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Digital Democracy: Technology, Accessibility and Approach of Indian Youth with Special Emphasis on Kerala

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ABSTRACT -

In the current democratic system, effective participation of youth can be achieved only by transforming it to a youth-friendly one. Digitalization of democracy gains importance in the above said context. This trend is already initiated through different methods such as social media, CSCs (Common Service Centers), e-campaigning, attractive mass media improvements, augmented reality applications, mobile applications, software introduction etc. Information Kerala Mission (IKM), Akshaya and FRIENDS projects, Sammaty software etc. are some of the examples of successful implementations. But the major accessibility of such digital utilities still compatible only with young generation as digital illiteracy still pervades in rural areas. This paradox of accessibility can be eradicated by implementation of Indian Accessibility Network and youth volunteership programmes. In this preliminary study, special emphasis is given to Kerala as the state is highly digitalized and empowered by its literacy achievements. This study will provide an introduction to assessment of a developing digital democratic State. The conclusion is that the spreading of digital democracy in the whole country can be accomplished through enhancement of young generation.

General Terms

Digital world, Digital democracy

Keywords

Digital democracy, Digitalization, Indian democracy, Kerala election, Youth and democracy

1. INTRODUCTION

Since a large number of citizens becoming 'Netizens' and their social interrelations becoming more technical, importance of digitalization and up gradation of current democratic system get justified in the current 'Quantum leap in the field of democratic politics' (Becker, 1998). Democratic system became more transparent and convenient by the wide range of technological application. Introduction of electronic voting machine in India made an initial step in this transformation. Terms such as 'cyber democracy', 'electronic democracy' and 'teledemocracy' were not familiar to us some decades ago. In India, along with the e-voting machine, many other sectors related with democracy became digitalized and the process is still continuing. Democratic processes incorporate not only voting but also citizen participation and

engagement in the governing activities. E-Democracy refers to the processes and structures that encompass all forms of electronic interaction between the elected government and the electorate. Examples include e-voting, e-consultation, e-representatives, e-campaigning, online deliberative polling, e-petitions, e-referendum etc. (Choudhury, *et. al*, 2007; Kluver, 2007; Chadwick, 2009; Mishra, 2009; Rahul & Sen, 2004) All these updates occurring in the democratic movement influences the young minds as their mainstream source of social knowledge get replaced by cyberspace and other digital media. An analysis on the effect of such digitalization on democracy will be helpful in understanding the current status of youth participation in Indian democracy. This also marks out the necessity of more studies on this topic.

2. TECHNOLOGICAL APPLICATIONS

Present notion of digital democracy is used to refer to a range of technological applications and experiments (Barry, *et. al*, 1999).

Government websites are one of the main platforms of people-government interaction today. Several improvements appeared recently in the regional and state government web-sites made them user friendly in varying degrees. Internet services provided a convenient pathway of communication to the citizens. But there arises the contradiction of access regarding common people even though the Common Service Centers (CSCs) rendered the duty of providing access to them. Financial crisis, lagging of time, repetitive procedures and remaining paper-using procedures

3. MASS MEDIA

Mass media is still an effective tool to point out politicians who have become tarnished with allegations of sleaze, corruption *etc.* They ensure freedom and good governance to the people. They also play key role in shaping youth's opinion, social attitudes *etc.* Apart from the political views, the attitudes, fashions *etc.* of the people, particularly the young, are powerfully affected by the mass media (Gopalakrishnan K. V., 2008). Some of the latest inventions introduced in this field are mobile applications for spontaneous news distribution and discussions, multidimensional statistical analysis of election results, debates on youth involvement in democracy *etc.*

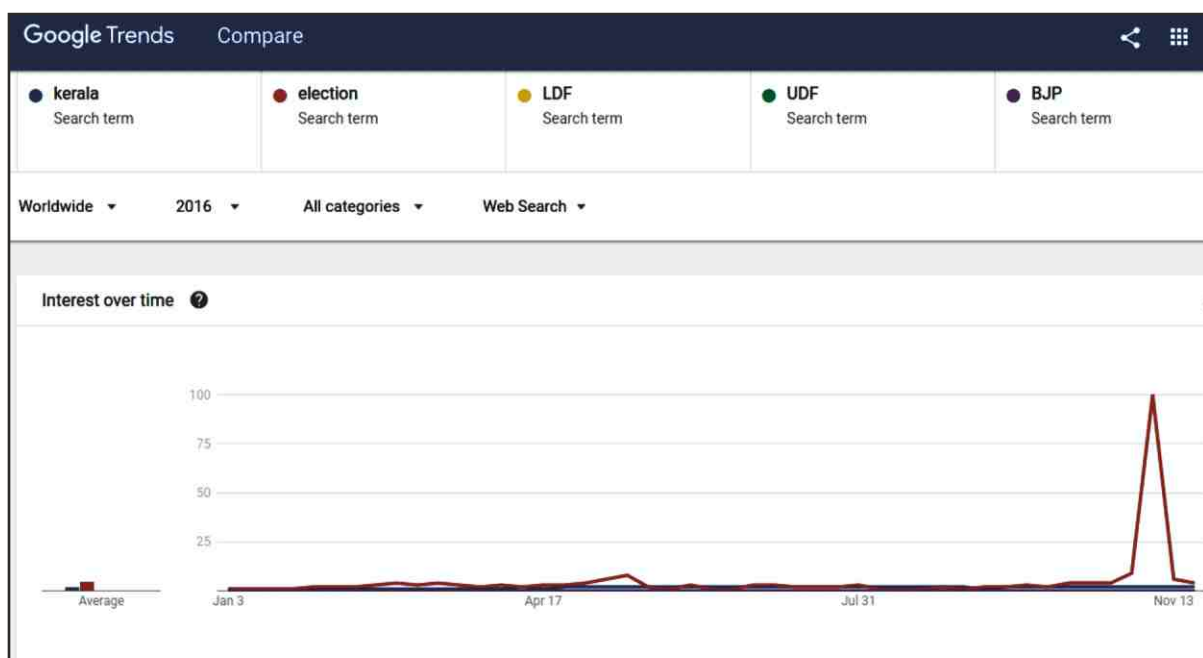


Figure 1: Google trends chart showing the most searched terms in 2016

still point out the reality. Unification of databases from various government services may enhance the popularity and effective usage of CSCs. Youth supports the digitalization process in democracy due its high importance in interactivity, freedom of access and approachability, permissibility *etc.*

3.1 Case study of Manorama News channel

Manorama News, a Malayalam news channel under MM TV Ltd. introduced the virtual reality technology for the first time in Malayalam media history. This enabled an easy understanding of election related statistics and information through

digital visual sessions. In the news show, the anchor will be taken digitally (using high-end graphic tools) towards the Kerala Secretariat building for analyzing the voting trends and details. This improvised experiment re-attracted viewers to visual media for availing election details. Upcoming election will be a competition among television channels to introduce such latest audience-friendly technologies.

3.2 Internet Information and Information Kerala Mission (IKM)

Internet provides a huge amount of knowledge related to democracy. Websites of governments, Election commission and other private sources contributes information to the 'accessible' people. Google trends data shows that the most searched term during the 2016 Kerala Assembly election (Figure 1) is 'Election' which is a worldwide statistics. That shows, the users were surfing on internet for election updates during the whole time period. This focuses on the importance of internet and online media in spreading of latest democracy. India's internet population becomes around 400 Millions and opportunities regarding this sector still increases. Real time communication through various media and polarized facts through social media leads to dissatisfaction and misinformation (Brexit: the first major casualty of digital democracy). Information Kerala Mission (IKM), an e-governance plan aims at overall digitalization in basic governance procedures onwards. The after effects of initial activities of IKM prove that the changes in root governing plan can promote larger steps in the digitalization of democracy.

4. AUGMENTED REALITY IN ELECTION CAMPAIGNS.

Conventional methods of election campaigns are going to be enhanced by Augmented Reality (AR)

based platforms with algorithms which capture various data sources, unifying and disseminating information through online and social media. More authentic and personalized shows with interactive sessions will be integrated with digital spaces and can be accessed through Augmented Reality applications in different platforms. Collective tagging, link juices and news feeds makes the publisher 'Get Found'. AR can be used in real time for interactive sessions between the publisher and users. Many private companies are ready to host such new trends for candidates. The same digital process will be the recent future of elections because of its popularity and ease of access.

5. DIGITAL INDIA AND COMMON SERVICE CENTERS

As the Government of India introduced the Digital India project and proceeded with digitalization of more governmental services (e-Governance under NeGD- National e-Governance Division) within the initial years, digitalization of democracy gained its primary strength. Through CSCs, government also tries to enhance the accessibility of information and services by the illiterates.

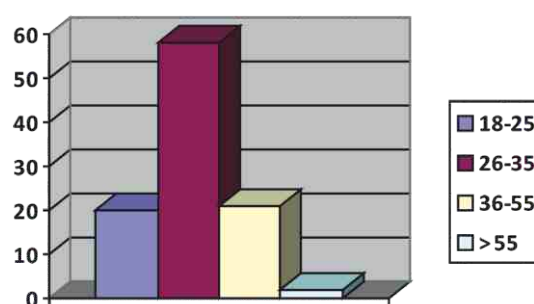


Figure 2: Age wise distribution of Akshaya Employees (2007)

In Kerala, Government web portal, FRIENDS (Fast, Reliable, Instant, Efficient, Network for Disbursement of Services) Jana Sevana Kendra and Akshaya Centres were the three revolutionary.

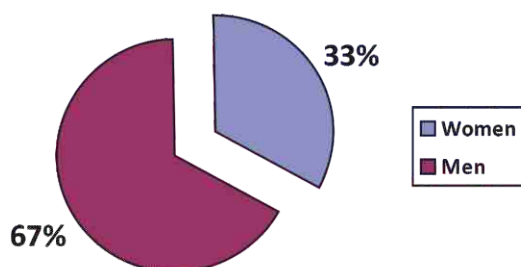


Figure 3: Gender wise distribution of Akshaya Employees (2007)

projects introduced for the same. FRIENDS Jana Sevana Kendra and Akshaya Centres becomes citizen friendly as the communication with government became easier. In addition to this, Akshaya project grown to a big success as it was developed and maintained in the regional language, Malayalam. An analysis of entrepreneur statistics of Akshaya project will reveal the youth participation in CSCs (Figure 2). This also points out the need of more women participation (Figure 3) in such activities. Through voluntarily participating in these kind of CS Centers, Indian youth can serve the nation and its people by enabling the full fledged digital democracy.

