore. Dr N.R. Alamelu, Vice Chairman welcomed the gathering and stated that over one lakh students have applied this year through the online portal for admission into engineering courses in the State. Dr. V. Rhymend Uthariaraj, Secretary, Tamil Nadu Engineering Admissions, Anna University, Chennai explained briefly about online Counselling process with PowerPoint Presentation. Dr. R. Rudramoorthy, Principal, PSG College of Technology, spoke about the current scenario in college admissions. The expert academicians of various departments Dr. K. Natarajan, Professor of Mechanical Engg & Dean Student Affairs, PSG College Of Technology, Dr. V. Ramamurthy, Professor, BioTechnology, PSG College Of Technology, Dr. T. Purusothaman, Professor, Dept. of Information Technology, Government College of Technology, Dr. G. Sankarasubramanian, Professor and Head, Dept of Civil Engg, PSG College Of Technology, Dr. M. Sundaram, Dept. of Robotics & Automation Engg, PSG College of Technology also addressed the gathering with useful guidance. Mr. V. Sivaramasamy, Secretary, thanked all the members. An interactive session with Q & A was also held. The session ended with National Anthem.



KOLKATA CHAPTER



A special lecture meeting on Prof Prasanta Chandra Mahalanobis (PCM) on completion of 125th Birth Anniversary Year is being celebrated all over the country and abroad in the year 2018. PCM, though studied and taught Physics at the College level, he is best remembered as a renowned Statistician, and for being members of the First Planning Commission of India. He founded the Indian Statistical institute (ISI) in early thirties of the last century and contributed to the development of large scale sample

▶ FROM CHAPTERS & DIVISIONS ▶▶▶

surveys in India. The ISI was the first institution in India to have acquired and installed an electronic computer in the mid-fifties of the last century. The installation and later its widespread application resulted in the development of modern computers and facilitated developmental projects. PCM's pioneering role in computing and more so, in the design and development of modern computers in India is less known and less talked about compared to his works in other disciplines. This talk has been organized by Computer Society of India, Kolkata Chapter on 11th August 2018 to show and cites some glimpses of early days of computing at ISI and some chronological and continuing efforts of PCM and his coworkers in this direction

KANCHEEPURAM CHAPTER

Kanchipuram chapter in association with Kani Tamil Peravai of Valliammai Engineering College, has organized a one day workshop on Webpage and Mobile Apps creation in Tamil on 28th June 2018. The workshop was inaugurated

by Dr. B. Vanathi, HOD-CSE. Mr. K. Shanmugam, AP-CSE delivered a welcome address. The Resource Person was Mr. S. Rajaraman, Technology Analyst, Infosys. The experts highlighted the importance and objectives of the workshop. Outcome of the workshop has provided special benefits for the faculties to create the own webpage and mobile app creation in Tamil. Ms. R. Thenmozhi, Coordinator gave special thanks to all the participants and resource persons. She also appreciated Mr. M. Nagarajan, Programmer-CSE for his support to the successful completion of this workshop.



Call for Paper for CSI Journal of Computing

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The articles must be written using APA style in two columns format. The article should be typed, double-spaced on standard-sized (8.5" x 11") with 1" margins on all sides using 12 pt. Times New Roman font and 8-12 pages in length. The standard international policy regarding similarity with existing articles will be followed prior to publication of articles. The paper is to be sent to **Prof. (Dr.) J. K. Mandal**, Editor-in-Chief, CSI Journal of Computing (csi.journal@csi-india.org).

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Aditya Engineering College, Surampalem



8-6-2018 & 9-6-2018 - FDP on Machine Learning Using Python



12-6-2018 - Guest Lecture on Funded Projects

REGION-V

Global Academy of Technology, Bangalore



12-7-2018 to 17-7-2018 - Faculty Development Program on Machine Learning

REGION-VI

Vishwakarma Institute of Information Technology, Pune



6-7-2018 - Workshop on Machine Learning

REGION-VII

National Engineering College, Kovilpatti



13-7-2018 - Release of CSI Student Branch Annual Report by Mr Jeyaram Perumalsamy, CTO, Linen & Luxury Inc, USA

Hindustan Institute of Technology and Science, Chennai



4-7-2018 to 6-7-2018 - Faculty Enrichment Program on Digital Transformation

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A V C College of Engineering, Mayiladuthurai



2-7-2018 to 6-7-2018 - Certificate Course on Advanced Concepts in JAVA



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25-6-2018 - Motivational Talk by Ms Vaishnavi Vignesh Raja

Rajalakshmi Engineering College, Chennai



19-6-2018 - WORKSHOP on Object Oriented Programming with Graphics

Priyadarshini Engineering College, Vaniyambadi



4-7-2018 - Workshop on Role of Big Data in Singapore Financial and Banking Sector

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7-7-2018 - Student Branch Inauguration and Guest Lecture on Building a successful career



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Contacts: The Convener, ICACCP-2019, Department of Computer Science and Engineering, Sikkim Manipal Institute of Technology, Majitar, East Sikkim, Sikkim, India, E-mail: icaccp.cse@smit.smu.edu.in, Web: <http://www.icaccpa.in/>, M: +91-9821928536. International Symposium on Computer Vision and Machine Intelligence in Medical Image Analysis (ISCMMA-2019) website: <http://symposium.icaccpa.in/>

