



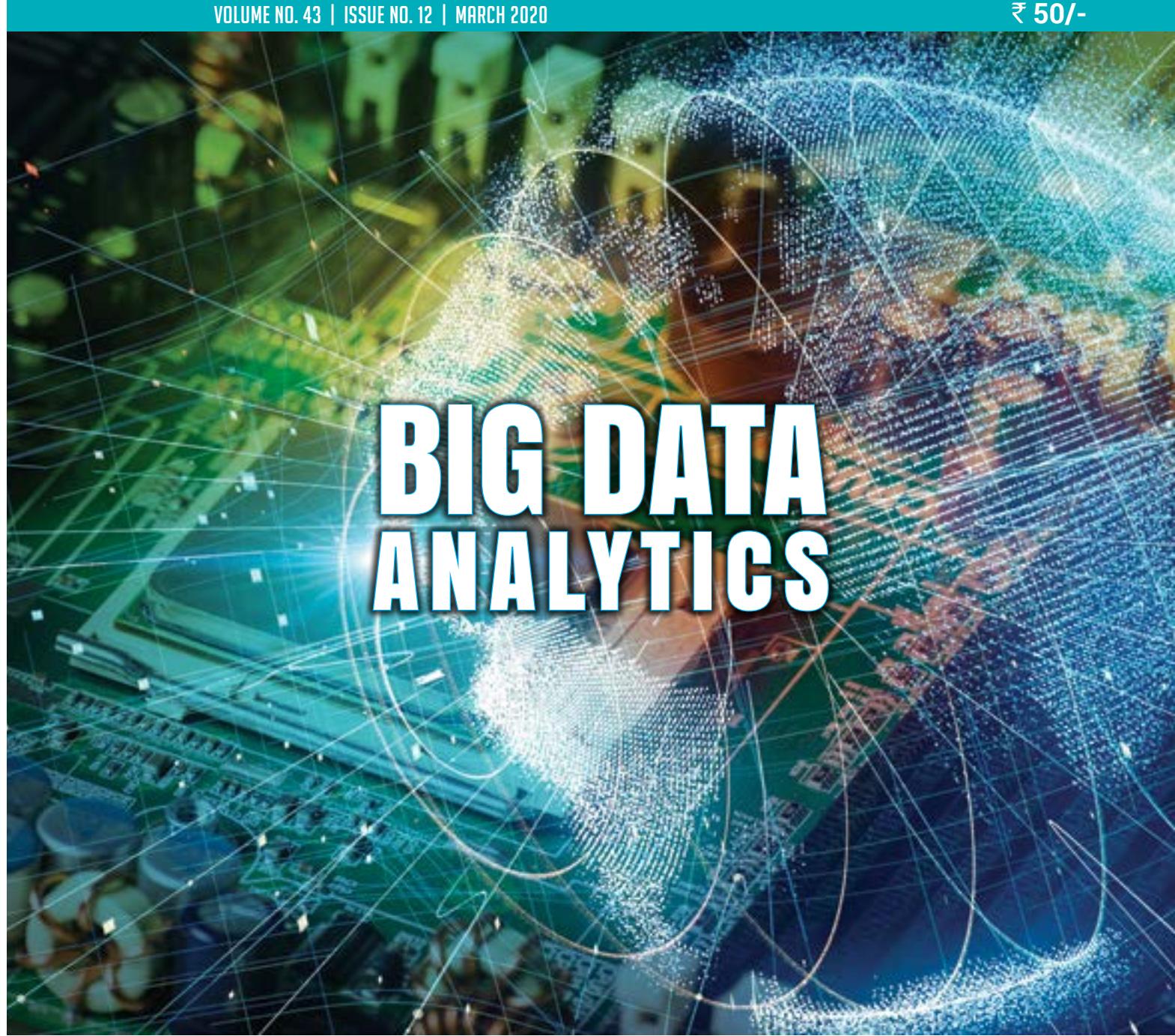
CSI Communications

Knowledge Digest for IT Community

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BIG DATA ANALYTICS



INVITED ARTICLE

Titbit from the History of Computing-8 **06**

COVER STORY

Big Data : A Technical Approach **08**

TECHNICAL TRENDS

The Role of Data Science in
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From the Desk of Chairman, Publication Committee



Dear Fellow Members,
Greetings.

In the recently held Annual Convention at Bhubaneswar, a number of papers, both contributed and invited were presented. Panel discussions were also held. Some of the presented papers were good and can be considered for publication in CSIC/Journal of Computing. I request Dr. S. Agrawal and Prof. R. R. Deshmukh Editors-in-Chief of CSI Communications and Journal of Computing respectively and Dr. (Mrs.) Ritika Wason, Editor CSIC to explore this. Prof. Rajaraman's articles are highly educative.

Distributed systems is an important area in Computer Science. Leslie B. Lamport - an American computer scientist made important contributions in this area. Lamport is best known for his seminal work in distributed systems, and as the initial developer of the document preparation system LaTeX. Leslie Lamport imposed clear, well-defined coherence on the "seemingly chaotic behavior of distributed computing systems", in which several autonomous computers communicate with each other by sending messages. He devised important algorithms and developed formal modeling and verification protocols that improved the quality of real distributed systems. These contributions have resulted in enhanced correctness, performance, and reliability of

computer.

Lamport's research contributions have laid the foundations of the theory of distributed systems. Among his most notable papers are: 1. "Time, Clocks, and the Ordering of Events in a Distributed System", 2. How to Make a Multiprocessor Computer that correctly executes multiprocess programs which defined the notion of sequential consistency etc.

These papers relate to such concepts as logical clocks and Byzantine failures. They are among the most cited papers in the field of computer science and describe algorithms to solve many fundamental problems in distributed systems. These concepts need to be taken further and I hope our readership will be interested to pursue.

I thank Prof. A. K. Nayak, President CSI for spending considerable time and effort in regulating the themes and monitoring CSI Communications and Journal of Computing. Suggestions are invited for quality improvement and innovative ideas.

With best compliments

Dr. D. D. Sarma
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Editorial



Prof. (Dr.) S. S. Agrawal

Chief Editor

Dr. Ritika Wason

Editor

Dear Readers

Big data is at the foundation of all the megatrends that are happening." - By Chris Lynch, American Writer of Books

- Chris Lynch

The above quote *By Chris Lynch, American Writer of Books* highlights the importance of big data in the present context. Simply explained, big data are extremely large data sets that may be analyzed computationally to expose patterns, trends and associations.

We dedicate this issue to understanding and appreciating how big data is altering the computing practice and applications. Continuing with our invited series Titbits from the History of Computing-VIII by the legendary Prof. V. Rajaraman, this issue discloses, "**ETA 10 Supercomputer – Genesis and Demise**". This article traces the birth and demise of the ETA systems. The first article, "Big Data: A Technical Approach" by Dr. A. R. Revathi, Ms. P. Rajalakshmi and Ms. M. Shwetha details the nuances of Big Data. The next story entitled, "Data Privacy and Big Data" by V. Rajendran highlights the security concerns of big data. The article, "War on Big Data" by Dr. Ritika Mehra, Mr. Mayank Upadhyay and Ms. Vishakha Arya highlights the need for strict data protection laws and guidelines while big data acquires wider market foothold.

The technical trends section discusses the role of data science in big data analytics in the article, "The Role of Data Science in Big Data Analytics-Overview" by Dr. S. Balakrishnan. This section also reports how big data analytics is being applied in agriculture. The next article, "Data...Data...Data Everywhere" by Dr. Xavier Chelladurai delves on the role of data in digital transformation and making the role of data analytics.

The research front showcases, "Research Challenges and Automated Tools in Big Data Analytics" by Dr. B. Chidambara Rajan, Dr. M. Senthil Kumar, Ms. P. Kiruthika and Mr. M. Rajakumar gives a brief overview of the underlying research challenges in big data analytics. The next article, "Big Data Analytics for Agriculture- Scope and Future" by Dr. P. Ganesh and Dr. Aparna K. details the application of big data to agriculture. The article, "Electronic Dumpster Diving" by Ms. D. Evangeline elaborates the Dumpster Diving network attack. How big data is contributing to other fields of collaborative research is depicted in, "Astronomical Big Data Analysis - A

New Paradigm for Collaborative Research" by Snigdha Sen that describes how big data analytics is proving to be a boon for astronomers.

The issue also reports important activities, events, collaborations done by various institutions and chapters of CSI and CSI congratulates them for conducting such activities. Various student branch inaugurations and activities have also been highlighted.

The issue also reports varied student branch activities as well as workshops. Varied student-centric activities carried by different regional chapters of CSI like industrial visit and programming competitions have also been reported. Glimpses of CSI 2020 have also been included to give the reader a detailed glimpse of the event.

We are extremely thankful to all our contributors as well as readers. Original, plagiarism-free, unpublished articles are solicited throughout the year from CSI members as well as non-members. Our sincere gratitude to the CSI publication committee members, editorial board members, authors and reviewers for their great contribution and support in realising this issue.

Our special thanks to Prof. A. K. Nayak, President, CSI for his constant encouragement, support and guidance in publication of March, 2020 issue.

We look forward to receive constructive feedback and suggestions from our esteemed members and readers at csic@csi-india.org

With kind regards,

Prof. (Dr.) S. S. Agrawal

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President's Desk

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Big Data combined by topics such as data analytics, and machine intelligence is a technology-driven process for analyzing data and presenting actionable information to help executives, managers and other corporate end users make informed business decisions. A lot of work has to be done and applied for numerous applications.

The theme of this issue of CSI Communications Big DATA Analytics is of great importance as it will focus on Technology Innovation and Trend Setting initiatives in Academic, Research, Corporate, Business, Industries, Government, Education, Security and Health Care domains for the citizens. The Global economy will experience the contribution of this great Technology in the current decade but the benefits of the same should be completely and uniformly understood and utilized by the Professional Community.

In the year 2019-20, CSI has played a significant role in creating awareness & research contribution by organizing massive numbers of Seminars, Conferences & Workshops starting from Student Branch Level, Chapter Level, State Level, National Level & International Level on current state of affairs of technological development. The year witnessed 493 plus events & activities at different part of the country which reports were published in CSI communications. The month of March issue alone contains the report of 53 events. I do believe, in the coming months, the quantum of such activities shall be in progress & such events will be regularly covered in CSI communications.

At the end of my tenure as the president of this great professional society, I have the great pleasure to greet you all and convey my respect & gratitude to all the Fellows as well as my best wishes & sincere thanks to Senior Members, Associate Members, members of the managing committee of the chapters, corporate members, academic institute Members and young student members of CSI.

I have been honored by getting the opportunity to serve the members of CSI as President for the year 2019-20. Together with the executive, NC members, I would like to say thank you for giving me & to our ExecCom members 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 was, am & will be positive that we can achieve our vision to be a globally recognised professional body, bringing values to our members, the profession and the larger community as a whole.

This year, the CSI Annual Convention was held at Bhubaneswar, Odisha on 16th, 17th & 18th January 2020 with the theme "Digital Democracy- IT for Change" for which the dedicated & devoted Members of the Bhubaneswar Chapter did a commendable job with their best efforts and made the convention excellent & scale of height. I congratulate each of them for making the Convention a land mark which shall be referred as a torch bearer for the future annual convention to be taken place.

At the outset, I express my sincere thanks & gratefulness to each members of my Executive Committee & Nomination Committee particularly the Regional Vice Presidents for their whole heart support to me for each of my decisions for the greater & better reach of the society as well as helping the society in organizing record number of activities in the history of the society including crossing the records for organization of no of state, regional student conventions including a very effective & productive National Student Convention at Mody University of Science & Technology at Lakhmangarh, Rajasthan. In the same time my sincere thanks are extended to all of our State, Regional



& National Student Coordinators who have contributed significantly by their effective & timely coordination with the RVPs for translating all our plans of activities in to action. Particularly by the great effort of our RSC-II, we are having the inclusive growth of CSI with our presence in the North-East part of the country.

Many of the activities which were not conducted since last many years were got revived during this year. The IT Excellence Award, Young IT Professional Award, Publication of CSI Journal of Computing, Clearance of the back dues of the Chapters, Record number of participation of the Chapter Representatives & Student Coordinators in the Annual Convention are some of the examples with many more. The Growth of Life Membership, significant growth of Student Membership, growth in financial positions are some of the remarkable highlights of the growth of the Society.

I got the full support of all most all Chapters & all the student branches of the country which resulted to make this year most significant & vibrant. I express my sincere thanks to all the chapter chair persons & Student branch coordinators for their great help which shall be remained in my mind as sweet memory.

Through out my career in playing the important roles in CSI, many Senior Fellows helped me in mentoring & grooming to bring up to this level. I express my gratitude & thanks from core of my heart for their great help & Support.

I will fail in my integrity, if I do not thanks to my office executives, staffs of CSI Head Quarter at Mumbai and Education Directorate at Chennai and key persons of our printing and publication house of GP Offset Pvt. Ltd. at Mumbai for their continuous help and support with cordial and sweet relationship during my work as the President of the Society. My sincere thanks to all of them.

At last but not least I apologize for any thing if I have not done properly to touch the expectation of our members.

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

Thanking you & looking forward to your continued cooperation & support for the all round develop of CSI.

*Thanking you all &
wishing you all a Happy Holi*

With warm regards,

Akshaya Nayak

Prof. Akshaya Nayak
President, CSI





Titbit from the History of Computing – 8

ETA 10 Supercomputer – Genesis and Demise

► **V. Rajaraman**

Emeritus Professor in the Supercomputer Education and Research Centre, Indian Institute of Science, Bangalore. Email: rajaraman.v37@gmail.com

“History, despite its wrenching pain, cannot be unlived, but faced with courage need not be lived again”

- Maya Angelou

The Cambridge dictionary meaning of titbit is “A small and particularly interesting item of gossip or information”.