6. MOBILE APPLICATIONS AND SOCIAL MEDIA.

Increased use of smart phones made our democracy easily accessible through mobile applications such as 'Narendra Modi App', 'EASY' *etc.* Revolutionary applications related with election were recently introduced by youth professionals, political organizations and government itself during the Kerala assembly election. On 2016 October 9, the Electoral Assistance System tapping mobile and online facility (EASY) was launched in Tamilnadu to enable voter ID card applications through cell phones, the first of its kind in India. Even though there are lot of security restrictions, voting through mobile phones would be the next step.

Contents from social sites like Facebook and messenger services like WhatsApp also having pivotal role in election campaigning and democratic discussions even though they are not proof read and authenticated. Originality of the content from social media are not reliable whereas that of applications can be partially verified from the platform provider (Google play store, iStore *etc.*).

7. ELECTION – SCOPE OF DIGITAL MOVEMENT

Live election information through government portals and Election Commission servers enhanced the credibility of results, proceedings *etc.* Increased usage of digital space for the publicity made almost paperless environment and improved the audience quantity. Easy handling capacity of digital posters, videos, sound tracks *etc.* made its widespread usage and sharing. Reactions of citizens and politicians were lively transmitted and the effective discussion on deeds and needs done through different media. Also, 'e-voting for pravasi' issue emerged as a bi product of these discussions.

8. SOFTWARE UPGRADING

New softwares were introduced to the computers for easy and smooth conducting of election, governance and future communications. Most of these were relied on proprietary operating systems. Some challenging open source softwares were developed by C-DAC and similar advanced computing centers. DGPLUG initiative made the youth aware of open source possibilities. One of the best among its kind is 'Sammaty' software.

8.1 Sammaty : A student initiative for school elections

Sammaty was developed by Nandakumar Edavanna, a student from Malappuram district of Kerala. The word sammaty means acceptance in

Malayalam. As part of the IT@School project, all schools in Kerala were using free software. Every computer run GNU/Linux (namely Ubuntu) instead of Microsoft Windows. But many schools were still using Windows just to conduct school elections. They were forced to do so. Endless search of schools for an election software that could run on GNU/Linux came to the attention of Nandakumar and he started developing such software in his early age. By June 2012, the first version of Sammaty was released via Mathsblog, a popular portal among school teachers and students. The software received a warm welcome from the community and started its updating journey. About a thousand institutions made use of Sammaty that year. In 2014, a web-technology based version of Sammaty was developed which also became popular. This initiative encouraged more young minds to devote their knowledge for social welfare and further developments boosted the digitalization of assembly elections and other e-governance schemes.

8.2 E-Sammaty -An Election Commission initiative for assembly election

e-Sammaty was developed by Election Commission in association with Kerala State IT Mission. It enables the smooth conduction of election through communicating with polling booths by the mobile application. Photograph uploading, VVPAT error notification, voter information, SMS updating, vote casting statistics *etc.* are some of the features available in the application. In addition to this software, a video broadcasting application was also published by the commission. These kind of mobile applications and softwares enabled the smooth conductance of last assembly election in Kerala.

9. CONCLUSION

Accessibility paradoxes can be eradicated through initiatives like 'IT for All' and 'Computers Don't Bite' (Britain Government initiatives). Most of the common people other than youth denied access on the basis of economic status, gender, geographic location, educational level, and so on. But this can be ignored if the youth can take care of these accessibility issues through volunteering in programmes like Digital India. Today, the Internet connection is believed to be the one which enables 'easy processing' of our needs like 'political connection' assisted ones (Achutsankar S. Nair, 2009). Indian youth can upgrade the status of nation's digital democracy through spreading their digital literacy and advanced knowledge. India's strength in software and IT sectors are due to its talented youth. Despite many problems, our schools and colleges have prepared them for the new challenges (Abdul Kalam A. P. J., 1998). The Department of electronics says eKranti averaged 32 million monthly transactions from January to April 30, 2015, dealing with land records, health, education, passport, police, courts, municipalities and taxes. India is on its way of new digital highways, in a dawning era of technology-driven democracies (Raja Murthy, 2015). A strong democratic movement can be possible through the paramount developments taking place in the technological sector as it strengthens the mass communication. Availability of Indian Access Network by 2020 (Abdul Kalam A. P. J., 1998) may accelerate the widespread usage of digital utilities through young minds. Achievement of the above said strength can be realized only by the present Indian youth.

10. ACKNOWLEDGMENTS

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Handwritten Devanagari Characters Recognition

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ABSTRACT -

Handwritten Devanagari character recognition system is a difficult task to achieve as writing tends to vary from person to person. Different writing patterns, complex structural features and complexities of a script make it more difficult. Apart from various complexities involved, automation of recognition system is still an ongoing popular research area. Devanagari characters has many loops and curves that makes it more difficult to recognise. So in this paper we will present an OCR for Handwritten Devanagari characters. Character recognition system is useful for wide range of real world problem. It will help in automation of data entry systems in various sectors like Banking, Postal sector, automation of Forms filling etc. Recognition of Devanagari characters consist of Preprocessing, Feature Extraction and Classification. The feature extraction stage uses Diagonal feature extraction technique. Every character has some set of features that uniquely identify a character from rest of the characters, so we will select these unique set of features. All these features are stored in a feature vector. Features will be classified horizontally, vertically and diagonally. Proposed work uses Back Propagation Neural networks for Classification Stage of this recognition system. It will comprises of training and testing of data. This system used a database of 44 character class with 100 samples of each class. The system reported a high recognition rate of accuracy.

Keywords

Handwritten Character Recognition, Diagonal Feature Extraction, Back Propagation Neural Networks.

1. INTRODUCTION

In the present work we will aim at developing a Devanagari character recognition system. Handwritten character recognition is still a challenging task even after years of research. Handwritten character recognition is a complex task because handwriting varies from person to person. Running handwriting can have overlapping characters that makes it more difficult to recognise[1]. Some people have such bad handwriting that it is merely impossible for a human to read that handwriting, so developing a system that gives 100 % result is a very challenging task. But it is a popular area of research as it can automate data entry system, Banking system and various types of form filling systems. Many research have been done in English, Chinese, Japanese and Arabic languages[3]. But for Devanagari languages very few research is been done as devanagari characters have complex shapes and structure, devanagari characters have multiple loops and curves, characters can be compound characters (Half characters) and can have modifiers on all sides of characters that makes them more complex[4]. India is a country with multiple languages. India has 22 languages that are mainly

originated from Devanagari script. If a solution for Devanagari characters is found, it will be easier to develop a system for languages like Gurmukhi, Marathi, Tamil etc. We will use Neural Networks as the information processing technique for our work[16][17].

2. DEVANAGARI SCRIPT

Devanagari script is widely used in India. Hindi is the national language of India originated from Devanagari script. Devanagari script characters can be classified into 11 swara and 33 vyanjanas. They combine to make basic varnamala of Hindi language. Devanagari script also has modifiers or matras that are applied to basic characters from any side. Basically modifiers can be placed on top, bottom, right or left side of basic characters. Devanagari script can have more complex shape as it has half characters or compound characters, that are formed by eliminating the vertical line from the basic characters[5]. Devanagari script is most complex script due to its peculiar shapes and formations of characters.

Script consist of multiple loops and curves.A sheirorekha or headerline above the characters define a word.India has 22 languages that are mainly originated from Devanagari script.

Vowels:	अ	आ	इ	ई	उ	ऊ	ऋ	ॠ	ओ	औ
Modifiers:		ऀ	ँ	ं	ः	ऄ	अ	आ	इ	ई

Figure: 1 Vowels and Modifiers

क	ख	ग	घ	ङ	च	छ	ज	झ	ञ	ट
ठ	ड	ढ	ण	त	थ	द	ध	न	प	फ
ब	भ	म	य	र	ल	व	श	ष	स	ह

Figure: 2 Consonants

Devanagari characters can be divided into 3 layers i.e Upper layer,middle layer and lower layer.Middle layer contains basic characters. Upper and lower layer contains modifiers or matras[6][7]. Every word is separated from each other using a Header line or Sheiorkha.Sheiorkha is a horizontal line above the basic characters. Each word has single headerline and each basic character seems to be hanging form that headerline.Devanagari script also has one more formation that is known as compound characters.Compound characters are formed by joining two basic characters of script, it can be formed by joining half characters and one full character[8]. In this paper we will not consider compound characters as they are more complex.English characters does not have such complex characteristics, so very few research has been done on Devanagari character recognition.



Figure:: 3 Three zones of a Devanagari word

3. PROPOSED METHODOLOGY

To recognized the handwritten data from document, there are number of steps which are involved while recognition, firstly the document is scanned using scanner[1]. This scanned document is converted into image. Then image is preprocessed with set of valuable steps and convert it into a character/script as per the environment. The scanned image undergoes number of valuable preprocessing steps so as to increase the ratio of recognition of the handwritten document. The general steps for Handwritten Character recognition is Image Acquisition,preprocessing, feature extraction, classification and recognition[3].

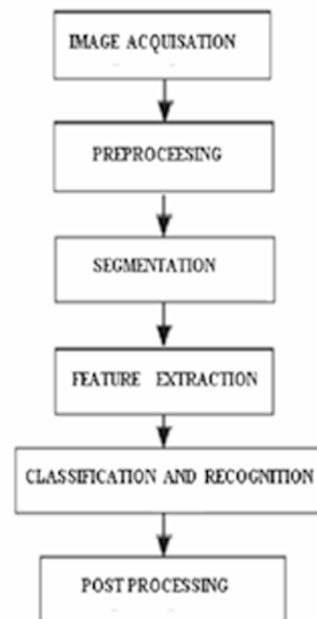


Figure: 4 Offline Character Recognition System

3.1 Preprocessing

Preprocessing consist of various operations performed on image. The aim of Pre-processing is an improvement of image that suppress unwanted distortions for further processing of image. Preprocessing enhances features of image so that it is suitable for segmentation phase. All work has been done in MATLAB[21].

- Image samples are scanned in RGB format.
- RGB image is then converted in gray scale image. A Binary image is retrieved from Grayscale image using Binarization.