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Second International Conference on Advanced Computational and Communication Paradigms (ICACCP'19) will be held at Sikkim Manipal Institute of Technology (SMIT) during 25-28 February 2019. Organized by the Department of Computer Science and Engineering, SMIT, the conference is technically collaborated with CSI, National Head Quarter, India and co-sponsored by IEEE Kolkata Section, India, IEEE Computational Intelligence Society, Kolkata Chapter and IEEE Communication Society, Kolkata Chapter. All accepted and presented papers will be submitted to IEEE Xplore (Digital Library) for publication in the proceedings (IEEE Conference Record# 45516). It will cover areas of research and development in advanced computation, communication and cyber security. The event will feature the following Tracks:

Topics of the Conference (not limited to):

General Tracks

- Advanced Computational Paradigms
- Networking and Data Communications
- Cyber Security and Data Forensics
- Signal Processing and Communication Engineering
- Computer Vision and Image Processing
- Computational Intelligence
- Adaptive Computation and Machine Learning
- Industrial Applications
- Electrical and Electronics Devices and Power Systems

Special Tracks

- Computational Neuroscience, Cognition, Bio-Medical Engineering and Biotechnology
- Human Computer Interaction, Mechatronics and Robotics
- Next Generation Computing and Communications
- Internet of Things (IoT) and Blockchain
- Big-Data Analytics and Social Networking
- Material Science and Nano Technology
- Graph, Geometric Algorithms and Applications
- Geophysical Remote Sensing and Geographical Information System
- Machine Learning Paradigms for Text Analysis and Bio-Signal Processing

Paper Submission Guidelines:

Papers to be within 06 pages. Double column IEEE format must be submitted through EDAS submission portal. Paper Submission Link: <https://edas.info/N25217>

Each Tracks has its own submission link.

Important Dates

Submission Deadline: **30th September 2018**

Acceptance Notification: **1st December 2018**

Early Bird Registration: **9th December 2018**

Regular Registration: **15th December 2018**

Copyright and Camera Ready

Submission: **15th December 2018**

Conference Date: 25-28 February 2019

Early Bird Registration Fees:

Rs. 800 (Academician)

\$200 (Foreign Delegates)

Rs. 6500 (Students*)

Rs. 9000 (Industry Delegates)

All IEEE, ACM and CSI Members will get concessions on Regular Registration fees (Except regular Students).

For more details about concession please visit http://www.icaccpa.in/registration_instructions

*All authors must be student to avail the benefit of student registration



INDIACom-2019

(IEEE Conference ID: 46181 | SCOPUS Indexed)



13th INDIACom; 2019 6th IEEE International Conference on

“Computing for Sustainable Global Development”

(13th – 15th March, 2019)

Organized by

Bharati Vidyapeeth's Institute of Computer Applications and Management (BVICAM), New Delhi

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Computer Society of India (CSI), Divisions – II, IV and Delhi Chapter, Institutions of Electronics and Telecommunications Engineers (IETE), Delhi Centre, Indian Society for Technical Education (ISTE), Delhi Section and Guru Gobind Singh Indraprastha University (GGSIPU), New Delhi

Paper Submission Deadline: 31st October, 2018 [No Further Extension]

Paper submission Link: <http://bvicam.ac.in/indiacom/submitPaper.asp>

Conference Website: <http://bvicam.ac.in/indiacom/>

Announcement and Call for Papers

INDIACom-2019 is aimed to invite original research papers in the field of, primarily, Computer Science and Information Technology and, generally, all interdisciplinary streams of Engineering Sciences, having central focus on sustainable computing applications, which may be of use in enhancing the quality of human life and contribute effectively to realize the nations' vision of sustainable inclusive development using Computing. **INDIACom-2019** will be an amalgamation of four different Tracks organized parallel to each other, in addition to the 05th International Workshop on Information Engineering and Management (IWIEM-20197) and few theme based Special Sessions, as listed below:-

Track #1: Sustainable Computing

Track #2: High Performance Computing

Track #3: High Speed Networking & Information Security

Track #4: Software Engineering & Emerging Technologies

Track #5: Theme Based Special Sessions

Instruction for Authors

Authors from across different parts of the world are invited to submit their papers. Authors should submit their papers online at <http://www.bvicam.ac.in/indiacom/loginReqSubmitPaper.asp>. New authors should first sign up and create an account on <http://www.bvicam.ac.in/indiacom/addMember.asp> to log in and submit paper. Only electronic submissions will be considered. Paper submission, as E-Mail attachment, will not be considered.

Important Dates

Submission of Full Length Paper	31 st October, 2018	Paper Acceptance Notification	15 th January, 2019
Submission of Camera Ready Copy (CRC) of the Paper	29th January, 2019	Registration Deadline (for inclusion of Paper in the Proceedings)	29th January, 2019

Accepted Papers will be published in **IEEE Xplore**, which is indexed with world's leading **Abstracting & Indexing (A&I)** databases, including **ISI, SCOPUS, DBLP, EI-Compindex, INSPEC, Google Scholar**, etc. Further details are available at www.bvicam.ac.in/indiacom. All correspondences, related to INDIACom-2019, must be addressed to:

Prof. M. N. Hoda

General Chair, INDIACom-2019

Director, Bharati Vidyapeeth's Institute of Computer Applications and Management (BVICAM)

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