Genesis of ETA Systems

Control Data Corporation (CDC) was a mainframe computer manufacturer that was established in 1957 in Minneapolis in Minnesota, USA. It started manufacturing computers intended for intensive scientific computation as a competitor of IBM which was dominant at that time. The main team of designers in CDC included the legendary Seymour Cray and William Norris. The first large computer it designed and marketed was CDC 1604 followed by CDC 3600 which was installed by many universities in the USA and also at TIFR in Mumbai. CDC went on to manufacture faster computers including CDC 6600 in 1964 and CDC STAR-100 in 1974 which was the first supercomputer that used vector processing and its speed was 100 Megaflops (Million floating point operations per second). Seymour Cray who was one of the main designers of CDC computers decided to leave CDC in 1972 to form his own company devoted exclusively to design, develop, and market supercomputers. The first supercomputer he designed was Cray-1 that used a pipelined vector processor achieving a speed of 160 Megaflops that was the fastest supercomputer in 1975. It cost \$8 Million and around 80 systems were sold. CDC in competition designed CDC Cyber 203,205 series of supercomputers. They were also vector processing computers but were slower as the vectors were stored in the main memory rather than in vector registers in the CPU. In some problems that required long vectors CDC supercomputers outperformed Cray. However, Cray dominated the supercomputer market.

In 1983 CDC decided to design the next generation of supercomputers to succeed the CDC Cyber 20x series. A group consisting

of Lloyd Thorndyke, head of the CDC advanced design laboratory, Neil Lincoln, the chief engineer of the CDC 205 project, and several other engineers convinced the CDC top management headed by William Norris that a separate corporation should be spun off from CDC to design it. The reasons given were:

1. A new company devoted primarily to manufacture supercomputers can generate capital by selling shares to both public and private investors.
2. A small specialised new company can be nimbler and take quick decisions to meet the challenging deadline of designing and marketing a new architecture supercomputer in three years.
3. A specialist company set up for designing state-of-the-art supercomputers can get government funding as a R&D project.

A new company named ETA Systems was established in 1983, a few kilometres from CDC headquarters, with the aim to design, build, and market a 10 Gigaflop supercomputer ETA 10 in three years.

Hardware design of ETA 10

One of the first decisions to be taken by the designers of ETA 10 was to select the integrated circuit chip technology to be used in the Central Processing Unit (CPU). Most supercomputers in 1980s used Emitter Coupled Logic (ECL) as it was the fastest technology. However, ECL circuits consumed more power and the packing density of transistors in ECL was lower compared to Complementary Metal Oxide Semiconductor (CMOS) logic. CMOS was the emerging technology with a lot of effort put in by the semiconductor industry to increase the number of transistors that could be packed in a chip. Switching speed of CMOS was slower than that of ECL. The ETA design

team decided to use CMOS technology in its CPU. To increase the switching speed of CMOS the team came up with an innovative idea of immersing the CPU in a liquid nitrogen bath at -196.5° C. (Nitrogen is an electrical insulator). Studies showed that cooling CMOS circuits increased their switching speed by a factor of two, speed similar to ECL circuits. The packing density of transistors in a chip increased dramatically by choosing CMOS. The CPU consisting of 250 integrated circuit chips could be packaged in a single printed circuit board eliminating error prone back panel interconnection circuits. The printed circuit board that was designed had space to place 260, 1 sq. cm IC chips, each chip with 20,000 gates. Each IC had 284 pins including 40 power and ground connections. The printed circuit board was a marvel of technology in the 1980s. It was a 41.9 cm × 57.2 cm × 0.64 cm, 44 layers board on which the logic chips were mounted and interconnected using 75000 plated through holes. Each IC chip had innovative self-checking logic circuits for ensuring reliability. At the end of the board there was a 3864-pin connector to connect the CPU to the memory system and I/O. An enclosure was designed to store liquid nitrogen and up to 2 CPU boards could be immersed in it [1]. The system was a shared memory parallel computer with up to 8 CPUs. The memory



ETA 10 CPU Board being shown to me (third from left) and my team at the ETA factory

system was mounted on the CPU enclosures and connected to the CPUs. Each CPU had 32 MB SRAM. The system was a shared memory parallel computer with 2GB DRAM that was shared by all CPUs. Besides these there was a fast communication system buffer memory to speed up communication between CPUs in the parallel configuration.

ETA 10 system had 10 I/O processors and used fibre optics to connect them to the memory – an innovation at that time. The CPU clock speed was 7nsec. The largest 8 CPU liquid nitrogen-cooled system, ETA 10G had a speed of 10 GFlops, a very high speed in 1986. ETA systems also marketed an air-cooled version, ETA 10P whose clock was 19nsec and speed 370 Mflops. To sum up, the hardware design was highly innovative and met the design goal of 10 Gflops computer.

Software of ETA 10

While hardware design was a triumph of technology, software design was an enormous failure. ETA software group decided to design an entirely new Operating System (OS) named EOS that was to be upward compatible with VSOS the OS of CDC 20x series of supercomputers. They also made a wrong decision to use Cybil, CDC's proprietary language (derivative of Pascal) instead of C to write the OS programs. The problem was compounded by non-availability of ETA prototype hardware to test the OS. The supercomputer being made by Cray was shifting to Unix based OS away from proprietary OS. The users were also becoming more comfortable using Unix and were demanding it. The development effort of EOS was so slow that

when the first ETA 10 was delivered to the Florida State University it was not ready and the University had to run manually one program after the other. Towards late1985, ETA bowed down to market demand and started developing Unix with the assistance of an outside contractor and it was ready by 1987. Most users preferred Unix OS. EOS had many bugs. ETA was unable to run many important application programs as it had not developed the necessary software including an optimizing Fortran compiler. Indian Institute of Science was evaluating ETA along with Cray and other supercomputers in the market in 1987. The institute sent 15 application programs to all the vendors including ETA. ETA was unable to run some of the important applications such as NASTRAN due to the non-availability of appropriate software whereas Cray was able to run all the programs in record time.

Demise of ETA Systems

ETA Systems sold 7 liquid nitrogen-cooled systems and 27 air-cooled systems and had the best price/performance ratio of any supercomputer in the market in 1989. In spite of this, CDC decided to close down ETA Systems in April 1989. Around 800 employees of ETA Systems were asked to assemble in an auditorium in Minneapolis and the HRD manager announced that all employees would be given one month's salary and terminated.

The three reasons for starting ETA Systems, namely obtaining capital from the market, making it independent of CDC's management, and getting R&D funding from the government were not seriously followed up. CDC treated ETA System as a fully

funded and controlled subsidiary, interfering even in its day to day functioning. No R&D funding was given by the government. CDC's mainframe business was becoming unprofitable and it found it difficult to support ETA Systems. CDC tried to sell ETA Systems but found no buyers [2]. The software of ETA was poor. Liquid nitrogen cooling of CPU board put off customers as the board cannot be taken out abruptly from liquid nitrogen to repair as it would crumble. Each repair of the CPU required the CPU board to be slowly heated and brought to room temperature, repaired and immersed again cooling it slowly to liquid nitrogen temperature. This was one of the most intimidating features of the computer as the time to repair each fault would be a few hours. Besides this problem, liquid nitrogen needs replenishment as it would evaporate as the CPU board gets heated during its operation. To replenish liquid nitrogen ETA systems designed a compressor that would take nitrogen vapour, liquify it, and pump it back to the liquid nitrogen tank. Customers wondered, if they bought an ETA system, whether they would be running a computer or a liquid nitrogen plant!

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- [1] D.M. Carlson *et al*, The ETA10 Liquid-Nitrogen-Cooled Supercomputer System, IEEE Transactions on Electron Devices, Vol.36, No.8, August 1989, pp. 1404-1413.
- [2] Rob Peglar, The ETA Saga, https://yarchive.net/comp/eta_peglar.html

About the Author



Prof. V. Rajaraman (CSI Fellow), Ph.D. (Wisconsin), is Emeritus Professor in the Supercomputer Education and Research Centre, Indian Institute of Science, Bangalore. Earlier Prof. Rajaraman was Professor of Computer Science and Electrical Engineering at IIT, Kanpur (1963-1982), Professor of Computer Science, and Chairman, Supercomputer Education and Research Centre, Indian Institute of Science, Bangalore (1982-1994) and IBM Professor of Information Technology, Jawaharlal Nehru Centre for Advanced Scientific Research (1994-2001).

A pioneer in Computer Science, education and research in India, Prof. Rajaraman was awarded the Shanti Swarup Bhatnagar Prize in 1976. He is also the recipient of Homi Bhabha Prize by U.G.C., Om Prakash Bhawani award, ISTE award for excellence in teaching computer engineering, Rustam Choksi award, Zaheer Medal by the Indian National Science Academy, Padma Bhushan by the President of India in 1998, and lifetime contribution award by the Indian National Academy of Engineering and Computer Society of India. He was awarded DSc (h.c.) by IIT, Kanpur and by Bengal Engineering and Science University, Shibpur. An author of several well established and highly successful computer books, Prof. Rajaraman has published a large number of research papers in reputed national and international journals. (A detailed biodata may be found in en.wikipedia.org/wiki/Vaidyeswaran_Rajaraman).



Big Data : A Technical Approach

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“Without big data analytics, companies are blind and deaf,
Wandering out onto the web like deer on a freeway”

– Geoffrey Moore, American Management Consultant and Author

INTRODUCTION

In early days, the data used was very less and there were not many industries that were using data in software. The data was in the form of spreadsheets and databases. In that case they found it trouble-free to store, handle and manage the data. It was even easier to bring conclusions from the known information. The world has changed a lot in the past few decades; the amount of data is increasing in an unimaginable way since software is introduced in nearly every place. The information emerges from everywhere, in various forms and in different sizes. Thus, it is laborious to manage huge data especially from the industries and workplaces as said in [1]. This is where Big Data comes in scene.

Big data fundamentally refers to huge volume of data that cannot be stored and processed using a traditional approach within the given time limit. Big data commonly represents data in Megabyte, Kilobyte or Zeta byte or Exabyte or anything that is larger in size. Sometimes even small data is referred to as big data based on the content present in it. Let us imagine a situation where 400+ terabytes of data is generated every hour. This data must be handled carefully as the size is enormous and different types of data is generated like text, audio, video and images and so on. Thus now we can understand the need for Big Data that it minimizes the cost, helps in better understanding and fast decision making. These are the important features that make business men to employ Big Data and make their business more profitable. Some places where big data is used are Amazon, Netflix, General Electric, Capital One, American Express and Miniclip etc.

The Big Data is framed with the help of its characteristics which is broken down into 5V's namely Volume, Variety, Velocity, Veracity and Value. There are three types of big data fall in the variety category and they are structured data, unstructured data and semi-structured data. The architecture is simple that anyone can understand easily. There are several benefits of using Big Data such as to predict, analyze and bring conclusions on the data and majorly reduces the burdensome of the people using the data. These positive aspects make it popular and it is employed in various applications. There are a number of tools and technologies that come under the Big Data.

Characteristic

There are 5V's in big data as shown in Figure 1, which help us to clearly know about big data and its properties.

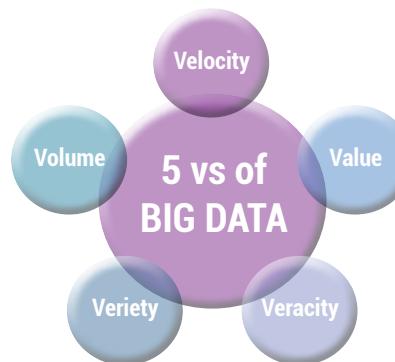


Figure 1 : Characteristics of Big Data

a. Volume

- The term volume also refers to the amount of data used to store it for future usage.
- Based on the size of data it can be

considered whether it is big data or not.

- In day to day life, the amount of information to be stored is increasing. Initially it was 8 ZB to store the information now it has moved on to 40ZB, which is enormous as said in [2].
- Volume is the important characteristic of big data which is to be considered while we use the term big data.

b. Variety

- Variety is the collection of different types of data.
- It can be structured, unstructured, semi structured, natural language, geographic or linked data.
- During earlier stages, data would be in the form of spread sheet and database. But in current times, it is in the form of images, videos, audios, PDF and so on which gives difficulties in storing and accessing it.

(i) STRUCTURED DATA

Structured data is the collection of similar data that is stored in the form of table which is helpful to access it. Figure 2 represents the students data, where all students information is of the same format. This is easy to access the data stored in table when it needs.