3.2 Segmentation

It is a process of partitioning a character image into multiple segments. This process simplify or change the image representation into subsegments and makes it easier to analyze further [7].

a) **Line Segmentation:** In Devanagari script having header lines a prevalent approach is to detect lines by horizontal projections. Header line is used to have maximum number of pixels while base line is used to have minimum number of pixels in horizontal projections

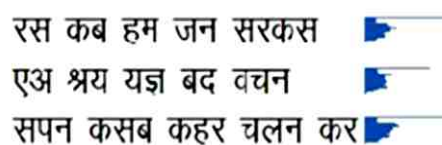


Figure 5: Line Segmentation

b) **Word Segmentation:** After line segmentation, the text in each line is segmented to detect words. It is called word segmentation. Word segmentation is easier than line segmentation, because there is generally enough space presents between words and each word is bounded by header line having no space within word.



Figure 6 :Word Segmentation

c) **Character Segmentation:** Now after word segmentation, each word need to segment into characters. It is called character segmentation. In Indian script, having header lines in most practices, we generally use to remove header line first to have vertical space between characters the word under consideration. Then segmenting the word into characters is based on present vertical space between these characters. Features of each characters are extracted by resizing it into 100x100 pixels.



Figure 7 :Character Segmentation

3.3 Feature Extraction

Feature extraction transform an image of character into set of features,to discriminate between different classes. Each feature is expected to contain some relevant information about the character[24]. Feature Selection algorithms selects the best feature subset.This stage is an important phase of the whole process as features extracted at this stage will be used by classifiers at next stage so as to recognise character accurately[9][10]. In proposed work we have used Diagonal Feature Extraction technique.

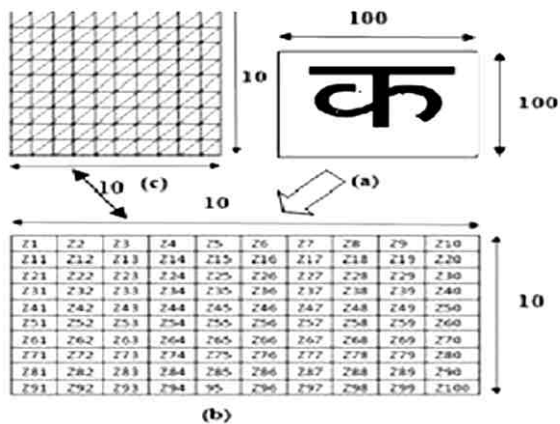


Figure 8: Diagonal Feature Extraction

Diagonal Feature Computation-

Each image is divided into 100 equal zones having size of 10x10 pixels(Fig 8)[12]. Diagonal features of each pixels are extracted from each zone having 19 diagonals. Foreground pixels present in each diagonal are summed up so as to get single subfeature and thus 19 subfeatures are obtained from each zone. These 19 subfeatures values are averaged to form a single feature value and placed in the corresponding zone. This procedure is sequentially repeated for all the zones. Finally 100 features are extracted for each character[14].

3.4 Classification

Classification is the last phase of Handwriting recognition system. All the sampled training data are selected and various classification techniques such as supervised or unsupervised learning are applied on training data so that an appropriate decision rule is selected[11][13]. In the proposed system we have used Backpropogation Neural Network for classification, it is a multilayer FeedForward network with one layer of hidden units[22]. It is three layer architecture where Input layer is connected to the hidden layer and Output layer is connected to the output layer by means of interconnection weights. The Input layer has 35 neurons, the Hidden layer has 100 neurons and output layer has 46 neurons, one for each alphabet. The BP algorithm performs training, calculating errors and Modifying weights[23].

The sigmoid function has been used as a non linear neuron activation function:

$$y = 1 / (1 + \exp (-z))$$

Backpropagation Neural network is a multilayer feed forward network trained with extend gradient descent based delta learning rule or backpropagation learning rule[18].

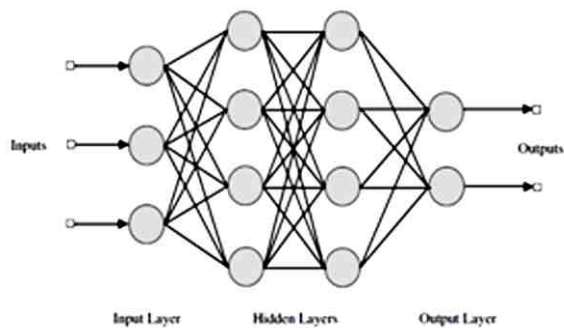


Figure : 9 Structural design of Back-propagation Neural Network

The Backpropagation Algorithm

- All the weights are initialised to some small random values.
- Each input unit receives an input signal and transmits this signal to each hidden unit.
- Actual output is calculated. Each output unit compares the actual output with the desired output to determine the associated error with that unit.
- Weights are adjusted to minimise the error

Training Algorithm

To train the network to recognize Devanagari Alphabet characters, the corresponding 5x7(6x8) grids are applied to the input of network. Then the weights are calculated using the equations provided. The initial

learning rate was experimentally set to 1.5 which is divided by a factor of 2 every 100 iterations and is reset to the initial value after every 300 iterations and the momentum rate is set to 0.95. the characters are considered recognized if all the outputs of the network were no more than 0.01 off their respective desired values.

4. CONCLUSION

The paper present Diagonal feature Extraction technique for devanagari Handwritten character recognition. Diagonal Feature extraction technique applied with BP classification technique proves to be powerful tools for recognition system. Feature extraction uses multiple features which gives better recognition accuracy. It tends to learning to repetitive set of patterns presented to it, it acquires the tendency to recognize these repetitive patterns. It does not requires instructions every time to recognise the class to which pattern belongs. The network is a working design of some neural mechanism of visual pattern recognition. The Backpropagation Neural Network can be used in any kind of recognition system such as cancer cell detection, face recognition system and finger print recognition system. The implementation of fully connected Backpropagation method give reasonable results towards recognizing characters.

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Design of an Expert Educator Performance Evaluator Model

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ABSTRACT -

The Objective of Higher Education is to create and develop the resources and intellect of the person. Thus, focus on the quality of the higher education system is needed for a nation's growth. The Government as well non-government policies assist in the regulation of the entire system to maintain its quality. More important, the quality and evaluation of a Faculty performance in the systems is of great concern. Here, in this paper, an optimized evolutionary model to evaluate the academic performance of a faculty of a technical institution has been introduced. The model proposed here is a Fuzzy expert model which is based on fuzzy logic techniques. The overall performance of the faculty has been evaluated through the model.

Keywords: Faculty Performance, Fuzzy Expert Model, Fuzzy Inference System, Fuzzy Rules.

1. INTRODUCTION

It is a fact that, there is a distinguished role of an educator at all level of the education. At primary level, an educator makes the base of the career of a student, whereas, at higher levels, the educator nourishes the students with their expertise and teaching skills. Thus, the need of a quality educator is in great need for a guided and perfect education environment. To maintain the performance of a quality education system, performance evaluation of an educator is to be done on regular basis [1].

The appraisal of teaching activity can be defined as the planned assessment of teaching performance as per their role and responsibility towards the objectives of the higher education and the learners of the system [2][3]. In this paper, a fuzzy logic based model has been presented, which could assist the Management as Evaluators to assess the performance of a teacher on the basis of the criteria and qualities expected in a healthy and knowledge providing teaching environment [4][5]. The Paper presented here is meant to depict the implementation of the fuzzy concept in

designing a Decision Maker specially for finding the best faculty or teacher through a student feedback system. Since there is an involvement of linguistic variables in student feedback system, the implementation of fuzzy logic is expected to be a suitable mechanism or approach to obtain more evaluative accurate results [6][7][8]. This proposed fuzzy decision maker system is expected to be a facilitative system to solve the stated problem. Section II of the paper introduces to the Concept of Fuzzy Inference System. Section III presents the Performance Assessment Model and Section IV portrays the results. Section V concludes the study.

2. FUZZY INFERENCE SYSTEM

Fuzzy inference is the process of mapping the fuzzy input with fuzzy output and assist in making decisions. The key entities of the Fuzzy Inference system (FIS) are membership functions, fuzzy logic operators and if-then rules. Mamdani-type and Sugeno-type are two of the commonly used output determination models [8][9]. A fuzzy Inference system's components are presented in figure 1.

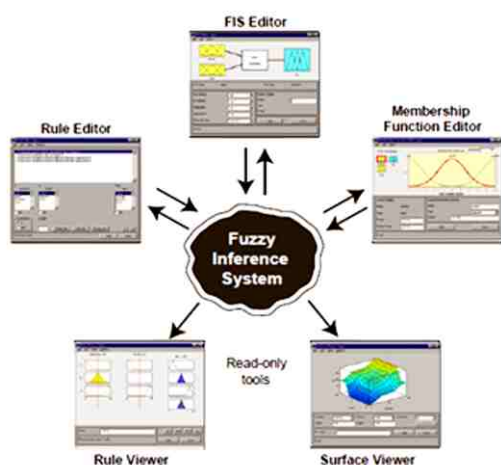


Figure 1: Fuzzy Inference System [11]

The Fuzzy Inference System (FIS) involves the FIS Editor, Membership Function Editor, Rule Editor, Rule Viewer and Surface Viewer. The Rule Viewer and Surface Viewer are the read-only tools, whereas the other components allow editing.

Here, in this paper an expert model for the educator's performance assessment and measurement has been proposed. Since, there is the involvement of the linguistic variables within the feedback and its analysis, the fuzzified approach is found to be suitable after reviewing the applications of fuzzy logic applications [5][10]. Thus, to solve the problem of analyzing the feedback and results, the fuzzy logic has been implemented to develop the model. The Performance Evaluation of an educator with Fuzzy Expert System comprises of four key steps - Identification of Crisp Value, Fuzzification (Fuzzy Input Value), Determination of Application Rules and Inference Method and Defuzzification and Performance Evaluation [10][11].

3. EDUCATOR'S PERFORMANCE ASSESSMENT MODEL

Step 1. Identification of Crisp Value

The crisp data is obtained using Student Feedback Form, Educator Self Appraisal Form and Peer Assessment Form. These forms are filled in by Students, Teachers and Peers of the Teacher.

Step 2. Fuzzification

The Input Variables includes Below Average, Average, Good, Very Good and Excellent. Trapezoidal function has been used for the conversion of crisp set values into fuzzified values, due to its simplicity.

Step 3. Determination of Application Rules and Inference Method

Here, fuzzy rules are formulated and using the appropriate membership functions, the result is inferred and evaluated.

Maximum number of fuzzy rules (MaxFR) [9], are given by the equation 1:

$$\text{MaxFR} = \prod_{i=1}^{\text{no. of inputs}} \text{No. of fuzzy sets in input } i \quad \dots \text{Equation 1}$$

All rules are formulated and then, using the proper membership functions [10][11], the result is evaluated. Here, considering SFB=Student Feed Back, TSA=Educator Self Appraisal, PA=Peer Assessment and on the basis of the descriptions of the input and output variables defined with the Fuzzy Inference Editor [11][16][17], few of the rules constructed are:

1. If (SFB (Avg) is Excellent) and (TSA (Avg) is Below Average) and (PA (Avg) is Excellent) then (Assessment Results (O) is Good).
2. If (SFB (Avg) is Excellent) and (TSA (Avg) is Average) and (PA (Avg) is Excellent) then (Assessment Results (O) is Very Good).
3. If (SFB (Avg) is Excellent) and (TSA (Avg) is Good) and (PA (Avg) is Excellent) then (Assessment Results (O) is Excellent).
4. If (SFB (Avg) is Excellent) and (TSA (Avg) is Very Good) and (PA (Avg) is Excellent) then (Assessment Results (O) is Excellent).
5. If (SFB (Avg) is Excellent) and (TSA (Avg) is Excellent) and (PA (Avg) is Excellent) then (Assessment Results (O) is Excellent).

Step 4. Defuzzification and Overall Performance

Overall Performance is the Output of the system. Mamdani Model has been used to infer the fuzzification [12][13][14].

Fuzzy Inference System for Student's Feedback and Membership Function for Fuzzy Inference System for Student's Feedback are shown in Figure 2 and 3 respectively.

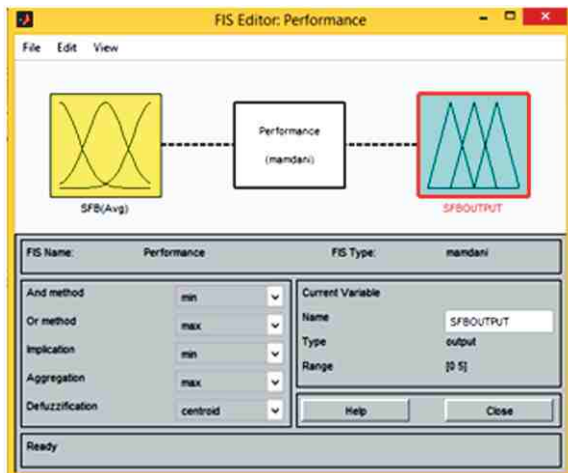


Figure 2: External Structure of Fuzzy Expert System for Faculty Performance Evaluation using Student Feedback

Fuzzy Inference System for Teacher's Self Appraisal and Membership Function for Fuzzy Inference System for the same are shown in Figure 4 and 5 respectively.

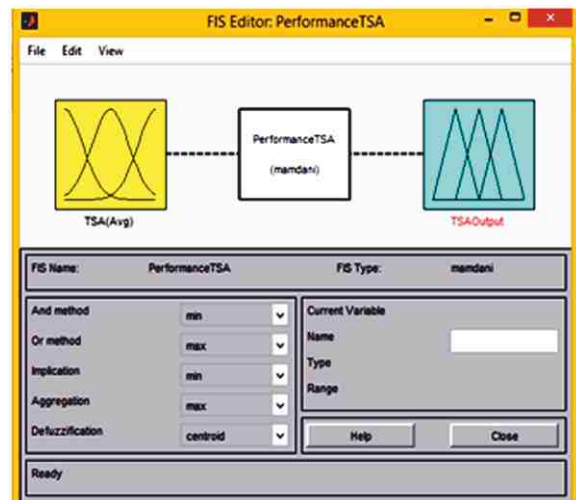


Figure 4: External Structure of Fuzzy Expert System for Faculty Performance Evaluation using Teacher's Self Appraisal

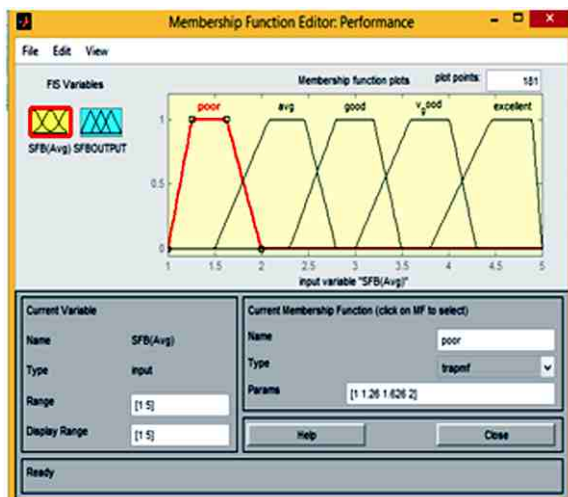


Figure 3: Membership Function of the Input Variable Students' Feedback

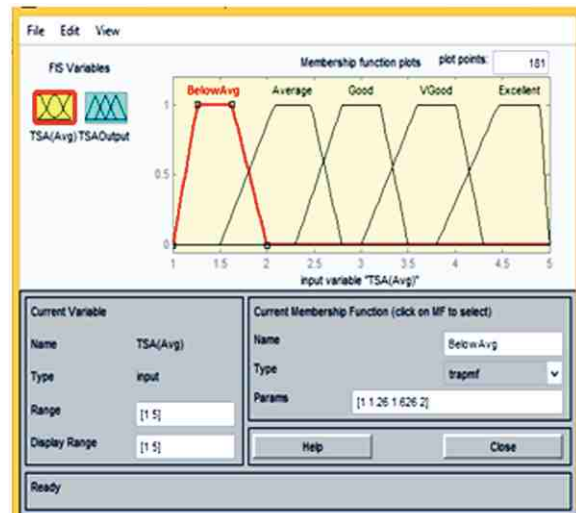


Figure 5: Membership Function of the Input Variable Teacher's Self Appraisal

Fuzzy Inference System for Assessment by Peers and Membership Function for Fuzzy Inference System for the same are shown in Figure 6 and 7 respectively.

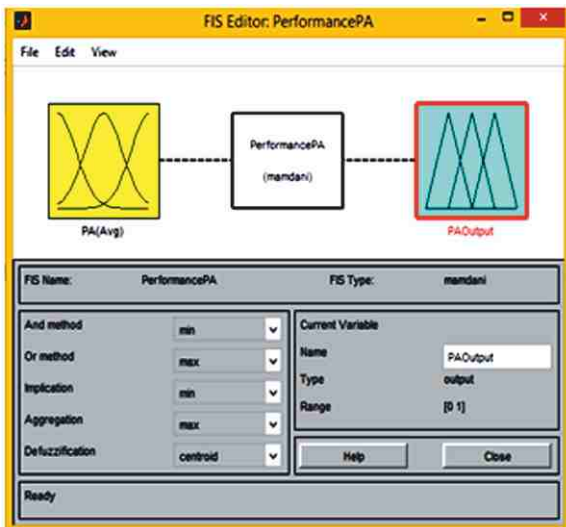


Figure 6: External Structure of Fuzzy Expert System for Faculty Performance Evaluation using Assessment by Peers

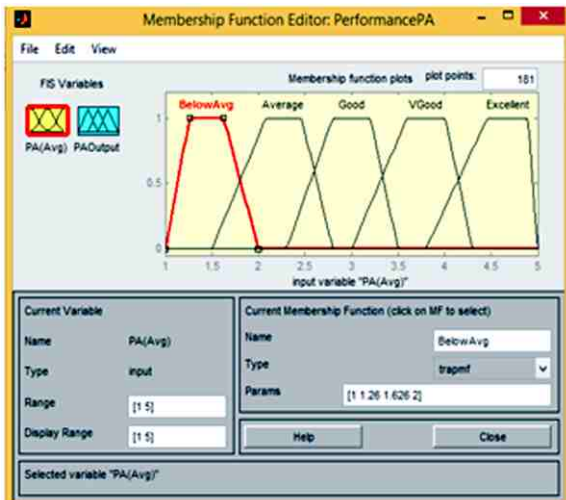


Figure 7: Membership Function of the Input Variable Assessment by Peers

Fuzzy rules have been constructed by using Rule Editor from the GUI on the basis of the input and output variables defined using FIS Editor, [5][13][14][15]. Figure 8 shows some of the rules for overall performance.

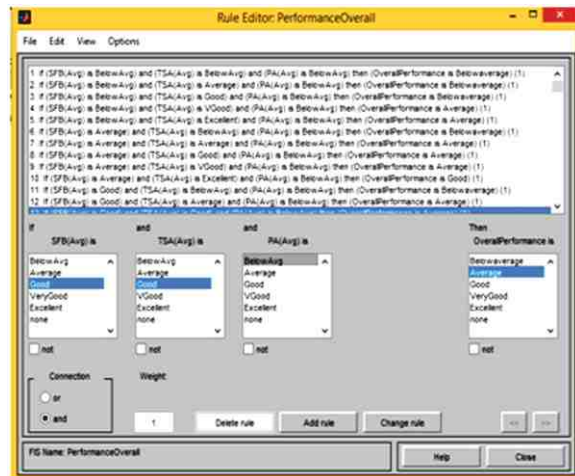


Figure 8: Some of the Rules for Overall Performance.

Surface Viewer for Overall Performance -

Figure 9 presents the interaction between inputs and outputs generated.

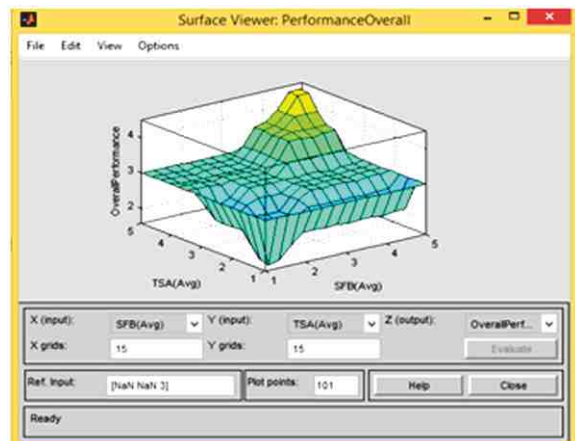


Figure 9: Surface Viewer for Overall Performance

4. CONCLUSION

In the paper a model to implement the fuzzy concept in designing a decision maker specially for finding the best faculty or teacher through a student feedback system is explained. This approach would be beneficial in comparison to the traditional arithmetic and statistical methods by offering reliable values for judging and assessing faculty performance. The output of the proposed system can assist in making decisions in design and development of institutional strategies. In future, the system may be enhanced with online version and other advanced assessment parameters.