Student ID	Student Name	Department	Percentage
501	John	IT	97%
502	Sharmila	CSE	95%
503	Meera	ECE	91%
504	Benny	IT	85%

Figure 2 : Structured data in table format

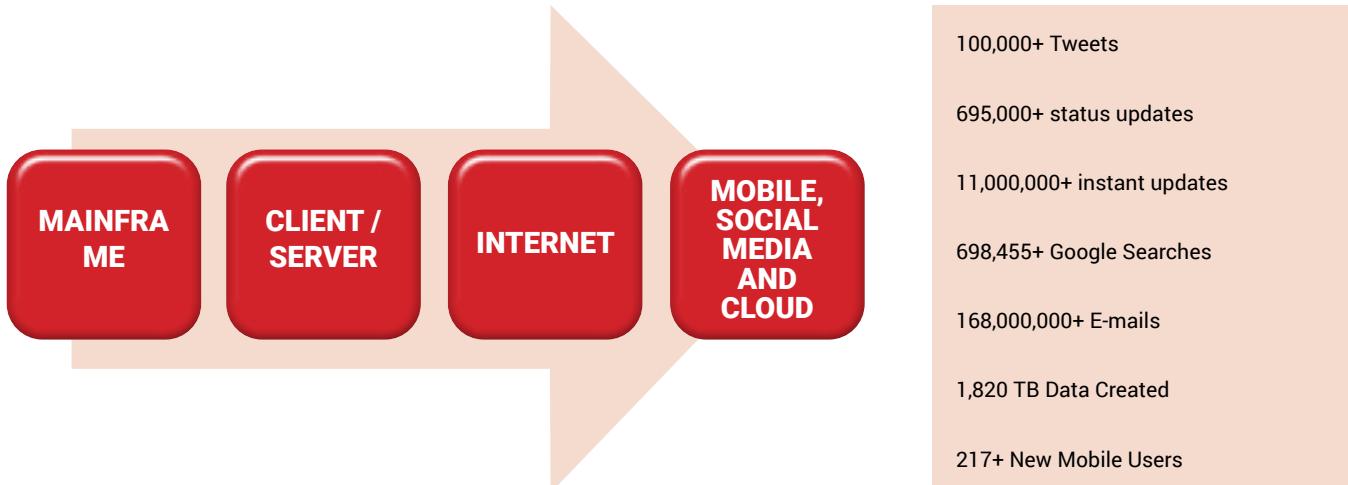


Figure 5 : Data generated per minute

The data is of any form such as image files, video files, Audio files, Text files etc as shown in Figure 3.

(iii) Semi-Structured Data

Semi-structured data is the collection of both structured and unstructured data. It is more flexible than structured data and less flexible than unstructured data.

```
<record>
<name>Michael </name>
<age> 40 </age>
<gender>female</gender>
</record>
```

Figure 4 : Semi-structured data

It is based on XML AND RDF format as represented in Figure 4.

c. Velocity

- The term Velocity refers to the speed of data or how fast the data is generated and processed to meet the demand. For example, Figure 5 shows the data generated every 60 seconds.
- The speed of data is also considered to determine whether the data is big data or not.
- In simple word it refers to the rate of analysis.

d. Veracity

- Veracity is the accuracy and precise of the data.
- It refers to the quality of data being captured can vary dramatically.
- It is used to filter what is necessary and

what is not.

- In simple word it is used to verify and validate the data being used as said in [2].
- e. **Value**
After having 4 V's there comes another V which is refers to value.
- Value is that the most vital aspects of massive data though the potential value of massive data is large.
- if we've data with no value then it's no good to access it, unless you switch it into something useful.

Big Data Architecture

Big data architecture is used to swallow, capture, process and analyse the enormous amount of data in real time which is often referred to as "big data" as said in [3]. This must be considered when we want to transform unstructured data for analysis

and reporting. The components involved in big data architecture are indicated in Figure 6. They are

Data sources

- Data storage
- Real-time message ingestion.
- Stream processing.
- Batch processing.
- Analytics and reporting.
- Orchestration.

Data Source

It is the complete location where the big data is produced and it includes data from Real-time sources such as IoT devices, static files generated from applications such as window logs, and the data from database.

Data Storage

It is the one of the place where the large amount of data are stored in various formats that is used to be processed via big data architecture. This kind of storage is often referred as "Data Lake".

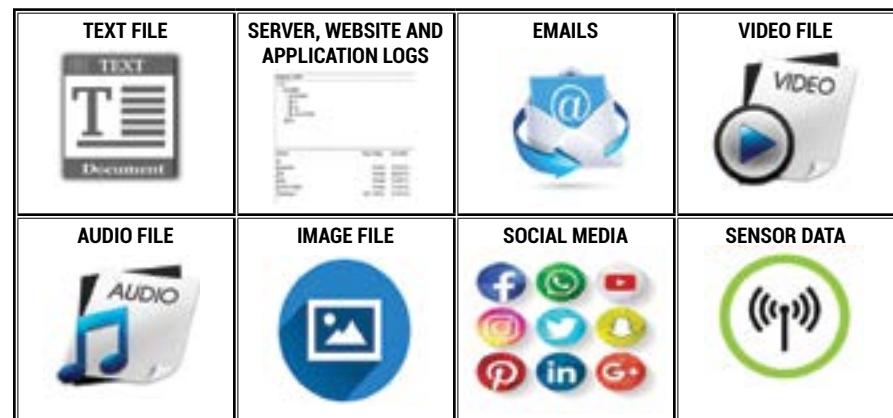


Figure 3 : Unstructured data representation

Real-Time Message Ingestion

The architecture must comprise how to capture and store real-time messages for stream processing, if the solution of big data includes real-time sources as shown in [3]. It is the simplest way of data store, where the incoming messages are stored in the folder for processing it.

Stream Processing

Data is processed once it arrives in storage layer which would be very close to the time it was generated. It commonly occurs in sub-second timeframes in which data processing happens in real-time for the end user.

Batch Processing

It is the one of the method in which it will process the block of data that have been stored over a long period of time. The data sets are huge that it processes the data files using long-running batch jobs to filter, aggregate, and otherwise prepare the data for analysis. It will read the source file to process it and write them in a new file as said in [3].

Analysis or Reporting Tools

After the completion of ingesting, capturing, analysing and processing of various data sources it is essential to include a tool to analyse the data which is achieved using a Business Intelligence(BI) tool and it may require a data scientist to explore the data.

Orchestration

The solution of big data contains the data processing operations, which is encapsulated in workflows to convert the source data, move them between multiple sources and destination, and to load the data that have been processed into an analytical data store or drop down the results straight to a report. Some of the orchestration technologies are Azure Data Factory or Apache Oozie and Sqoop.

Application Areas

In many places, Big Data is applied in almost every field for making the applications smarter. This also eases the people to work with data as said in [4]. Some Big Data application areas are listed below:

Smart Healthcare

The information is extracted from high volume patient's data. This information is used to foreshow the health condition of the patient. This monitors the patient's health

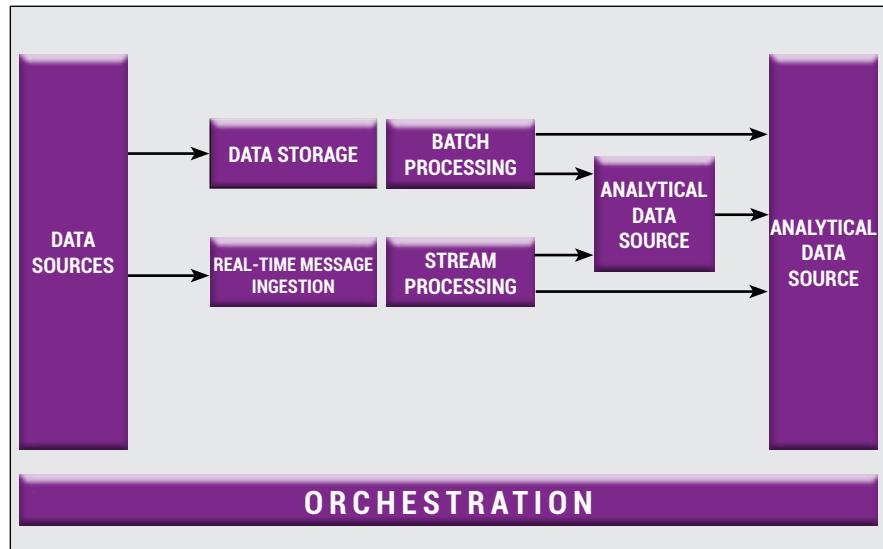


Figure 6 : Architecture of Big Data



ADVANTAGES	DISADVANTAGES
<ul style="list-style-type: none"> It is more expensive and also eventually save a lot of money. They are excellent at detecting patterns and anomalies. It improves the healthcare and public health. It provides better decision-making 	<ul style="list-style-type: none"> It faces difficulties in parsing and interpreting. Big risks on security and privacy. Lots of big data is unstructured. It is not useful in short run. It needs to be analyzed for longer duration to leverage its benefits.

Figure 7 : Pros and Cons

and creates awareness. Some applications provide precautions and suggest treatments to overcome further health issues such as Redox, Flatiron Health, ePatient Finder and Apixio.

Trade

The greatest welfare of Big Data is retail. The customer behaviour can be understood easily by doing so. This will be helpful to know what products the customer

will buy together and other such details. Applications like Amazon, Netflix, American Express, Miniclip and BDO.

Traffic Management

Traffic congestion is a serious trouble faced by almost all the cities. It is difficult to control the vehicles on the road. The data from sensors can be exercised for managing the traffic. This is very useful in crowded cities and towns. Popular apps

such as Google Maps, Uber, Ola and other organisations employ Big data.

Manufacturing

In manufacturing industries the big data can be used to analyze their products. This data is used to minimize the defects in the products that are produced. This also saves money and time.

Telecommunication

Telecom sectors gather information to analyze it and provide solutions to different issues that have been caused. Employing the big data applications they can reduce the loss of packet data. By doing this way customers can be provided with best network connection quality. Wimbledon Championships uses Big data to deliver the data in good quality. Improvement in supply chain abilities from big data being used to increase productivity.

Social media

This contains data about what people share on social media. It may be about business, product, and personal that is literally very huge. It assists the target audiences for retrieving information in their interested domain by observing their activities as done in Facebook, Twitter and Instagram and others.

Merits and demerits of Big Data

Big Data removes the flaws in conventional technique and provides numerous advantage. Still it has its own

negative sides as shown in Figure 7.

Case Study : Amazon

Amazon operates Big Data collected from their customers while they surf to search for products they desire to buy. Amazon has to store all the received information carefully since the volume of the data is enormous. It employs 'use and pay' services to do this work. Amazon Web Services (AWS) is used to overcome the flaws thrown while storing large data as said in [5]. AWS is highly flexible where even if the requirements change according to time, it can be used to work with the data efficiently.

This technique is employed for most Big data applications. We may wonder how they estimate what we want to buy every time we enter into the application. The items purchased by every single customer is stored and analyzed by applying algorithms. By doing so the data is converted into meaningful and useful information. This information is used to understand the customer behaviour. In this way the prediction of what the customer will search next time can be done. It also recommends the products based on the past purchase made. This is how Amazon attracts more people and assists their customer in purchasing products. There are different aspects for which the algorithms are performed. At times it sorts the data based on the reviews submitted or the ratings given to a product or past purchase of that customer or the price range in which

the customer has already bought some products.

This is the major reason that Amazon can handle all data and help them to improve the customer experience.

Conclusion

To sum up, Big Data simply is huge amount of data that cannot be handled by conventional techniques. It can be understood in detailed by studying its 5V characteristics. The architecture of big data is very simple that anyone can master it. The use cases of big data are numerous as mentioned above. Some popular algorithms can be applied to the data stored to retrieve relevant information by analyzing it. These operations can be used to make predictions, take decisions and others.

Thus big data is highly employed in every industries

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Data Privacy and Big Data

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Introduction:

Big Data is being discussed in detail elsewhere in this issue from various angles. This article focuses on the security concerns in Big Data, especially in the emerging scenario of Big Data Analytics and the Data being stored in various places including what is interestingly called 'the cloud' ie across a network server, and studying such a scenario in the backdrop of the Personal Data Protection Act (expected to be passed in India in a month or two).

Data Security and the Legal position:

The Information Technology Act, 2000 was notified in India on 17th October 2000 and has been in vogue since then. Subsequently, it was amended by IT Amendment Act 2008 effective from 27 October 2009. One of the powerful sections of the 2008 Amendment Act was its Section 43-A which provided for data protection especially the legal responsibility of corporates while dealing with the personal and sensitive data of public. The section uses the words "body corporate", "reasonable security practices" and "sensitive and personal data", signifying that the critical data relating to individuals which are collected, saved and processed or used by companies should be handled with utmost care and that they would be liable for breach and contravention if they do not adopt reasonable information security practices for data protection. In short, this section is for the civil liability of those handling data.

The Act in other sections speaks about the criminal liability of data theft, crimes related to electronically publishing objectionable data over the internet and other related cyber crimes. Besides these criminal offences, the Act also has a provision for due diligence thereby, those intermediaries handling data if they take adequate care, and if still some data theft occurs, would be protected in case they take proper care subject to the exceptions and other guidelines stated therein. After the Amendment Act, 2008, IT Rules were framed in April 2011 which described the phrases in Section 43-A cited above. Though these rules

cannot be taken to be a definition of sensitive personal information, these rules may be taken as a description of what constitutes such information, in an inclusive manner and hence are not exhaustive.

In this backdrop, we have to look at the landmark judgement in the Puttaswamy case [Justice K.S.Puttaswamy, (Retd) vs Union Of India, Writ Petition (Civil) No.494 of 2012] delivered by the Supreme Court on 26 September, 2018, which holds that the right to privacy is a fundamental constitutional right. Having said that, it has become all the more interesting what exactly should come under the definition of 'privacy' which of course does include the related concepts 'personal data' or 'data privacy' as well. Though privacy has not been defined, it is still considered very significant in social and legal circles, especially after the proposed legislation on Personal Data Protection, being discussed in India, and expected to be passed in April 2020 as an Act.

The process of Personal Data Protection Act started with the submission of the draft bill by the Srikrishna Commission in July 2018 to the IT Ministry, soon after which it was also available in the public domain. Before the bill could be passed as an Act, the tenure of the Lok Sabha was over. Fortunately in the next Lok Sabha, the same Law Minister assumed charge and everyone hoped that the bill will see the light of day as an Act. As of now (19 Feb 2020), it has been referred to a Joint Panel of Lok Sabha and Rajya Sabha and public comments have been sought on the same.