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Artificial Intelligence - A Threat or an Opportunity?

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ABSTRACT -

Artificial intelligence is one of the fastest growing fields in the world. Its uses abound. Sometimes we encounter it casually in our everyday lives and at other times it pervades our lives through mysterious and hidden ways that are generated in laboratories and feed the R & D of Marketing, Production, Logistics and Finance Departments (among others) of large companies.

Artificial Intelligence relies on the automation of decision making on the presumption that if there are enormous quantities of data, then the information can be processed to create a program of automated decision making that is faster, cheaper and more impartial than a human could ever be. This paper purports to show that while intelligent machines are a reality, human beings can never really be completely made irrelevant in the process of decision making. In fact the risk of unsupervised Artificial Intelligence is too much. Human beings shall continue to stay central to the way work is done although they shall have to learn to refocus their jobs on skills that are unique to human beings and that can be neither automated nor replicated by machines.

Keywords

Artificial Intelligence, Cognitive Technologies, Automated Decision Making.

1. INTRODUCTION

As we sit on our computer and type, the word processor autocorrects spellings, checks grammar and highlights any sentence composition it considers incorrect. It is a reminder of how by tracing patterns, understanding trends and learning from past mistakes, artificial intelligence is increasingly and easily taking over easy and routine jobs. It is expected that managers shall be more free –free to use their time more creatively and productivity. Is this the opportunity that managers have been waiting for or is it a threat that they face?

2. WHAT IS ARTIFICIAL INTELLIGENCE?

Artificial Intelligence can be defined as a “system able to perform tasks that normally require human intelligence”. A lot of human intelligence requires decision making. The growth of Artificial Intelligence is aimed at increasing the quality of decision making to the extent that it may replace executive decision making.

For example in the company Cognito, behavioral adaptation is used to improve the emotional intelligence of customer support representatives. Machine learning collaborates with behavioral science to improve customer interaction of phone professionals interacting daily on voice calls.

Boxever, is a company that depends on machine learning and Artificial Intelligence to improve the customer's experience in

the travel industry and create 'micro-moments,' or experiences that delight the customers during their travels and thus keep them engaged.

John Paul, a luxury travel concierge company, is another powerful example of effective Artificial Intelligence that uses predictive algorithms to understand and know the desires and needs of customers. The company powers the concierge services for millions of customers through large companies such as VISA, Orange and Air France. It was recently acquired by Accor Hotels.

Amazon's transactional Artificial Intelligence has resulted in great success. As its algorithms get more refined every year, the company has become smarter at predicting just what the customer is interested in buying based on an analysis of online behavior. Perhaps in the future Amazon plans to ship products to us before we even know we need them though it hasn't quite gotten there yet!

Netflix provides very accurate predictive technology based on customer's reactions to films. It analyzes billions of records to suggest films that you might like based on the customer's past reactions and choices of films. As its data set grows it gives even better and more accurate results.

Pandora uses one of the most revolutionary technologies that exist today. Called their 'musical DNA', and based on 400 musical characteristics, each song is first manually analyzed by a team of professional musicians based on the given criterion, and then the system recommends songs to people

that they would love. Its accuracy is uncanny.

3. CAN ARTIFICIAL INTELLIGENCE REPLACE EXECUTIVE DECISION MAKING?

3.1 Process of Automation of Decision Making

While cognitive technologies are constantly improving the quality of many decisions taken by executives, it continues to be a challenging task because most decisions are not well defined enough to fit into a format suitable for automation and so the goal of executive decision making being replaced by Artificial Intelligence is still far from reality.

Let us follow the process of how automation of decision making takes place-

- 1) Gather data for same or similar decisions in very large quantities.
- 2) Use the collected data as input to be further processed using algorithms.
- 3) Establish the connection between observation and outcomes using minimum human guidance.
- 4) The machine finds the pattern and make data based predictions.

3.2 Why Automation of Decision Making is not possible in several areas of Executive Decision Making?

The automation of decision making works well in areas like accounting and radiology where it is possible to gather numerous examples to serve as inputs to create a programme for Artificial Intelligence. This process does not work for several other types of executive decisions because of numerous reasons:-

- 1) The Algorithmic approach requires numerous same/similar examples in huge numbers, while in reality; same/similar decision data is not available because each decision is contingent on several dynamic variables.
- 2) Available information is not clearly explained or Structured- in other words-How does one collect data about something that could have happened but didn't? Or happened but there was no recorded data collected for it!
- 3) A lot of executive decision making could depend upon what will happen in the future- for example a legislative change that is on the anvil and gets passed

to become a law or fails to be passed....It could be the same for a regulatory change or technological breakthrough that executives may have imagined but have no way of knowing if it shall be converted into reality.

- 4) Managers don't deal with identical multiple organizations say 'A' and 'B' and 'C'...So they have no way of creating a perfect randomized test to gather data. Learning from past decisions is only possible by observing similar scenarios with alternative decisions.

3.3 Artificial Intelligence is a rapidly growing field.

In spite of the challenges, Intelligent Decision Support Systems have the potential to revolutionize human decision making by using Artificial Intelligence in congruence with Information Technology and Systems Engineering.

Because of the complexity of the Human Cognitive System there continue to be research gaps in the rapidly growing field of Artificial Intelligence. In some areas it is certainly more useful and accurate. For example Artificial Intelligence can help reduce errors in investment decisions in the area of Financial Management. It can do this by using neural networks to forecast stocks performance through the analysis of historical data. It may also sift through news, press releases and social media content that may impact stock prices to forecast potential changes which would help hedge fund managers to invest accordingly.

3.4 Managers must learn to Survive Artificial Intelligence and Stay Relevant.

Clearly, Artificial Intelligence will soon be able to take over the administrative tasks that consume the managers time at a much lesser cost. The strides in this area have become a threat to managers who feel that their very existence may be challenged. Managers must not only adapt to the world of Artificial Intelligence and Smart machines but also must use them to their advantage.

- 1) Let Artificial Intelligence do the Routine Administrative Tasks. More than 50% of a manager's time is spent on coordination and control tasks A store Manager has to constantly rearrange shift schedules around worker's illness or vacation or exit. Report Writing is another relevant example. Technology will in fact be able to draft a management report that purports to report facts freeing up managers for other

tasks. Artificial Intelligence can and will automate such tasks.

2) Managers must focus on 'Judgement' work. Several decisions require insight beyond what AI can draw out from

Data as Managers use the organization's history, and culture, empathy and ethical reflection. Manager's must use judgment oriented skills of creative thinking and focus upon data analysis and interpretation and strategy development in order to succeed.

3) Managers must collaborate with intelligent machines and not view them as the enemy. For example Kensho Technologies (provider of next-gen investment Analytics has created a model of collaboration in Human- Machine interaction)

4) It is not sufficient for Managers to be creative. They must develop the ability to draw out the creativity of others. They must strive to embed design thinking into the practices of their teams and organizations and create collaborative creativity.

5) Manager's must develop social skills that are critical to networking, coaching and collaborating and that will help them stand out in a world where Artificial Intelligence carries out many of the administrative and analytical tasks.

4. CONCLUSION

While the oncoming disruptions won't arrive all at once, the pace of development is faster and the implications more far reaching than most managers and executives realize. Managers must gear up to combat the onslaught of Artificial Intelligence by focusing on upgrading their social Intelligence not fearing the Artificial Intelligence of machines. The example of Microsoft's chat box learning to be racist is perhaps a reminder of how dangerous unsupervised artificial intelligence can be! Managers must remember that they shall continue to remain central to organizations, only their jobs will change to focus on things only humans can do. That Artificial Intelligence is not a threat but an opportunity to be made the best use of- and this opportunity can be best availed of if they use their own human intelligence to stay in command of the situation.

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Decision Support System in Precision Agriculture: Past Endeavors and Future Perspectives

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ABSTRACT-

Agriculture plays a vital in our daily life. The process of agriculture is improved by the use ICT. When we integrate Agriculture with Computer Technology it becomes Precision Agriculture. Geographical Information System, Global Positioning System, Sensor Network, Internet of Things and Artificial Intelligence are the different technologies and concepts that improved the production, irrigation and cultivation of Crops. Decision Support System is a special kind of computer program that helps a system for making decisions using analyzing the available data. It uses precise information, patterns and analytical models for making a decision in an organization. This paper is a review about how Decision Support System is useful in precision agriculture, what factors should be involved while designing DSS for precision agriculture. Taxonomy Survey and web based DSS and future gaps are also discussed in this paper.

Keywords : Precision Agriculture, Decision Support System, Expert System.

1. INTRODUCTION

Agriculture is only sector in India that not only provides the food for livelihood but also contribute heavy component (more than 15%) in overall GDP of Indian economy[1]. There are so many problems encountered by the farmers, agriculture scientists and other agriculture professionals like uncertain whether, poor knowledge of farmer, government policies etc. Computer Science and Engineering Technology discipline help to encounter such serious problems and to upgrade and update the process of agriculture. When the process of agriculture is carried out by the means of ICT enabled services it becomes the term Precision Agriculture. Precision Agriculture is not the luxury but the essential requirements of today's era. Precision Farming is generally defined as Information Technology enabled based farm management system to identify, analyze and manage variability within fields for optimum profitability, sustainability and protection of the land resource [2]. Decision Support System is one of the major components of Precision Agriculture. Decision Support Systems are the efficient software systems that help an organization/system for decision making. OLAP, FINANSEER, Micro SIMPLAN, Budget Express, SAS, Forecast Master Plus, ESP, Expert Choise, Decision Aide, Decision Pad, PROMCALC, GAIA, TACDSS, TAPS are the

examples of some Decision Support Systems [3]. The Decision Support Systems are time saver, effective, globally accepted in nature. The Decision Support Systems are best models for future predictions. Agricultural decision support systems are designed to assist the farmers to handle crucial problems in production of crop, utilizing available resources and data for best crop yielding. Smart technologies like Global positioning System, Geographical Information System, Image Processing, Artificial Intelligence, sensor network and smart phones are used to design and develop the agriculture based decision support systems as shown in the figure number 1.