The bill assumes significance in our study of security concerns in the big data environment especially with large volume of data being stored, processed, communicated and made available in various parts of the world in various networks and at various times too. The proposed Act speaks about the concepts of localisation, responsibility of stake holders in the context of data being processed outside India, the role and responsibility of the various parties

associated with data processing and related activities like the data principal, data protection officers etc.

The proposed Act consisting of 98 sections divided into XIV chapters and two schedules seeks to provide for protection of personal data of individuals, create a framework for processing such personal data, and establishes a Data Protection Authority (DPA) for the purpose. Like Reserve Bank of India (the banking regulator) and TRAI (the telecom regulator), the DPA as proposed in the Act is going to be an all-India body presumably with technological, legal and other expert members on the Board and many regional or zonal offices, regulating and controlling the data protection arena. DPA will also be the judicial authority to handle cases of contraventions in the area of data protection and its breach, providing the required redress mechanism with enormous powers to levy penalty to those responsible for not protecting the data.

Personal Data means the data which is identifiable, a personal trait, characteristic or an attribute and Data Principal is the natural person to whom the personal data relates. Information such as financial data, health data, official identifier, sex life, sexual orientation, biometric data, genetic data, transgender status, caste or tribe, religious or political belief are all included as sensitive personal data.



Data Principal, as per the Act, is vested with rights such as Right to confirmation and access the data and a Right to correction in the data if

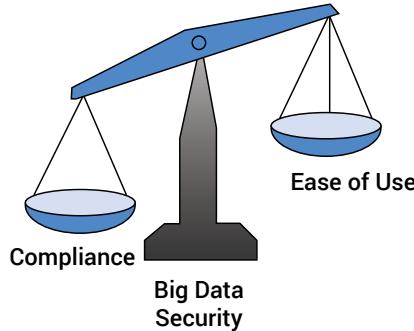
anything false or objectionable is found and a right to seek erasure of the data through the regulator DPA. Besides, he also has a right to data portability and a right to be forgotten. This right ie the right to be forgotten is something new introduced in the Act. In the context of big data, one has to study carefully the impact of all these, which forms part of "big data" being handled or processed by firms and entities including government departments.

Big Data and bigger processing:

"Data Fiduciary" is defined as any person, including the State, a company, or any entity or any individual who alone or in conjunction with others determines the purpose and means of processing of personal data. Therefore, it may be safely concluded that data fiduciary may have to deal with, most often, what is known as 'big data'. All the security related controls as enshrined in the Act, should be in place for any entity dealing with or processing big data ie a data fiduciary. There are some mandated obligations on the part of the fiduciaries to comply with. In the context of big data processing, cloud storage and remote processing, these provisions are quite significant, maybe somewhat difficult to comply with in today's ambiguous environment of techno-legal issues involved in cross-border and global processing of data.

The Act speaks about 'harm' to data and also 'significant harm'. In the area of big

data analytics, when data moves from one server to another or is processed in various places, these concepts assume enormous significance, since the DPA is vested with powers to levy penalty in the event of contravention and the nature of harm caused to the data, in any technological process at the fiduciary level or elsewhere too. Probably, compliance of all the regulations of the Act may be even at the cost of ease of use, which is an issue, the stake holders may have to address.



Security concerns localised: To have a better control on the data whatever the nature of data and wherever the same is processed, the Act envisages localisation of data. Sensitive personal data may be processed outside India for specific purposes with the data principal's express consent but are to be stored only in India. Data which are to be notified by the government as Critical personal data are to be processed only in India. Besides, data audit has been mandated. To address the

security concerns of data principals and to give them a comfort feeling that the rules would be strictly complied with by the stake holders, the DPA has been vested with powers too to levy a penalty of maximum 4% of global turnover of the corporates (or other entities) in the case of any breach and contravention. The localisation rules may evoke much criticisms too, since most of the big data and cloud storage now move across in a global network, across nations with the data principals not even knowing where his/her data moves and where and how it is processed and what his redress remedies are, in the event of any data loss.

To provide an ease of use, for big data users with larger volumes of data involving huge technological process, the Bill provides for a Consent Manager. A consent manager is a third party expected to possess a reasonable amount of technolegal know-how and will express the consent or otherwise on behalf of the data principal to the DPA or a Data Processing Officer, who will represent the fiduciary to the DPA. Perhaps, tech-savvy chartered accountants and lawyers and other big data analysts have good opportunities waiting for them from corporates!

Of course, there are quite a few exceptions and exemptions inasmuch as the Bill provides for processing without a consent in the event of emergency, national sovereignty and other such exigencies. ■

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War on Big Data

► Ritika Mehra

Professor, School of Computing, DIT University

► Mayank Upadhyay and Vishakha Arya

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"The data protection law will be like a new shoe, tight in the beginning but comfortable eventually"

— Justice B.N. Srikrishna

The big data mania has taken the market by storm. Organizations are investing more to store data for a prolonged period, as storage technologies (like Amazon S3) become more economical. To safeguard the personally identified information there is a need for strict data protection laws and guideline [1].

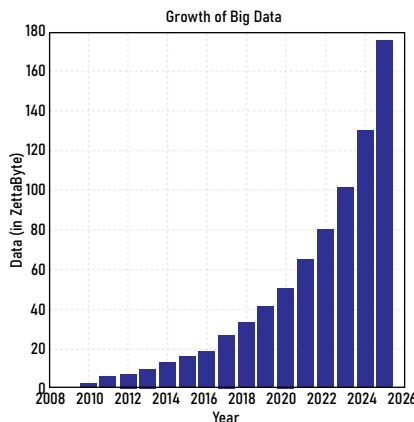


Fig. 1: Growth in Big Data Generation

Introduction

Big data is gathered from disparate sources (like defense, stock exchange) in the form of structured, semi-structured or unstructured. In recent years there has been a boom in digital technologies leading to an exponential growth of data. IDC (International Data Corporation) reports shows that the cumulative data of the world will reach around 40 ZB (zettabyte) in 2020.

ML, predictive analytics, product development, fraud and compliance and many more depend on data analysis. They require bigger data to generate better results. Data regulation laws (like General Data Protection Regulation, California Consumer Privacy Act, Personal Data Protection Bill and Lei Geral de Proteção de Dados Pessoais (LGPD)) ensure individual's right to privacy. In this article, we will discuss various concerns regarding data security and privacy of big data.

Big Data

Extracting valuable information from big data that is generated from multiple sources involves collecting the data, processing the data, analyzing the data and utilizes the result.



Fig 2: Big Data Life cycle

This valuable information is used in many fields (like education, healthcare, mining sector). The huge amount of data generation leads to various privacy and security concerns. Many organizations recognize that there is a need for better safety measures to prevent data breach. Many countries have taken steps to protect its citizen's right to privacy.

Why protect it?

Tech companies not only use big data to know the easily available information like your recent browsing history, your location, amount of time you spent online, etc., but use data analysis to infer things like your political opinion, and numerous other information which you have not provided directly to the company.

One of the famous examples was of Target's advanced advertisement system which analyses the shopping patterns of its customer to provide coupons to increase sales. In one of the incident, it was able to predict the pregnancy of a teenage girl before her parents knew about it [2].

Corporation Vs Corporation

With the increasing popularity of Globalization, it is also becoming much easier for personal data to flow across the

border.

Big tech giants like Facebook, Google, are built on the model of freely exchanging individuals data in return for free services[3].

So that they can analyze and predict consumer behaviour to increase sales and stay ahead of their competitors. Or to simply sell the data to a third party organization.

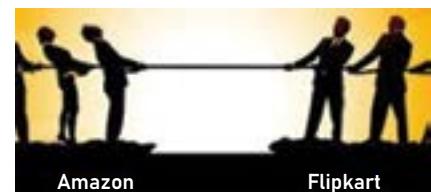


Fig. 3 : Tug Of War Between E-Commerce Giants For Consumers Data

Corporation Vs Country

There has been a tussle between giant tech companies and government regarding the degree to which personal data is collected and used. The EU's GDPR (General Data Protection Regulation), California's CCPA (California Consumer Privacy Act) and LGPD (Lei Geral de Proteção de Dados) are regulations to protect consumer private information.

CCPA/The California Consumer Privacy Act	LGPD/Lei Geral de Proteção de Dados
<ul style="list-style-type: none"> Enforced on date 1 Jan, 2020 To collect California resident personal data. Business, third parties, California consumers. Personal data related (monetary and other valuable info) Penalties upto \$7500 as per violation 	<ul style="list-style-type: none"> Enforced on date 15 Aug, 2020 Framework on personal information collection in Brazil. Law applied to Brazil citizens within their territory. Penalties upto 2% of annual turnover in Brazil.

Fig. 4: CCPA and LGPD Regulation

The Indian government in their part has also taken steps to protect the sensitive data of its citizens. The Personal Data Protection Bill (PDPB) mandates that personal data characterized as sensitive (financial, health, religious belief) will be stored in India [4].

Company	Government Organisation	Fine
▪ Google	▪ European Union	▪ \$9 billion in total, for unfair advertising rules and forcing smartphone manufacturers to pre-install google chrome.
▪ Facebook	▪ Federal Trade Commission (FTC)	▪ \$5 billion for mishandling users personal data
▪ Youtube	▪ FTC	▪ \$170 million for violating children's privacy
▪ Facebook, Twitter	▪ Russian Court	▪ \$63 thousand each for refusing to store Russian citizen's data on servers in Russia.

Fig. 5 : Fine on Tech-Giants

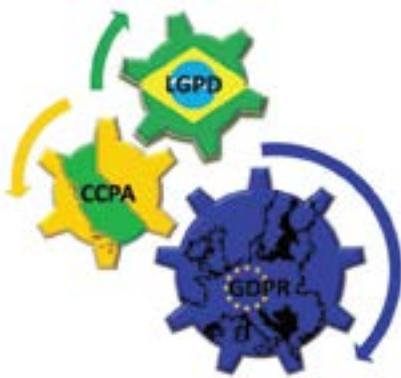


Fig. 6: Data Regulations

GDPR (European Union)

On 25 May 2018, the General Data Protection Regulation (GDPR) was adopted. It outlines rules to protect personal information and privacy of EU citizens. This provision is applicable to all 28 EU countries.

Key Principles of GDPR:

- Consumers consent must be needed for data collection.
- Companies can collect only relevant data.
- Minimization rule and process must implement for relevant data.
- Inaccurate personal data must be rectified.
- Only task-relevant personal data be stored for a longer duration.
- Secure personal data from theft and destruction.
- Company failing to comply with these principles will have to pay 4% of global revenue as a penalty.

PDPB (India)

On 11 Dec 2019, the Personal Data Protection Bill (PDPB) was initiated in Lok Sabha. The bill asks for personal data protection of its citizens. The PDPB bill inherits its core structure from GDPR.

Key Areas of PDPB:

- **Data localization** - Sensitive personal information should be stored within Indian boundaries.
- **Accountability** - Data fiduciaries to conduct annual audits of processing activities.
- **Identity verification** - Social media mediators must enable voluntarily identity verification to Indian Citizens.
- **Data infringement notification** - In

case of data breach data fiduciaries should notify DPA (Data Protection Authorities).

- In case of non-compliance of PDPB penalty up to 15 cr or 4% of global revenue.

Conclusion

Big Data have used across several domains making it a valuable resource. It is generated from casual web surf to online transaction, so it is crucial to protect personal data. The government needs to enact data regulation and to educate their citizens regarding their data rights. The organizations collecting customer data needs consumer consent, and inform them if their data is being sold to a third party, and ensure the safety of their personal data like "Digital Safe" bank is one of the method for guarding consumers personal data providing digital password. Thanks to wide range of Anti-surveillance companies, freely available security oriented software tools that are working to guard consumers data by limiting its access to the service providers.

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The Role of Data Science in Big Data Analytics - Overview

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Data is made ceaselessly, and at an ever-growing rate. Phones, Online social networking, imaging advances to choose a therapeutic assurance all these and more make new data, and that must be taken care of some spot for reasons unknown. Gadgets and sensors therefore produce explanatory information that ought to be taken care of and arranged persistently. Big Data is making critical new open doors for associations to infer new esteem and make upper hand from their most important resource: information. The field of data science is "rising at the crossing point of the fields of social science and statistics, information and computer science and design".

1. Introduction

Around 100 hours of video are moved to YouTube reliably and it would take around 15 years to watch every video moved in one day. AT&T is thought to "hold the world's greatest volume of data in one remarkable database – its phone records database is 312 terabytes in size, and contains pretty much 2 trillion lines". Consistently we send "204,000,000 messages, create 1,800,000 Facebook likes, send 278,000 Tweets, and up-load 200,000 photographs to Facebook 570 new sites spring into reality each moment of consistently".

Data science is the "investigation of where data originates from, what it speaks to and how it tends to be transformed into a significant asset in the production of business and IT systems". A key part of information science is the use of the logical strategy to shape and move theories to approve decisions about fundamental examples in information.

The general goal of data science may appear to be direct; however execution is an intricate procedure and includes various strides before the estimation of an information science item can be watched.

This is what that resembles:

1. "Business Understanding
2. Data Understanding
3. Data Preparation
4. Modeling
5. DS team evaluation
6. Stakeholder evaluation

7. Deployment"

The data and analytics landscape is evolving. The business around enormous information and information science is one aftereffect of this advancement/transformation. In spite of the fact that the market frequently utilizes the terms enormous information and information science reciprocally, they are actually very unique. Big data alludes to the capacity to oversee huge volumes of divergent information at the correct speed and inside the perfect time span to empower examination and activity. Large information is about the three v's for example volume, variety, and velocity – and some would include esteem. Associations are pushing toward progressively cross breed conditions to deal with this enormous and multistructured information. This regularly incorporates the cloud, Hadoop, and information lakes just as NoSQL databases and different stages. Enormous information examination habitually requires the utilization of MPP (massively parallel processing engines), in-memory processing, and different advancements that can deal with huge amounts of information.

2. Data Science Landscape

Data science landscape can be divided into the following categories: (i) Fields (ii) Objects (iii) Techniques and (iv) Approaches.

2.1 Data Science Fields

Data Science has different fields such

as "Nanotechnologies, Physics, Robotics, Mathematics, Statistics, Information theory, Information technology and Artificial Intelligence".

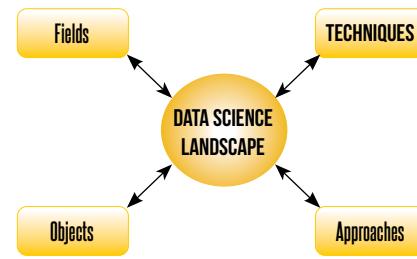
2.2 Data Science Objects

Methods that "scale to Big Data are of particular interest in data science, although the discipline is not generally considered to be restricted to such data".

2.3 Data Science Techniques

Data science techniques may be in the form of "Signal processing, Probability models, Machine learning, Statistical learning, Data mining, Database, Data engineering, Pattern recognition, Visualization, Predictive analytics, Uncertainty modeling, Data warehousing, Data compression, Computer programming and High Performance Computing".

2.4 Data Science Approaches



The development of "machine learning, a branch of artificial intelligence used to uncover patterns in data from which

predictive models can be developed, has enhanced the growth and importance of data science".

3. Big Data Landscape

So as to design big data architecture it is essential to get a handle on the information on the current large information scene and fuse it into existing foundation. In conventional information the board structures, the organized data or information was nourished into the endeavor combination device which moved the gathered organized information into information stockrooms or operational units. At that point diverse scientific capacities were utilized to uncover the information, however the new type of information the executives structures that acquire large information scene are intended to meet the "velocity, volume, value and variety of requirements". To deal with these enormous informational indexes, new designs have been framed that fuse multi hub equal handling strategies. Big data landscape has a further characterization dependent on preparing prerequisites and various techniques are proposed for group handling and continuous preparing.

A few innovations through which we can outfit big data are:

1. Massively Parallel Processing
2. MapReduce
3. NoSQL
4. Hadoop

3.1 Massively Parallel Processing

The data is circulated among various hubs for quicker handling. The procedure is done resemble on each machine and the yield is gathered to reason the necessary outcome. This innovation requires information on SQL and costly equipment to chip away at.

3.2 MapReduce

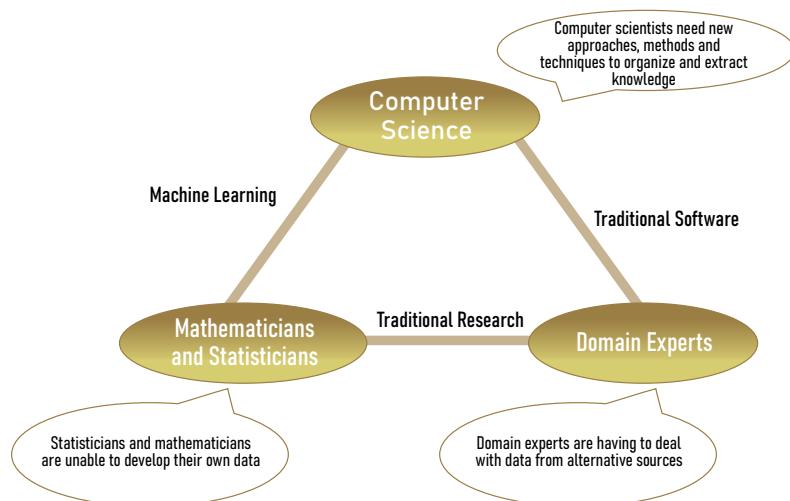
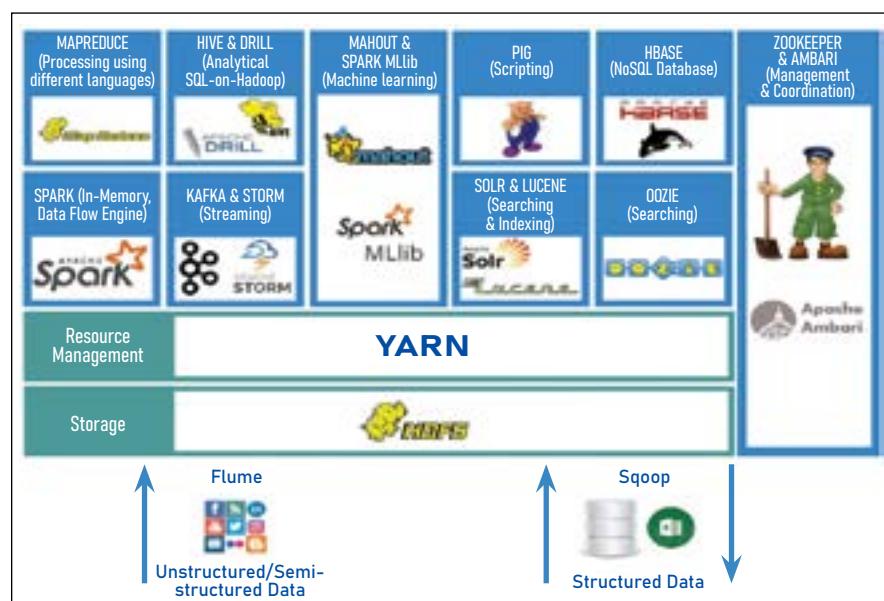
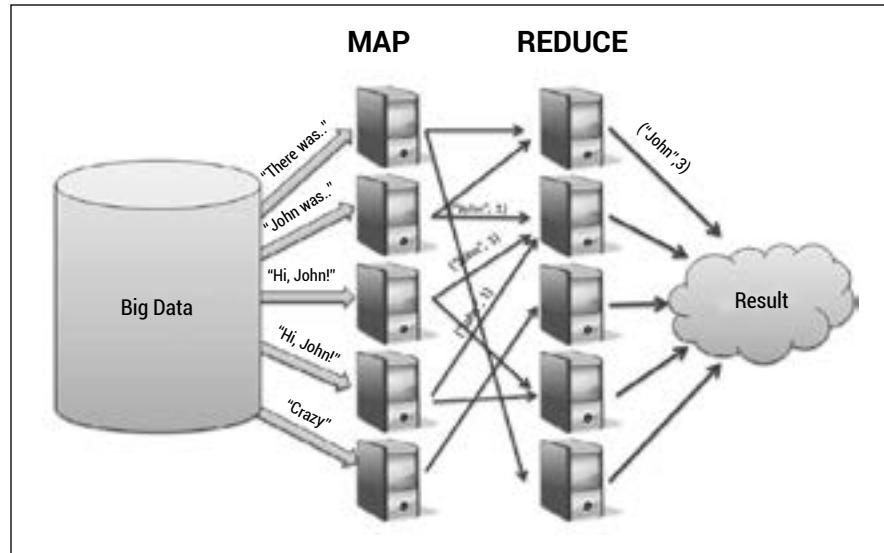
Mapreduce also use the concept of "multi nodes and parallel processing". It consists of two functions:

- (i) Map - It isolates data over various hubs which are then prepared in parallel.
- (ii) Reduce - This capacity consolidates the outcome sets into a last reaction.

Massively parallel processing uses "SQL queries however Map Reduce uses java and doesn't require exorbitant submitted stages".

3.3 NoSQL

NoSQL database-management systems are "unlike relational database-



management systems, in that they don't utilize SQL as their query language". They forgo the overhead of "indexing, schema and ACID transactional properties to make enormous, reproduced information stores for running investigation on economical equipment, which is helpful for managing unstructured information".

3.4 Hadoop Ecosystem

Hadoop is an "open-source software framework used for storing and processing Big Data in a distributed manner on large clusters of commodity hardware".

4. Big Data as the new frontier of Data Science

Starting from phenomena such data deluge, the existence of new and alternatives data sources like the Internet, sensors and

images, the availability of data not ad-hoc collected but automatically generated, it is understood that relations between scientific fields could not be confined to a binary interdisciplinary relationships, but it needed a triangulation and a transdisciplinary approach, and the identification of a data-driven scientific method.

5. Conclusion

Data science, big data, and advanced analytics have been "progressively perceived as significant main impetuses for cutting edge advancement, economy, and instruction". Despite the fact that they are at a beginning time of improvement, vital conversations about the "master plan, patterns, significant difficulties, future headings, and possibilities are basic for

the sound advancement of the field and the network". The up and coming age of information science, including a wide scope of orders, science, and economy, depends intensely on the key arranging and visionary activities that will be embraced in organized information look into territories and new companies. Most assuredly, the present inquiries, for example, "for what reason do we need information science" will be supplanted by a group of logical speculations and devices to address the obvious stupendous difficulties and huge issues confronting tomorrow's huge information, science, business, society, and the economy. We will be significantly astonished by the astounding advancements and potential changes that will occur in the following 50 years.

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Data... Data... Data Everywhere

Big Data Analytics in digital transformation

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In the last few years we observe that data is gaining more prominence in the market. Data is considered as a high value commodity and business houses pull up their sleeves and run around to acquire data, clean, polish and secure them to preserve. Data theft incidents suddenly are looked at as serious sensitive occurrences. Facebook data leak relating to Cambridge Analytica and several such incidents have created a sense of seriousness about the data. At the same time the volume of data analyzed is growing and the practitioners have started coining several names to signify that: Data Processing, Data Analytics, Big Data Analytics, Data Lake, Data fabric and so on. Market leaders believe that businesses become more and more data dependent. The institution that has the capability to capture the data process them and use effective tools to analyze them to get actionable insights has a competitive edge in the marketplace. In 2016 the big data analytics market was USD 12.018 as per a market report. Market Research Future has predicted that the market will grow with CAGR 30.08% and reach USD 77.64 Billion in 2023. In this article we see the role of data in the digital transformation and the efficiency of data analytics in making human life better, safer and more productive.

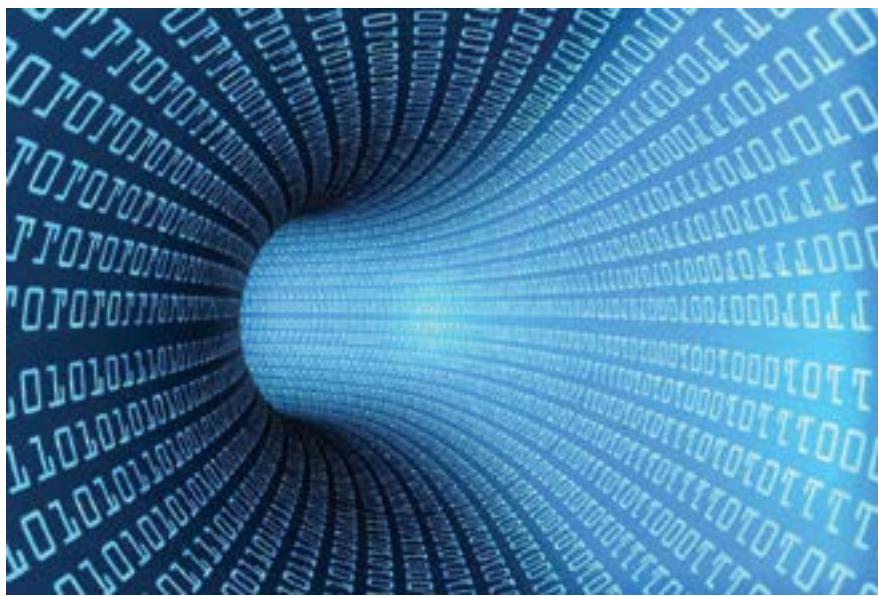


Fig. 1 : Digital Transformation

In traditional business, business leaders focused on the business domain and the business domain knowledge was with individual humans. While technology grew, businesses became technology enabled. In the last decade businesses have moved from

technology enabled model to data driven model and called the digital transformation.

Technology Enabled business

In technology enabled era, every business house had the required technology to drive efficiency and improve customer

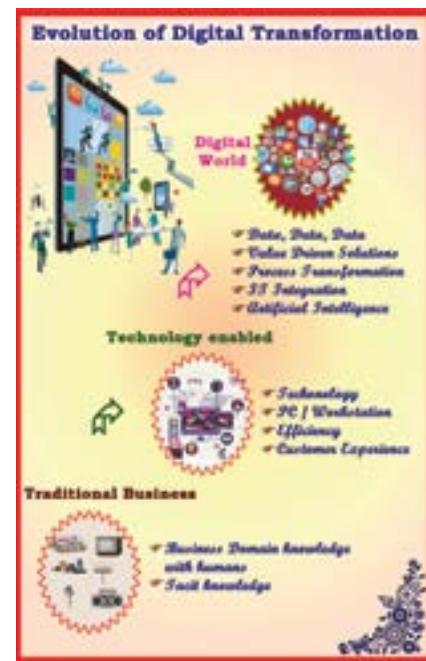


Fig. 2 : Evolution of Digital Transformation

experience. The following are some simple examples:

1. FMCG Vending Machine
2. Train Ticket Vending Machine

3. Self – Service Kiosk for flight check-in
4. Coffee / Tea Vending Machines

Digital Transformation – Key Drivers

Transformation of businesses driven by data is called the digital transformation. The following are the key drivers for digital transformation.

1. Customers demand increases into live and real time requirements. Due to the rapid growth of social media culture, customer expectations have grown significantly.
2. High volume of data is generated by the business through their customer interactions, business transactions, market trend and the industry trend. Businesses have the responsibility to acquire the data, process them quickly and make them competitive in the marketplace.
3. Availability of high-end technologies in Business Analytics and Machine Learning. Rapid growth of technology has made data analytic almost real time.