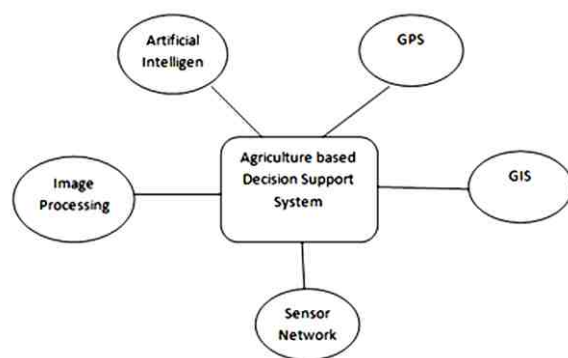


Figure 1 : Components of Agriculture based Decision Support System

In this paper, we will review all the major decision support systems developed in last two decades.

2. PAST ENDEAVORS

In this section we are elaborating the research work carried out in the field of agriculture based decision support systems. One of the major decision support system is DSSAT. Decision Support System of Agro-technology Transfer (DSSAT) is the software that consists of crop simulation models (crop simulation models are those simulators that estimated the crop yields by considering different parameters like weather, soil etc.) for more than 40 crops [10]. This efficient software is being used from last 20 years in more than 100 countries. It is very hard to say when the concept of agriculture based decision support system was actually introduced, so in this paper we are highlighting review of literature from the year 2000.

In the year 2000, Allan LeckJense et al. [3], developed a personalized decision support system named as Pl@nteInfo® for crop management. Authors conducted research on the feasibility of using Internet in real time agriculture advisory system. The main objectives of this decision support system was to visualize the collected knowledge and built user friendly advisory system for agriculture professionals and farmers. This system was capable for collecting, processing and integrates real time information and deployed on web-page.

In the next year 2001, J.J. Stoorvogel et al. [4], this decision support system was jointly carried out by Wageningen University, Montana State University, and International Potato Center for evaluate tradeoff between production and impact of the production on human and environment. This decision support system used GIS framework for linking data and model. The result of this model is represented in forms of curves which are easy to understand.

In the year 2004, Anna Perini and Angelo Susi[5], designed a decision Support System for integrated production in Agriculture. This Decision Support System was based on Tropos which has 5 stages of development. The first stage is Early Requirement Analysis which focuses on the understanding of problem. The second stage is Late Requirement Analysis which on the system to be introduced. The third stage is Architectural Design which is made up of various subsystems known as Actors, which has as unique tasks to perform. The third stage is Detail Design which is designed for making a Skelton at the micro level. The last stage is implementation Activity which performs the actual coding part of Decision Support System.

In the year 2005, L. Brown et al. [6], designed a decision support system named as NGAUGE for optimizing the Nitrogen fertilization of grassland. This decision support system was helpful for farmers to aware about the loss of Nitrogen in the soil in the grassland field. The decision support system got the prominent results by reducing nitrate leaching up to 46% without compromising the production considering the large variety of inputs like soil texture, weather, drainage status etc. The prominent feature of this decision support system was that it reduced the loss of Nitrogen without the cost of yield production.

In the year 2007, S. Karmakar et al. [7], review some decision support systems for manure management, the purpose of their work was to identify management criteria, literature review on manure decision support system and suggestion for integration of system components. Authors observed that majorly all decision support systems focused on nutrient managements, some decision support system consider the whole farm for management and none of these decision support systems designed for conventional and non-conventional systems. Authors strictly recommended that all sub-systems that influence the nutrient content should be considered for proper management and monitoring of manure.

In the year 2008, Kelly R. Thorpaet al. [8], described the methodology of Apollo (Apollo is an agriculture decision support system), they detailed about the functionality of Apollo using example application.

In the next year 2009, a model based DSS was designed by D.J. Parsons et al. [9], for weed management. This decision support system was named as Weed Manager that was capable to help arable farmers. This system was designed to two times scale, first on is single season and other one is several year rotation. Single season decision was supported by wheat and multi-stage heuristic model. Second i.e. rotational scale used seed population dynamics and stochastic dynamic programming concept. This DSS was tested by more 100 farmers and professionals for 2005-2006 & 2006-2007 crop seasons.

In the year 2010, Ahsan Abdullah[11], did not developed any decision support system but use Agriculture decision support system for analysing the Bt Cotton cultivation. This study was done in Pakistan as because yielding of Bt cotton was banned at that time. They showed the relation between Bt cotton and non Bt cotton with different parameters like pest and pesticides, chewing pest, farm size, predators and pesticides spray and sucking pest etc. the result was that Bt cotton crop is not subject to boll-worm complex, Bt cotton crop is not resistive in nature for sucking pests. Moreover, growth

regulator was a good choice to control whitefly and jassids population. Further, in this year Ming Li et al. [12] designed a PDA (Personal Digital Assistant) for keeping the production record. This PDA was not only capable of keeping the production record but also capable of acting as a Decision Support System for traceability in cucumber using Geographical Information System. It was a Windows Operating System based PDA which was made of four layers. Layer 1 was operation System which provided facilities for memory storage and high resolution display. Second Layer, the Software Support Layer was responsible for providing map management and data synchronization. The next layer was Model Layer, which facilitated the user as fertilizer decision support and early warning models, this layer was designed in C#. The last layer was Function Layer that provided facility keeping and decision making facilities.

In the next year 2011, soft computing is used in agriculture. E.I. Papageorgiou et al. [13] designed a Decision Support System for predicting yield of cotton based on Fuzzy Cognitive Maps. FCM is a special part of AI, which is a graphical representation of knowledge about a system. FCM is a combination of cognitive mapping and fuzzy logic. In this FCM, soil factors are considered such as N, P, K, types of soil etc. These factors have 2, 3, 4, 5 and 7 fuzzy values.

In the next year 2012, A web based Decision Support System named as CropScape was developed by Weiguo Han et al. [14], which helped farmers in disseminating and exploring cropland data products of US Conterminous. CropsScape offered online responsive maps, statistics of crop acreage, web based geo-processing such as on demand crop statistics and automatic data delivery. This system was divided in three layers i.e. Application Layer, Service Layer and Data Layer. The Application Layer deal with various geospatial based applications that incorporated with online service with local data. The Service Layer was responsible for make available geospatial data and its processing service with the help of Web Map Services, Web Feature Service and Web Coverage Services. The Data Layer was responsible for offering geospatial data, which was stored in database and in file. The data received by data layer was again sent back to the application layer for end-user.

In the year 2015, E. Giusti and S. Marsili-Libelli [15] designed a fuzzy based Decision Support System for irrigation and water conservation. In this work was an enhanced version of IRRINET model. Fuzzy toolbox of Matlab was used to develop this model. The main objective of this enhanced model was to-aware about whether irrigation is needed and its amount by different set of rules. This model was based on

fuzzy inference system which combined fuzzy based soil moisture model. This soil moisture model was designed with total water required to the crop, growing degree-days and crop evapotranspiration. Testing was done on corn, potato and kiwi.

In the last but not least year 2016, H. Navarro-Hellin et al. [16], designed a decision support system exclusively for irrigation, it was very smart system to estimate irrigation requirement of whole week of a crop. This decision support system considered climate and soil variables for estimations. This study was performed in Spain on Citrus tree.

3. FUTURE PERSPECTIVES OF AGRICULTURE BASED DECISION SUPPORT SYSTEM

In above section we have reviewed large number of agriculture decision support systems starting from the year 2000 to 2016. All these decision support systems are very efficient and deliver high rate of accuracy, but all these agriculture decision support systems we reviewed all mostly for the use of agriculture scientists and professionals. Developing countries like India where farmers are not so much familiar and comfortable for using technology are untouched from these decision support systems. So, in future smart phone based with effective layouts (user-friendly) should be designed and implemented, so that farmers can use them, then only the real utility of these efficient software will be taken out.

4. CONCLUSION AND FUTURE WORK

Agriculture is the prime source of livelihood. Precision Agriculture is now proven as benchmark for sustainable development in agriculture. Decision Support Systems are the vital component of precision agriculture. In this paper, we delineated agriculture decision support systems in chronological order. These agriculture decision support systems are designed for high skilled farmers, agriculture scientists and experts. Authors recommended that farmer oriented decision support systems should be motivated that help them at ground level and easy to use too. As a future we will review farmer oriented smart and emerging technologies that are capable to develop agriculture decision support systems.

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Intelligent Governance (I – Governance) of Smart Cities using Information Communication Technology

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ABSTRACT -

Development of Internet communication technology has changed the world tremendously. Today Urban population use communication technology in daily life for many house hold activities and this trend in upcoming generation is increasing day by day. The concept of modern cities or Smart Cities where almost all the activities of the human being are supported with the use of communication technology, which leads us in designing Smart Cities for effective Intelligent Governance: I-Governance. This paper proposes the day to day life activities dependent on hardware to interact with each other as using Internet of Things and extract meaningful knowledge from Big Data for the better development of population through effective I-Governance. Proposed design of Smart Cities will have traditional services of city blended by ICT enabled services, Digitizing them using different hardware architecture and clubbing the data to make Big Data useful for the governance of city. Using this Big Data produced, using different Internet services through interconnected devices policy drafts for the development of Smart Cities could be framed by respective stakeholders. Various components of Smart city would include Intelligent Transport system, Intelligent Administration, Intelligent Energy, Intelligent Health Care System, Intelligent Education System, Intelligent community services, Digital transaction, Digital Currency, Smart Mobile Applications, Smart Mobile wallets, Intelligent Governance and so on. Combination of two fast emerging technologies that is Internet of Things (IoT) and Big Data (BD) will enable us to design the proposed concept of Smart Cities for effective Intelligent Governance: I-Governance. Using existing physical hardware we will network all the devices and digitalize information to single point of control. This single point of control will use this information for planning and implementation of various smart services in Smart City. This development of Smart City infrastructure will deliver best I-Governance and I-Services for the population living in smart cities and uplifting their life style tremendously to make life more safe and easy.

Keywords

Smart City, Internet of Things, BigData, Intelligent – Governance (I-Governance), Intelligent - Services (I-Services), Digital Currency, Mobile wallet.