Features of Digital Transformation

Digital Transformation happens as follows:

1. **Leverage Data:** Identify the data sources and leverage both the structured and unstructured data. Data plays a lead role in business. So, capturing the data at the source, analyze them quickly and arrive at actionable insights and reacting to them is key in the digital business.
2. **Value driven solution:** Bring value driven solution matching the demand using the data. Customers are expecting a high value service from the institutions. So, in order to retain the customer base, the business houses have to do the extra homework on the value delivered. For example, in a telephone bill customer expects the analysis of the usage, comparison with various price plans and recommendations for the benefit of the customs.
3. **Process Transformation:** Transform the business processes into more agile and dynamic response system. This has opened several channels for customer interaction and service delivery. New channels included are: Social media, mobile application, chatbots, Voice bots etc.



Fig. 3 : Banking business - Digital Transformation

4. **IT Integration:** Make the IT function a partner fully integrated to the business. IT is not considered as a separate function to support business. IT is an integral part of business. So, emerging technologies such as Social Media, Mobile Computing, Data Analytics, Cloud Computing, Artificial Intelligence,

Blockchain and Internet of Things must be a part of the business. For example, several banks and supply chain companies have integrated Blockchain based services. The future road map of the business has services using these emerging technologies.

Data, Data, Data everywhere:

There is a bunch of market reports published in the industry on the data growth in this decade. The following are some highlights.

- Annual global IP Traffic has surpassed two zeta byte threshold. (1 zeta byte = 103 exabytes, 1 exabyte = 1018 bytes)
- More than half of IT Traffic originate from non-PC devices such as TV, Tablet, smart phones and other machines.
- Number of devices connected to IP Network is 3 times the global population. This means, for every human being in the world three devices are connected to IP network.
- Video Content: Enormous volume of video are available in the IP network. One estimate published recently says that it would take an individual over 5 million years to watch all the video available in 2019.
- Video on Demand (VoD) is doubling every year.
- Mobile data traffic has increased 10 fold in the last 3 years.

Let us have a detailed look at an example of a digital transformation. In the last 20 to 40 years Banking business has undergone full scale digital transformation.

In a traditional bank that ran operations during 1980s, the bank had a few employees, ledger books for keeping the account and currency chest for keeping the cash safely. The banking transactions happened in person and the pass book signed by the banker was an important record.

During 1990s, computers were introduced and the computerized banking was introduced. In large banks, the core banking solutions were running on the central server where every branch connected their systems and transaction happens. In short, the ledgers were replaced by computers.

In the period from 2000 onwards, digital transformation kicked in at rapid scale.

- Customers get internet banking facility.
- Debit cards and credit cards opened a new channel for business.
- ATM machines provide the cash dispensing and deposit service.
- Customers can apply for loan, new account and almost all services through internet banking.
- In the last few years, mobile apps are provided to the customers to make the experience better. Live SMS / Whatsapp alert on every transaction.
- Data analytics provide the customer behavior and spending, savings pattern. Predictive Analysis based recommendations provide a new wave of information to the customers.
- Loyalty programs are managed digitally. Customers are given the flexibility to use the loyalty points in various services and get benefited.

We have seen the digital transformation of banking business. In a similar manner every business has undergone digital transformation.

- Travel and Hospitality
- Manufacturing

- Marketing
- Sales
- Telecommunication
- Insurance
- Education

Every industry is becoming digital and hence has the following key advantages of using an efficient data analytics tool.

- Detect and correct the errors in the datasets with the help of data filtration techniques
- Improve the quality of data and hence Improve productivity and efficiency in the field operation
- Optimize the resources including the workforce

Key players in the Big Data Analytics market

As per market research report published recently, the following are some names of the key players in the big data analytics market. Microsoft, SAP SE, Amazon Web Services, Oracle Corporations, SAS Institute Inc., Dell Inc., Alteryx Inc., Datameer, Looker Data Sciences Inc., IBM Corporations.

Conclusion

Data has become very significant in human life including the business. Human behavior related data are used in various industries to manage the relationship. It is expected that technologies such as Internet of Things, Machine Learning, Deep Learning will fuel the growth of Big Data Analytics. The role of data will make human life better in the future. ■

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Research Challenges and Automated Tools in Big Data Analytics

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Data is generated day by day enormously in terabytes. These data are of various forms and not similar in nature. These kind of large data sets are referred to as big data. Huge volumes of both structural and unstructured data are present in the world. One of the techniques that stores huge data is big data. The data which is stored has to be analysed which is a challenging part. Thus, in this review, the architecture of big data is illustrated. Following that, in materials and methods detailed survey of tools used for big data process is present. After which, open research issues associated with Big data in various fields are represented.

Keywords: Big data analytics, Architecture, Tools, Research issues.

I. Introduction

Almost half the overall world's population is available online. A census report of 2018 shows that the number of internet users in 2018 is 4.021 billion and this shows increases each year by 7 percent. The data occupies the web are growing in exponential fashion [8]. Thus, the volume of large data sets both structured and unstructured data are referred to as big data [2]. And the analysis of these large data sets is known as big data analytics. NIST defined big data characteristics are: Volume, Velocity, Variety and Variability [4], [6], [9],[10].

Volume – Describes size of the dataset
Variety – Describes data from multiple repositories, domains or types.

Velocity – Describes rate of dataflow.

Variability – Describes the change in other characteristics.

The process of analysing the data sets present in big data storage is known as Big Data Analytics. Fig 1 represents the architecture of big data analytics [3]. The term analytics refers to any statistics that is useful for concluding with specific decisions. The phrase analytics is classified into corporate and academic research analytics. Corporate analytics is testing any hypothesis and draw any conclusion theories. Some of the big data applications are described below [2] [5]:

Structured analytics is the analytics of data being generated from business and research fields.

- Text analytics is acquiring meaningful information from large text as the most common way of storing data is text.
- Web analytics is the process of extracting useful information from web pages. Also known as Web mining.
- Multimedia analytics includes the analysis of audio, video, graphics and images. Multimedia analytics is the process of withdraw useful information

from multimedia datasets.

- Mobile analytics involves mobile phones, RFID etc.... As there is a vast volume of data present mobile analytics evolves.

II. Materials and methods

1. Research Challenges

Tremendous amount of data is growing in trillion in recent days. The world's data is doubling rapidly. Data science and big data analytics are the point of focus of research people for analysing these data sets. This section describes some of typical research

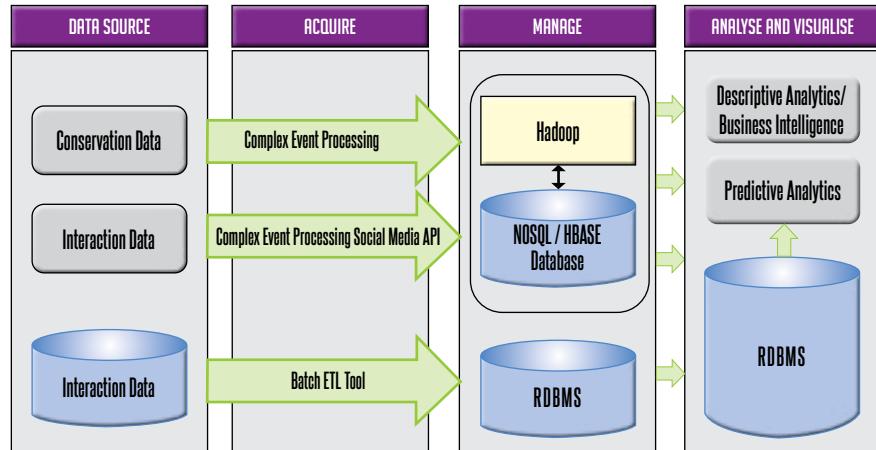


Fig. 1: Architecture of Big Data Analytic

challenges in big data [7].

A. Internet of Things for Big Data analytics:

The challenge failed in IoT is acquisition of knowledge. Sufficient infrastructure to analyse IoT data sets are needed. The devices and sensors of IoT produce continuous data sets and specialized tools to extract necessary information from it. Algorithms of machine learning and computational intelligence are the only solutions of handling data sets of IoT. Thus, IoT is a technology that automates our entire lifestyle and its performance would be more efficient when the above challenges are solved.

B. Cloud Computing for Big Data Analytics:

Cloud is an infrastructure that provides us huge data storage, computing the cloud storage datasets involves analysis of data. Cloud infrastructure offers various cloud models for its users. But though the infrastructure should also provide analysis tools to acquire and extract meaningful information from datasets. This, cloud is a vast storage provider and it would be more efficient when above challenge is solved.

C. Quantum Computing for Big Data Analysis:

Quantum computer is a computer which can solve the given exponential data set simultaneously and rapidly. The data which is present in Terabytes are gathered

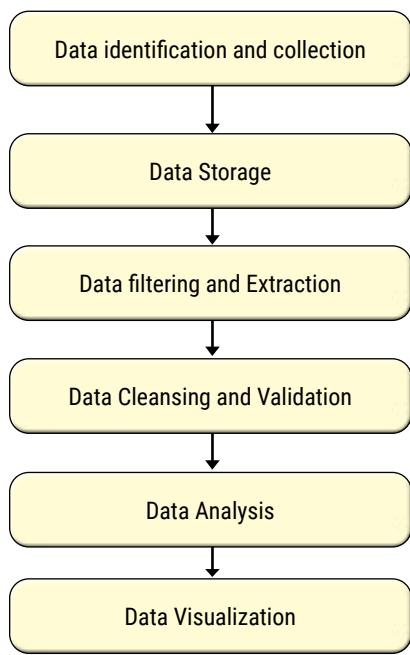


Table 1 : Collection phase tools

Tools	Open Source/Licensed	Features
Opinion Crawl	Licensed	Analysis of Sentiment
Semantria	Open Source / Licensed	Analyse much number of documents, Excel visualization, Customizable, Batch Processing.
Open text	Open source	Organize electronic documents, Classify documents.
Trackur	Open source	Analyse and influence the sentiment.

Table 2: Storage phase tools

Tools	Open Source/Licensed	Features
Mongo DB	Open source	Data duplication, Balancing load, Replication, Indexing.
Couch DB	Open Source	Storage of document, Validate, Privacy.
Cassandra	Open source	Transaction report, Tolerance fault, Data Storage, Data Distribution
Hadoop Database	Open source	Linearly scalable, Automatic failure support, Data replication.
Oracle	Licensed	Grid computing, Business Intelligence, Clustering, Security

Table 3: Filtering and data extracting phase tools

Tools	Open Source/Licensed	Features
Octo Parse	Licensed	It is software technique for extracting the data
Mozenda	Licensed	It convert the understand data into structured data format.
Parsehub	Licensed	It is used to scrap the data and extract it into original files.
Context Grabber	Licensed	Agent logging scripting capabilities error handling are some features of Context Grabber.

together which is collectively known as big data. The problems of big data can be solved more quickly. The quantum computer bits

are referred to as qubits or quantum bits. The big data problems can be solved by using large scale quantum computers. Thus, it is

Table 4 : Cleaning phase tools

Tools	Open Source/Licensed	Features
Tibco Clarity	Free version	It remove the duplicate data and it's address. So that, to identify the trends make quickly.
Vinparse	Paid version	It delete the duplicate data from the entire system (including database, spreadsheet)
Data Cleaner	Free version	This tool is used to analyse the quality of data. It can able to detect the duplicate of data.
Reifer	Free version	It has some features like run time performance, fast development and high accuracy.
Data ladder	Free version	It is a data quality tool. It detect the quality of data and then removed the less quality data.

Table 5: Analysis phase tools

Tools	Free/Paid version	Required Programming Languages	Description
Data Wrapper	Free version	Ready codes	It is used to make interactive charts.
Solver	Paid version	No programming languages required	It is used to represent the data by push button access to all data sources.
Qlik	Paid version	SQL and coding in any programming language	It creates dashboard, apps and visualization. With these data can able to see the whole story.
Tableau	Paid version	No coding required	It is elegantly simple and intuitive tools.
Google Fusion Table	Google service web	No coding required	It is an incredible tool for data analysis.
Gephi	Free version	JAVA required	Gephi is a network analysis tool. It's software package is written in JAVA.

the challenging task for future generation to construct the quantum computer that solves the problems of big data.

2. Tools

There are six phases in big data analytics [1]. They are as follows. Fig. 2

represents the big data analytics phases.

A. Data Collection Phase Tools

The kinds of data used differ for various business applications. Some of the data collection tools are represented in table 1.

B. Data Storage Phase Tools

The data storage is an important task in this framework. Some of the data storage tools are represented in table 2.

C. Data Filtering and Extraction Phase Tools

This process converts the unstructured data sets into structured data sets. Some of the data filtering and data extraction tools are represented in table

D. Data Cleaning Phase Tools

Cleaning of data reduces the excess time taken for processing and speed of execution also increases. Some of the data collection and validation tools are represented in table 4.

E. Data Analysis Phase Tools

The data analysis also employs the features such as data mining, artificial intelligence etc. Some of the data analysis tools are represented in table 5.

F. Data Visualization Phase Tools

Data visualization tools are available in the markets with the combination of data extraction, analysis and visualization. Some of the data visualization tools are represented in table 6.

III. Conclusion

The world is Ninety percent of big data are generated in the previous years. The data in the present world are to be analysed in a proper way for future generation. In this digital world, big data is not a part of luxury but it has become a necessity. Thus, this paper consolidates the architecture of big data along with its basics. Also, the tools for analysis on all the stages of big data processing are explained. Furthermore, this paper explains the open research issues on big data at present days in a detailed manner. Big data is the reading technology and considered as the long-lasting technology because data would grow tremendously but would not reduce. Thus, constant researches on big data would lead this digital world towards improvement.

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Table 6: Visualization phase tools

Tools	Free / Paid version	Description
Knime	Free version	Knime Analytics is data-driven innovation to discover the hidden data.
OpenRefine	Google's web service	It transforms the data from one format into another format. Then, those data are to be stored in external data and web service.
Weka	Free version	A set of machine algorithms and those algorithms can apply either by JAVA code or directly to a data for Data mining.
RapidMiner	Paid version	It able to analyse the data by manipulating, analysing and modelling.
Pentaho	Paid version	It is used to blend any data and notify the barriers.
R-Programming	Free version	It is used to develop the data analysis and statistical software.

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Big Data Analytics for Agriculture – Scope and Future

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Agriculture sector forms the basis of economic growth of India at large. Agriculture products feed humans to survive. Today, this back-bone is getting affected either due to climate changes, lack-of-interest among farmers, labour shortage, globalization, industrialization or migration of farmers from villages to cities etc. On the other hand, it is required to increase the rate of production of crops to meet the significant growth in the demand arising due to increase in population. Imagine a day, as a result, where farmers could not produce or harvest, which could affect the entire eco system and such a situation looks to be closer than expected. In contrast, in the current scenario, there is a requirement to increase the production in order to meet the increasing population given the constraint of shortage of fertile land. With technology, we can instil confidence in farmers and support them to get better yield and make it profitable so that farming activity continues as expected.

Big Data and Analytics is one such promising technological support system for agriculture domain that promises timely inputs to farmers on weather forecasting, irrigation practices, plant nutrient requirements, soil capabilities, crop selection, market demand, etc. In the field of agriculture, big data is considered to be a blend of technology and analytics that can assemble the required data and analyse them to process it in more informative and appropriate manner to help the farmers in decision making.

Big data combined with cloud supported apps can further direct the farmers precisely on how to balance their harvest in line with market demand and enhance their produce and thus maximize their profits. This technology enables the farmers to micromanage farming and its associated activities. The beauty of this technology is that farmers can gain insights and estimate their yield even before actual planting of crops. In this article let us try to find ways to boost agriculture produce with the support of cloud, big data and analytics.

Role of Big Data Analysis in Agriculture

Application of new and emerging technologies is need of the hour in agriculture sector. In this direction, many established organizations and upcoming companies are coming forward to lend required support [1]. There is a definite need for Big Data in the agricultural sector as it has made significant advancement in the fields of IT, healthcare, education, sports

etc. [2]. While majority of farmers could maintain and increase soil health through traditional and conservative practices, technology assisted tools might be influential in ensuring a viable farming for future. Data analysis tools can help determine if the changes incorporated in the traditional agricultural patterns will give the same or better yield to meet the increasing food demands of the

population which is growing significantly while at the same time preserving the necessary natural resources. The final outcome of agricultural data analytics is to analyse and propose workable solutions with enhanced yield and outcomes. For instance, an image of an area of a land taken by the satellite has many levels of data giving us sensible information to analyse.

Scope and Effect of Big Data in Agriculture

Accomplishment in the farming domain has been fundamentally reliant on natural forces and resources, but not anymore in future [3]. Technological evolutions and services such as IoT, big data, analytics and cloud computing are emerging as tools to counter the ill-effects of climate changes, global warming and to meet the increasing demand for food. IoT devices facilitate the direct and real-time data collection from the ground through sensors plugged in crop fields, soil and plants. Data analysts can integrate these large and real-time data collected along with other significant information accessible from the cloud, such as climate data and pricing models to identify the patterns. These identified patterns and insights help in monitoring the situation. They assist to identify prevailing concerns, like functional inadequacies and issues with the quality of the soil and develop predictive algorithms which can alert the occurrence of a problem. It is estimated that with adoption of analytics, the agriculture output can grow consistently with an annual compounded growth rate of 16% [4]. Thus big data, can surely revolutionise the agricultural sector, along with cloud based system coupled with appropriate tools and software to integrate data sources for making good decisions.

Advantages of Data Analysis in Agriculture

1. Data analysis facilitates farmers, seed companies, insurance agencies, bankers, fertiliser industries, machinery industry etc. with right input at right time for better outcomes.
2. Data analysis provides better awareness, more precise knowledge



Fig. 1 : The precision farming in place at Israel [6] - Samples

and helps to bridge the gaps in the supply chain market of the agriculture industry.

3. The agriculture industry will be guided with abundant information for more informed decision making.
4. Scope for developing new seed patterns and behaviors with access to the plant genome and new methods to quantify the same.
5. New era of precision farming can boom with Big Data. The outcomes of analytics, perceptions and better results can then be used through precision farming methods as shown in Figure 1.
6. Scope for Food tracking with the aid of sensors and analytics to prevent damage leading to wastage and food-borne diseases.
7. Significant impact on supply chain of seed, crop inputs and food.

At present, the big data technology is in its nascent days and the potential for it to create value addition is still a probable figure in agriculture sector. But it has put the industries on the pavement of creating a disruptive innovation. Countries like Israel have been using this data analytics and

significant improvements in the farming sector are observed, as a result. Stakeholders with an urge to innovate new things will be the first ones to reap greater rewards in this direction. GODAN (Global Open Data for Agriculture and Nutrition) framework aims at bringing all the stakeholders together to leverage technology and solve global problems in agriculture industry [5].

The authors are hopeful of seeing this revolution happening in Indian agriculture sector for the benefit of its farmers, economy growth and survival of human race.

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Electronic Dumpster Diving

► D. Evangeline

Assistant Professor in Department of Information Science and Engineering in Ramaiah Institute of Technology, Bangalore

Everyone has heard of an old adage "One man's garbage is another man's treasure." It is relevant even in today's world. Hackers try to extract useful information from the network using much number of ways. Dumpster Diving is one such attack that has been playing such a role for quiet sometime [1]. Usually, hackers try to find useful information from the garbage. In case the hacker gets a user's credentials, impersonation is done. Hence, any kind of information, even when disposed must be done in well-calculated manner such that the wrong people do not gain access to the same [2].

Examples:

Documents of a bank are thrown in garbage and the security issues that arise are discussed by Steve Hunt [3] as follows: Transactions between banks in different nations can be found. Also, a bank cheque with his name and account details was

found. And now, Hunt hunted the person by googling his name. There he found his picture. Now, impersonation becomes very easy. Matt Malone, [4] a dumpster diver makes \$2500 a night by dumpster diving. He searches for retailers' garbage to find resaleable products. Now, one can be sure that the threats to digital world can also be from physical documents [5].

Interestingly, there are certain law policies to protect information leakage by destroying physical documents. Even those documents can be shredded to micro-cut or 6200 shreds per 8.5*11' sheet. Hence, paper shredder is very important in all corporate offices to destroy physical documents.

Digital Dumpster Diving

In today's Internet world, information is available to everyone at their fingertips at ease. This promotes open-source Intelligence (OSINT) which can be used for betterment of all lives or for launching

attacks on vulnerable individuals. Phone books, scientific journals, books also add to the contribution of OSINT [6]. So, it is always good to make sure that important details are wiped out when electronic goods are disposed and also information available in OSINT is only the most required one and not each and every little detail of an individual.

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Astronomical Big Data Analysis- A new paradigm for collaborative research

► Snigdha Sen

Assistant Professor, Global Academy of Technology, Bengaluru-98. Email: snigdha.sen@gat.ac.in

As we are approaching towards digitization, data plays a crucial role in decision making. Analysis of huge volume of data collected from multiple sources leads to business growth as well. Therefore, bigdata concepts are gaining huge popularity of late. Along with other fields like social media, E-commerce and IoT networks, astronomy community also has entered bigdata arena. The high end modern large aperture telescopes equipped with million pixels camera which can capture large portion of sky at a shot are generating huge volume of data which need to be processed. According to different sky surveys done so far, data collected per night by these instruments are reaching up to petabyte range. Hence, efficient algorithm and proper data analysis is very much essential to carry out intelligent decision making which can be a boon to astronomers. In this regard interdisciplinary research field Astroinformatics is becoming a popular choice among astronomers, data scientists, computer scientists and software engineers as it can use information technology tools to solve problems and challenges faced by astronomy community.

Introduction:

By the term bigdata we understand huge volume of structured, unstructured and semi structured data from various heterogeneous sources like social media, automobile industry, retail, satellite, sensors etc and of different formats (audio, video, image etc). Precisely such data is so large and complex that traditional RDBMS tools are not enough to store and process it efficiently. Handling this huge data growth requires proper data analytics which helps in analysing ingested data in order to generate quick decisions. Therefore, Big data analytics is the way forward. Bigdata solves the four major challenges[6] which are often referred as four Vs of Big Data. Sometimes they are also known as big data characteristics.

[1] Volume: Big data refers massive quantity of data. It can be in petabyte (2^{50} byte) and Exabyte (2^{60} byte) range. It might be generated online or offline from plenty of sources like healthcare, retail, ecommerce, embedded devices, Netflix, GPS, simulations, telescope etc.

[2] Variety: Data can now be in the form of audio, video, image rather than simple text as it used to be earlier. Astronomers mostly deals with image data, spectrum, emission lines and time series data. Generally astronomical data is high in dimension and rich in

complexity.

[3] Velocity: It is the rate of flow of data how it is generated or processed. Data generation by different telescope is at high speed. Astronomy data can be batch data or real time data. Processing real time data is a major challenge.

[4] Veracity: Mostly, it deals with truthfulness of data. The data collected from various sources may not be all the time meaningful.

Beside the above mentioned four characteristics we must deal with value of data which basically describes the quality of data. If this astronomical big data is analysed properly it can unfold many mysteries of our big universe. Fig. 1 describes about four Characteristics of Bigdata.

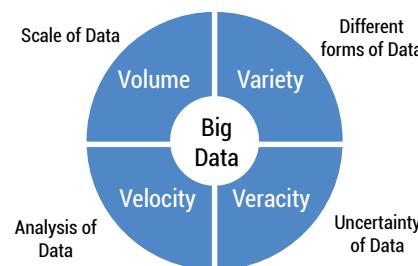


Fig. 1 : Characteristics of Bigdata

Astronomical Big Data sources:

Following are different sky surveys from which astronomical data can be collected.

SDSS: Sloan Digital Sky Survey is basically for imaging and spectroscopic survey. Currently it is having DR15 data set which contain observation from July,2017.

2MASS: This Two Micron all sky project surveys the whole sky in infrared.

VISTA: This VISTA telescope helps to capture three dimensional galaxy structure in detail.

LSST: This Large Synoptic Survey Telescope is being built to capture night sky for fainter objects.

All the above surveys by[1] telescopes generate large volume of data as depicted by Fig. 2.

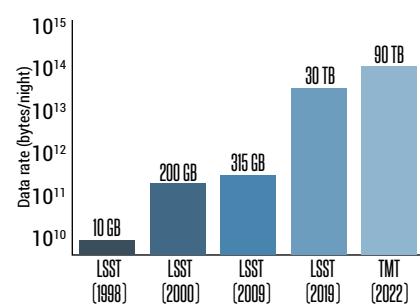


Fig 2: Data generated by sky surveys

Why Big Data Analysis is so important?

Classical or traditional approaches fail on many big data problems because

- The classical tools used in data analysis are not adequate to handle this exponential growth of data.
- Big data represents data which overtakes processing capabilities of traditional database system
- Traditional database architectures are not fit enough to handle so rapidly moving huge volume of data.
- Traditional tools require fixed schema architecture which big data don't have as it is coming from variety of sources. Unstructured data lacks a logical schema for understanding and decoding the data through traditional programming.

To overcome such limitations by traditional systems[5] bigdata analytics tools and framework is necessary.

Big data tools and frameworks:

There are two types of data processing mainly: Batch Processing and stream processing

Batch Processing: This method is used when large blocks of static data need to be processed together. Generally, it is useful for archive data or historical data.

Stream Processing: It is mainly for real time data processing where data is not static.

Tools:

Hadoop: It's a framework for parallel distributed processing[2] and Map reduce is the processing engine here. As HDFS is distributed file system of Hadoop, the collected data first need to be stored in HDFS. Then Map reduce programming need to be executed on it. It works in two phases. Map and Reduce. In mapper phase data will be split first and distributed in chunks among multiple nodes by generating key value pair and finally in reducer phase results collected from different nodes will be combined and written back to HDFS again.

Spark: This real time fast data streaming[3] software works on RDD (Resilient distributed dataset) concept. New RDD can be created from old RDD which provides fault tolerance and parallel processing. Spark processes data in memory rather than disk. That's why it is faster than map reduce. Spark's Mlib is useful for iterative machine learning algorithm.