1. INTRODUCTION

Study on different research papers have been done on smart cities, Internet of Things, Big Data and E – Governance. These research publications published in various journals helped in analyzing the present work done and detecting the lacunas which remains unsolved in the current work.

Annalisa Cocchia in their paper “Smart and Digital City: A Systematic Literature Review” [01] suggested that within last few years of twenty century, two salient events have been occurring in the development of world population: movement of rural population towards cities and growth of Information Communication Technologies (i.e. ICT). Concentration of population in cities is growing at rocket speed that created both positive and negative impact at world level. On one hand it has positive impact by increasing the upliftment in the living standard of people, cultural level, opening of new job options and development of economic conditions. On the other hand, heavy growth of population in cities created negative impact

by increasing traffic jam, less space for living, less use of ICT enabled services, emission of carbon dioxide and greenhouse gases and solid waste disposal with consequences on health conditions. The new concept of smart cities is emerging, these cities are capable to resolve urban problems by paying attention to the environment using latest technologies of Internet of Things and Big Data.

Hollands, R. G. in their paper “Will the real smart city please stand up? City: Analysis of Urban Trend, Culture, Theory, Policy, Action,”[02] suggested that in the international context, in order to achieve the objectives established in the Kyoto Protocol, the Smart City concept was born and has been adopted by many institutions (e.g. European Commission, Setis-EU, OECD, etc.) which labeled as “smart” initiatives and projects relevant to cities sustainability. Especially, Smart City and Digital City are often used without specifying their similarities and differences.

During our research work would be using two main emerging technologies for designing a model of Smart cities framework for effective Intelligent Governance namely i) Big Data and ii) Internet of Things.

I) Big Data

Today a world without data cannot be imagine. Every organizations has to reterive useful knowledge and information, implement extensive studies by analyzing the data stored in structured format and fromulate meaningful Intelligence from that data. Anything ranging from product names and product description, to products availablity, to final purchases made by client, to work froce hired, etc. has become necessary for day-to-day activities. Thus data is the core entity on which any organization exists.

In reference paper “Big Data Analytics” [03] suggested that Big data means to datasets that are not only massive, but also huge in diversity and momentum, which makes them challenging to manage using traditional tools and techniques. Due to the increasing growth of such data, solutions are required to be need and made available in order to handle and reterive exact values and information from these datasets. Furthermore, Strategic planers need to be able to access meaning ful information and generate Intelligence from frequently updating data. This kind of tracking of voluminous data can be tracked using algorithms of Big Data by logical analysis.

A Practical Guide to Transforming the Business of Government. In: TechAmerica Reports [04] suggested about are latest BigData mechanisms available that are useful for controlling the exponential increase in network generated data, as well minimise database issues by developing the ability to reterive exact required data by the demand of user query.

Another : SAS Reports[05] review suggested that BigData implementation is useful in core industries like service oriented companies, manufacturing industries, ICT based companies, Engineering and Technology based organizations. This database implementation and analysis is helpful in increasing the productivity and client satisfaction of the organization by suggesting valuable inputs on the basis of data collected and analyzed.

ii) Internet of Things

The Internet of Things (IoT) means interconnection of digital devices used in every day life connected via wired or wireless internet. An example of a simple IoT object that digital survilance camera installed in drawing room, kitchen, looby

poarch of home, main gate ect of a Smart Home could be connected through mobile using internet connection. Services related to digital gadgets can be controlled through mobile application by widening the Internet to a network of interconnected objects” [06], the IoT will have a wide range of network of devices. These devices will include sensors to open the main gate lock, control the appliances available in kitchen, digital lights control mechanism of looby, recording of favourate TV channel and other sensors to control digital devices. These devices will genearte unstructured data that has to be converted usng proper alogrithms in meaningful information to control the digital gadgets and perform physical actions in appropriate manner.

Research paper [07] states that development and designing of architecture of Internet of Things (IoT) is very complex challange as the range of digital devices to be interconnected in the system is endless. Evey new digital device entering in the system has a different protocol and structure, so common structure and standard formulation had to be developed for providing services of IoT. This architecture should be secure as well as open to integrate the development and addition of new digital devices. Thus interconnecting devices should use common platfrom to store and reterive data and meaningful infromation for various actions to be performed.

“Convergence of MANET and WSN in IoT urban scenarios,” [08] pointed that the IoT concept, will in future make services of internet more interactive and user friendly. With the increasing use and development in wide range of services of IoT potentially large volume of data will be created by these devices. This volumnous data will create meaningful infromation that will be used for Intelligent Governance (I-Govenance). This new kind of Intelligence will generate entirely different kind of services helpful for the growth and development of society. Administration at local and celtral level will user this intelligence for proper planning and implementaion of various social welfare schemes. Common people will use this kind of platform for the ease of their day to day activity and smooth conduction of lifestyle.

Although till now we do not have any formal and structured defination of “Smart City” Our focus is to reduce the operational cost of public administration and make Intelligent governance. This could be achieved by making utilization of the public resources in proper and best manner, enhancing the service quality provided to the citizens of that city.

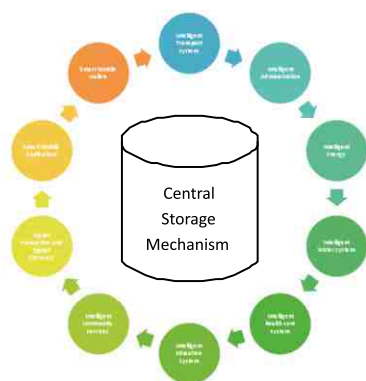
To develop and design Smart City network of services, Internet of Things will be useful for integration of hardware together whearas, Big Data will be helpful in storing the data in

systematic manner to reproduce meaningful Information to be used as services for Intelligent Governance. This infrastructure of Smart City Integration along with Government policies make effective utilization of Intelligent Governance by implementing IoT, BigData and latest hardware integration, should bring number of advantages in the management and effective utilization of services being provided in Smart Cities.

2. SERVICES OF SMART CITY

Objectives of our research paper is to identify the application model of Internet of Things (IoT) alongwith Big Data (BD) in the establishment of Intelligent Governance (I-Governance) System in Smart Cities. Using these emerging technologies of Information Communication Technology, we can transform E-Governance system to Intelligent Governance (I-Governance) system. Identify the core areas, where use IoT and BD for developing the intelligent system in smart cities. These core areas include the various services to be brought under one umbrella for efficient use of data for every service. Various services that could be brought under one umbrella of Smart city would be following.

- Intelligent Transport system
- Intelligent Administration
- Intelligent Energy
- Intelligent Water system
- Intelligent health care system
- Intelligent Education System
- Smart community services
- Digital transaction and Digital Currency
- Smart Mobile Applications
- Smart Mobile wallets



All these leads to the Designing of Smart cities for Intelligent Governance (I-Governance).

All these systems will be integrated with central data bank. With the increase in storage capabilities of highend ultra modern hardware and mechanism of data collection, large volume of data could be generated easily and rapidly. Every moment, data is being generated and needs to be examined and saved to reterive effective value. With the development of latest hardware, so organizations need as much as value as possible from the huge volume of stored data. Huge amount of data sizes are increasing very fastly, currently starting from a few dozen terabytes (TB) to many petabytes (PB) to Exabytes (XB) to Zettabytes (ZB) to Yottabyte (YB) of data in a one data set. This unstructured format of large data is now stored in database. The volume, variety, and constant change of such data require a new type of data analytics, Big Data Analytics, as well as new mechanism of data storage and analysis mechanism. Such unscalable amounts of big data need to be analyzed properly, and interconnected knowledge should be retrieved.

We will develop model through which every information of all different hardware working to get data in various different forms would be clubbed together using IoT to formulate Big data that will be utilized efficiently for the Intelligently designing policies for the development of Smart Cities including both infrastructure development and enhancement of common man living standards.

3. IMPLEMENTATION OF SERVICES

During the course of research work, focus on the following methods to complete our research work. Prepared a frame work for connecting various technologies to generate Big Data. Used all latest hardware device and joined them through wireless network and physical wired connectivity, so as to generate central data bank in form of Big Data. These neworked devices are managed through Cloud based services made available to the stake holders of the smart city. These cloud based services and neworked devices are controlled using architecture of Internet of Things. Now, after building the infrastructure for the smart city, all the previously mentioned services of Smart City are clubbed together for generate Big Data.

From this Big Data using various algorithms of reveriving data services of smart city are being made available to both administration and people living in city. Using this automated data for services, governance of smart city will become very useful for all the stakeholders. Thus, automated services will

provide Intelligent Governance (I – Governance) taking E – Governance a step ahead. This will help city administration as well as people living in the smart city in living more comfortable and smart life.

This Intelligent governance system will keep track of almost every services to be provided in Smart City. Intelligent Governance (I – Governance) is helpful using IoT and BigData in sustainable development of Smart Cities. Therefore, development of “Smart cities” concept will focus mainly on the Intelligent Governance for the growth of population as well as of infrastructure.

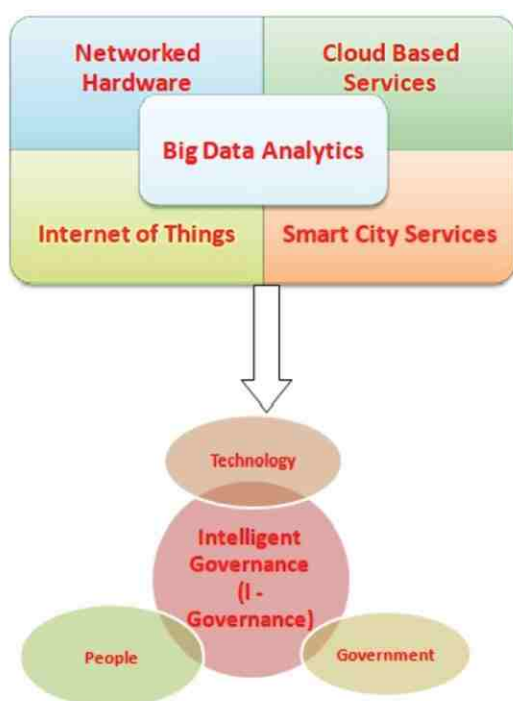


Fig: Intelligent Governance: Smart City, IoT and Big Data Analytics

4. CONCLUSION

Thus proposed framework for the use of Internet of Things (IoT) and Big Data (BG) in developing Smart cities for the effective use of infrastructure using latest technologies for Intelligent Governance (I- Governance). Use of interconnected devices through Internet of Things and Big Data will upgrade the lifestyle of people living in such Smart cities upto next digital level. This design of Smart cities will promote Intelligent Transport system, Intelligent Administration, Intelligent Energy, Smart health care system, Intelligent Education System, Intelligent community services, Digital transaction, Digital Currency, Smart Mobile Applications, Smart Mobile wallets. Thus using proper and

Intelligent planning effective Intelligent Governance system will manage the up gradation of standards and growth of economic facilities.

Further there will be scope of improvement of every services available in the smart city. With the establishment of more Intelligent hardware and more complex data analytics better model of the smart cities could be converted to intelligent self sustainable cities.

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Search Engine: An Overture

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ABSTRACT -

The World Wide Web is a wide platform where people to share information globally. As the use of web increases day by day amount of information also grows very rapidly. In order to dig out relevant and necessary information, a means is required to search the Web. This tool is search engine. A search engine is a software program available through the internet that searches documents and files for keywords and returns the results of any files containing those keywords. Search engine uses various algorithms to search the desired contents and methods to rank a given page.

This paper shows overview of search engine. Search Engines can search only a small portion of total available web pages because most of the data available are unstructured. Each search engine uses different algorithms to search and rank pages; but there are certain things that all search engine algorithms have in common like Relevancy, Individual Factors and Off-Page Factors along with some closely protected secrets for at least two reasons: search engines companies can protect their methods from their competitors and make it difficult to website owners to manipulate their ranking.

Keywords : Search engine, website and webpage

1. INTRODUCTION

Internet is a vast pool of web pages comprises of billions of heterogeneous pages having structured and unstructured data .When a user wants to access web pages, a special site is needed. Internet search engines are used for the same [1]. A Search Engine is a tool used for information retrieval system, which locates the web pages relevant to user queries. The results are being presented in the form of lists called hits in order of relevancy and one being shown at top having high priority and at bottom having low priority [2]. Search engines works on Indexes and these indexes are regularly updated to operate swiftly and competently. The quality of index also ensures the distinction of result. Search engine may be an enterprise search engine, personal search engine and mobile search engine [3]. A search engine may be a full text search engine which retrieves information from web, establishes database and retrieve it according to the user's query. Another type may be a directory search engine it only retrieves all the entries of directory listing. Another search engine is META search engine which provides search results from multiple search engines according to user's query. A vertical search engine focuses on specific field and search demand [4].

2. ARCHITECTURE OF SEARCH ENGINE

Web: The World Wide Web is an information space where documents and other web resources are identified by Uniform Resource Locators (URL), interlinked by hypertext links, and can be accessed via the Internet [5]. As the Web persists to cultivate swiftly, it requires better search engines for fast and effective working. There are three important uniqueness of the web due to which crawling are complicated: Heavy Internet traffic, Fast rate of change of contents of documents, Dynamic Page generation.

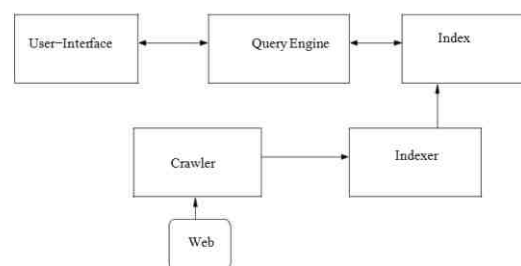


Fig 1: A centralized architecture of a Web search engine

Crawler: A crawler is a program that visits Web sites and reads their pages and further information in order to craft entries for a search engine index. It refers to the capacity of a search engine to negotiate the billions of interlinked pages on the World Wide Web in immense amounts of pages being spawned on an hourly origin unattainable for users, unaccompanied to visit evidence and systematize them.

Web crawler is the software used to craft a facsimile of the whole visited pages for an indulgence by a search engine that will catalog the downloaded pages to provide swift searches. It can also be tailored for automating defense tasks on a website, such as links and validating hypertext codes. They are also used to collect peculiar information from websites like searching e mail address and URLs.[6].

Indexer: Web pages unruffled by the crawler are indexed by an additional component called 'indexer'. Indexer maintains the index and ensures that the index should modernize periodically and new words included in the same. Indexing is an essential part of it and built over an assortment of credentials.

Index: Index is a list data to make its accessing fast. Indexing is a process of creating a massive list of words that crawls through the visited web pages. The mined contents is stored and sorted in an organized way for further use. The objective of indexing is to optimize rapidity and routine in finding relevant documents for given search query. Index requires additional memory space and is feasible for large data.

User-Interface: Search user interface provides an environment which aid the explorer's perceptive and phrase of its information desire. It assist users to plan its query ,select better available information recourses, recognize search outcomes and keep track of the improvement of the search. Different users interact with the search engines differently and factors which affect the interaction may be type of task, affordable time to invest in the process and the domain proficiency of the information hunter. [7].

Query Engine: Query engine is an important part of search engine architecture. It takes query of user as an input evaluates and executes the request and returns

result back to its user. It acts as an intermediate layer between client and underlying resources. It encapsulates the processing within it and shielding the clients from details. Generally query engine is built as a reusable component. The interface of a Query Engine contains classes that represent search requests and classes that wrap results [8].

3. FEATURE OF SEARCH ENGINE

Search engine is a very useful tool for accessing the web. A search engine must be strong and fast enough that can search the perceptible and undetectable data from the outsized web. It can access significant results, provides user easy routing, gracious and customizable user interface for relevant results and also capable to manage the outcome according to different criteria like viable and open access content [9].

It must possess following three features for facilitating user's search [10].

Relevant results- Search Engine must provide relevant results that user actually interested in. Relevance denotes how well a retrieved document or set of documents fulfills the information requirement of the user.

Easy to read interface- The interface provided by search engine should be trouble-free and must has simple interface so that a beginner can work on it easily and conveniently.

Helpful options to broaden or tighten a search- Search Engine must be capable to provide assistance to users so that they can move towards the desired results. Various options available on search engine not only guide how and where to move but also helps to broaden and tighten their search.

4. WORKING OF SEARCH ENGINE

Almost all search engines work in same way. Following steps explains the general working of search engine [11]-
Step 1-Search engine is a complex program or algorithm. These algorithms are called web crawler also known as spider or bot. Its prime task is to search the web pages.

Step 2-Spider finds new web pages from following the links in the existing pages. Once the page is searched it is read by the crawler and a list of the content is added in the huge database called index. These data are kept in coded pattern to that memory can be saved.

Step 3-Whenever a user inputs its query to the search engine, it focuses on the database where index is saved and finds the matching of the given query. It finds millions of matched pattern, so it is very important to use algorithm for faster results.

Step 4-Different search engines use different searching algorithms for its fast searching. Searched information is fetched from the database in minimum time and the result is ready in the form of Search Engine Result Page (SERP). For a better ranking of the website, it is very necessary to update the websites on regular basis because regular updating and unique content give website a better position on SERP.

5. SOME POPULAR SEARCH ENGINE-

Google- It is a very popular search engine used by maximum net surfers. Its crawler is Google bot. Crawler not only fetches web pages by link quantity but emphasis on quality also. For fabricating high accuracy effect, Google search Engine provides two essential features that are first, utilize a link structure of the Web to evaluate an eminence ranking of each web page, this type of ranking is known as Page Rank [15]. Second, utilization of links to recover Search Outputs Although their algorithm is smartly designed but they still produce biased results and they rank old pages with high score than newer ones [16].

Bing- This search engine is owned and operated by Microsoft. Bing provides the facility of searching web, video, images and map. It keeps a recent search history and helps user to easily jump back to recent search. Twitter integrated map facility enables user to see live media activity. Apart from providing facilities it is not free from some limitations like filtering of new searches by country is not supported and is not as simple as Google [17].

Yahoo- Another search engine that is very popular among net surfers. It has very large contents and a paid inclusion program also. Its results are more wide ranging than any other search engines specially for shopping. "Exact matching" has additional consequence than "concept matching" in Yahoo search engine. Yahoo formulates them vaguely additional vulnerability for spamming, which provide auxiliary significance to Meta keywords and narrative tags [18]. Its shopping feature most often keep user away from the main stream.

Ask- It is a popular search engine among contemporary communities. Their market share is very limited in comparison to their competitors. Because they emphasis more on newsworthy neighborhood, which are deliberate to order sites.

5.1 Some More Recent Search Engine:-

DuckDuckGo- This is a clean and simple search engine. This search engine has some efficient features like 'zero-click' information i.e. all answers are found on the first results page

and it also possess disambiguation property. Also it has less ad spam than Google [19].

Dogpile- Before Google, Dogpile was an efficient and fast search engine, but soon Google became the first choice. But now a day's Gogpile is coming back and provides more pleasant looks and presentation. It has more growing index and quick representation.

Yippy- It is a deep search engine. It is used to search other search engines for the users. It net surfers want to explore some obscure blogs, government information, news academic or other contents then it is not possible by conventional search engines but yippy provides results for such type of searching.

Table 1.1 : Proportional Analysis of Various Search Engines [20]

Features	Google	Bing	Yahoo	Ask
Website	google.com	bing.com	yahoo.com	ask.com
Web Search	Yes	Yes	Yes	Yes
Explore Images	Yes	Yes	Yes	Yes
Explore Videos	Yes	Yes	Yes	Yes
Explore News	Yes	Yes	Yes	Yes
Explore Books	Yes	No	No	No
Proceed Search	Yes	Yes	Yes	Yes
Shopping	Yes		Yes	Yes
Conversion Service	No	Yes	No	No
Multilingual Support	Yes	No	No	No
Business Solution/Service	Yes	No	No	No
Themes	Yes	No	No	No
Case susceptible	No	No	No	No
Protected Search	Yes	Yes	Yes	Yes
Preferences	No	Yes	Yes	Yes

6. CONCLUSION

A Search engine is the basic tool helps in searching information from web. Its intelligent design ensures that intended data can be searched in minimum time. This paper describes various search engine algorithms in detail. But as we know the size of the web increases day by day so it is very essential for every search engine that more intelligent algorithms are to be designed so that best ever, relevant, specified and quality results can be achieved in minimum efforts by the users.

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