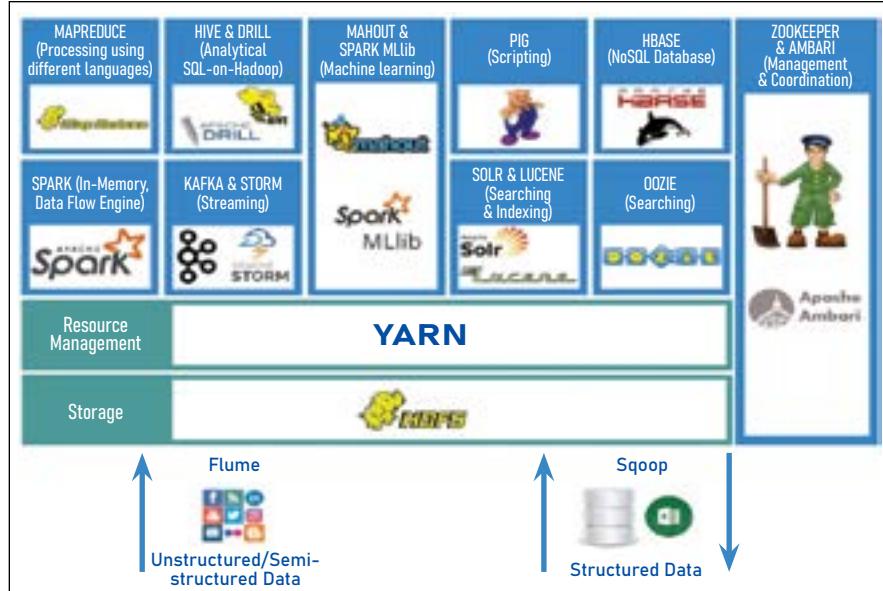


Fig 3: Hadoop Ecosystem

Storm: It is one type of Stream processing distributed fault tolerant framework which focuses on low latency which is much beneficial for real time data. It has a support of multiple programming language.

Samza: This stream processing system tied with Apache kafka used for fault tolerance.

Flink: It offers batch processing as well as real time stream processing framework. Flink is faster than Spark also and highly scalable. Working with machine learning using Flink is also better compared to hadoop and spark.

HIVE: It is an ETL tool and facilitates SQL like interface to query data stored in different databases integrated in Hadoop.

MongoDB: This No SQL database works without fixed schema architecture, therefore suitable for bigdata processing instead of RDBMS

Sqoop: It offers data transfer between RDBMS servers and HDFS.

Flume: It is used for distributed stream data processing, collects logs from multiple machines and puts into HDFS.

The usage of proper framework and tool depends solely on type of data that need to be processed and how much time we are ready to afford. In particular to analyse astronomical data, different mining tools and modules such as AstroWeka, AstroML, AstroPy were mainly used. Recently Apache

Spark, Hadoop are becoming the go to tools in this area. Fig 3 describes hadoop ecosystem architecture[8]

Conclusion

Although data driven astronomy is booming, it is still in a very nascent stage in India. Application of big data tools certainly speed up data processing which helps to overcome challenges faced by astrophysicist and astronomers and subsequently leads to new and rare discoveries of the universe.

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KIND ATTENTION !

Prospective Contributors of CSI Communications

Fourth Coming Issues : April 2020 : IoT

Please note that Cover Theme for **April 2020 issue is IoT**. 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 March, 2019.

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, **Prof. (Dr.) S. S. Agrawal** in the email ids **csic@csi-india.org** with copies to the Publisher **Prof. A. K. Nayak**, in the email id : **aknayak@iibm.in** and Editor **Ritika Wason**, Associate Professor Bharati Vidyapeeth's Inst. of Computer Applications and Management (BVICAM) in the email id : **rit_2282@yahoo.co.in**

Issued on the behalf of Editorial Board, CSI Communications.

Prof. (Dr.) S S Agrawal
Chief Editor



Themes for CSI Communications

2020

Month & Year	Theme	Month & Year	Theme	Month & Year	Theme
January, 2020	Computer Assisted Education	March, 2020	Big Data Analytics	May, 2020	Semantic Web
Feburary, 2020	Green Computing	April, 2020	IoT	June, 2020	Quantum Computing



5th Discover Thinking National Programming Contest 2019

Reported by **Dr. Ranga Rajagopal**, National Convener, CSI Programming Contest
Mr. M Gnanasekaran, Manager (Administration), CSI Education Directorate



Computer Society of India jointly with ReliScore, Pune organized the Fifth Discover Thinking National Programming Contest 2019 exclusively for the Students. This is an individual event to showcase the programming abilities of the student in C, C++, Java, Python, PHP, JavaScript, C#, Ruby, Go or Perl languages. More than 11,000 students registered for the contest across the country. The first online round contest was held on Saturday the 21st December 2019 between 8.00 AM and 8.00 PM. Top 10% of students based on their performance were shortlisted for the Second online round which was held on Monday the 30th December 2019 between 8.00 AM to 8.00 PM. Top 50 students from the second online round were chosen and invited for the 53rd CSI Annual Convention during 16th & 18th January 2020 at KIIT University, Bhubaneswar on the theme "Digital Democracy – IT for Change". CSI arranged free accommodation and free registration for the convention along with other facilities at the convention venue for three days, thanks to the excellent support from the Organizing team of CSI 2020. The final online round was conducted on 18th January 2020 between 10.00 AM and 12 noon at ICT Lab, KIIT University, Bhubaneswar. Dr M Sundaresan, RVP- Region-VII, Dr P Kumar, National Student Coordinator (NSC), Mr. V Sivaramasamy and Mr. R Ravikumar from Coimbatore Chapter were the observers for the finals. Reliscore, Pune as the Technology Partner provided impeccable support for conducting all the Online rounds without any hitch. The top three students from the finals were awarded cash prizes and achievement certificates.

The final results are given below:

Name of Student	Institution	Position
Mr. K A Kaushik Ram	PSG College of Technology, Coimbatore	First
Mr. S Dhinesh	Sri Sivasubramaniya Nadar College of Engineering, Chennai	Second
Mr. Nellimarra Venkata Hement Kumar	Raghu Engineering College, Visakhapatnam	Third
Mr. R Lakshminarayanan	PSG College of Technology, Coimbatore	Special Mention
Mr. Sundar S	National Engineering College, Kovilpatti	Special Mention



Reports of CSI Regional & State Student Convention, Region VI

Reported by **Pradeep Rathi**, Regional Vice-President (Region-VI)

State Student Convention 2020 for Maharashtra State (Region-VI)



Inaugural function with Mr. Pradeep Rathi, Vice-president (Region VI)



Inaugural function with Mr. Pradeep Rathi, Vice-president(Region VI)

The 'CSI-DIT' Student Branch of Mr. D Y Patil Institute of Technology, Pimpri, Pune hosted CSI State Level Student Convention, "INNOVISION" for Maharashtra state on 29th-30th January 2020.

The objective of the student Convention was to provide an opportunity to bring together students, and present their ideas, to strive in the global competitive engineering field.

The inauguration ceremony on 29.01.2020 marked the beginning of the State Level Student Convention. Hon'ble Principal Mr. Pramod Patil Sir, HOD Dr. Santosh Chobe Sir graced the ceremony along with Mr. Pradeep Rathi, Vice-President, CSI Reg-VI and Mr. Muraleedharan Manningal, Vice-President, EC2.

An overall crowd of 200 participants from different CSI student branches visited the college. The convention includes four sub competitions as detailed:

1. **WebMyWay** : A Web Designing event to design a website for CSI DIT-Student Branch in the platform of choice of the students. The website was judged on the basis of usability, user-friendliness, appropriate content, and aesthetics.
2. **Hackathon** : This event was divided into 2 days span consisting of 12 hrs each day. Judges scored projects creativity, technical depth, challenge of doing the task in a short amount of time, and usefulness in the real world.
3. **Workshop on Blockchain Technology** : A workshop was conducted on "Blockchain Technology", a small task was also given to the participants at the end of the workshop and top three students were selected.
4. **Technowiz** : Technical quiz event
All the events received huge participation, positive responses and feedback of participants.

Regional Student Convention 2020 for Region-VI



The CSI Committee of Vishwakarma Inst. of IT, Pune had conducted Regional level Convention, "Techno Vishwa" on 13th and 14th of January 2020.

The convention was the annual Regional Convention (Region VI) held every year at varied, VIIT was chosen this year for hosting the convention, Region VI of CSI comprises of the state of Maharashtra and Goa. The convention saw active participation from both the states and from all over the country. The aim of the convention was to bring all the technical minds together and give them a platform to showcase their talent.

The Opening Ceremony was graced by Mr. Pradeep Rathi, CSI Regional Vice-President (Reg-VI), Mumbai, as Chief guest and Mr. Hemant Sonawane, MahaMetro, Pune, as Guest of honor.

The technical events Bug-off, Earn-code and Reverse coding started with immense enthusiasm which then experienced great competition. A Workshop was also arranged on Intellectual Patent Rights which also witnessed a huge number of participation.

All the events received overwhelming responses and participation's even from the students of other colleges. Almost every event had more than 100 participating teams which in turn is big achievement for the CSI Committee. In spite of this, events were well received and has been managed very nicely and the overall feedback from the participants was positive.

By conducting this convention, CSI Committee was able to achieve its main objective to provide opportunities and platform for the students to showcase their skills & talents and providing means to explore the knowledge of current hot trending topics.



CSI VIIT has received Best Accredited Student Branch award and one of the student committee members has received Best Student Branch Activist Award.



Industrial Visit of Narayana Engineering College, Nellore (Region-V)

Reported by **Mr. S Ramasamy**, Fellow and Past Regional Vice President, Region-VII



An industrial visit to a Professional Society body named Computer Society of India, Education Directorate at Chennai was organized for the III CSE students of B Tech program on the 15th February 2020. The visit was organized by Mr S Ramasamy, Fellow & Past Regional Vice President and with the support of CSI Education Directorate staff. The students were given an introduction about the Personal Branding which includes Creative Communication, Presentation & Negotiation, SWOT Analysis etc. Students also had a great opportunity to interact with the Resource person, Mrs. Sri Vidya, Entrepreneur who was very liberal to share her time to answer all the questions raised by the students of the CSE department. Total 78 students got benefited from this visit. The visit ended with a felicitation to Mrs. Sri Vidya, by the students of third year and the faculty members of CSE Department.



CSI Kolkata Chapter Best Chapter (National Level) & Best Newsletter Awards



Mr. Gautam Hajra, Chairman, Mr. Snehasis Banerjee, Hon. Treasurer and Mr. Sourav Chakraborty, Hon. Secretary are receiving the awards



Report of CSI Regional Student Convention, Region-VII for 2019-20

Reported by **Dr. N. Prasath**, Associate Professor, Dept. of CS and Engg., KPR Institute of Engg. and Technology, Arasur, Coimbatore - 641 407

The Regional Student Convention of CSI, Region-VII for the year 2019-20 was organized at KPR Institute of Engineering And Technology, Coimbatore, Tamilnadu by the department of Computer Science and Engineering on 14th and 15th February, 2020. The convention was inaugurated by Prof. A. K. Nayak, Hon. President, CSI and Dr. M. Sundaresan, Regional Vice President, Region VII, Computer Society of India. We could able to attract 170 students for this regional convention out of which from 46 Institutes were actively participated in different events of convention.

The session started with prayer followed by lightning the Kuthuvilaku and the welcome address was delivered by Dr. M. Usha, Director, Centre for Research and Development, KPRIET Then the chief guest introduction was given by our student branch office bearer Ms. T. Dharani and Ms. P. Sangavi. After introduction, chief guest was honored with memento, bouquet and shawl. Next to honoring chief guest of honor Dr. M. Sundaresan was honored with memento, bouquet and shawl.



Inaugural speech by Prof. A.K. Nayak, President, CSI



Honoring the chief guest Prof. A.K. Nayak by KPRIET Student Branch Coordinator

Prof. A. K. Nayak, presented his presidential address explaining the Computer Society of India, when it was started and developments happened in CSI. He also proudly said that CSI is the

one big professional society in India having members more a lakh. He also discussed about the opportunities in recent technologies Artificial Intelligence, Big data, Cloud Computing, Mobile and other technologies that how young leaders can utilize in their career. Also Dr. M. Sundaresan, Regional Vice President addressed the gathering about the its role in our nation, its activities, awards and recognition given on various categories, Need for student branch, and funding opportunities by Computer Society of India.

After presidential address events overview was read by our office bearer, for this two day student convention and then inauguration was ended with national anthem. The following are the events organized on these two days:

- 1) Paper Presentation
- 2) Project Presentation
- 3) ICT Quiz
- 4) Code Debugging
- 5) Treasure Hunt
- 6) Poster Presentation
- 7) Workshop

On the second day of the event the expert was from Industry and Invited Talk was delivered by Mr. M. Vinod Kumar, Project Head, Pantech Solutions, Chennai on titled "IoT and Analytics". He outlined the latest IoT trends with regard to technology, use cases and the various business verticals which was covered on the first session from the second session to session 4, practical session was handled using Raspberry Pi and he made the participants to work on three different case studies.

At the end of day 2 the valedictory function was started and also participants shared their experiences about the two day convention and about the workshop and how they benefitted from it. Dr. M. Usha, Director, Centre for Research and Development, KPRIET distributed the prizes for the event winners and Dr. N. Balaji, HoD/CSE addressed the students congratulating them on their active participation and certificate was distributed to all the prize winners and participated participants.



Group photo by CSI office bearers and event coordinators with chief guest and guest of honor



CSI Rajkot Chapter (Gujarat) Region – III Events Report (Feb 2020)

Reported by Dr. Ashwin Dobariya, Vice Chairman, CSI Rajkot Chapter

Event 1 : Knowledge Forum Session

Expert : Mr. Sanket Anadani, Founder & CEO, Social Circuit Pvt. Ltd., Rajkot
 Topic : Social Media Marketing
 Date : 03rd February, 2020



More than 65 students & faculty participated in this knowledge Forum Session.

Session was started with welcome speech by Dr.R.Sridaran, Chairman, CSI Rajkot Chapter and he gave brief about various activities carried out under CSI Rajkot chapter.

The following topics are covered in the seminar: 1) Fundamentals of Social Media Marketing. 2) Various media available for Marketing. 3) Various terminologies about it. 4) Discussed about Face book marketing. 5) Career and opportunities in field of Social Media Marketing.

At end of session, Dr. Ashwin Dobariya, Vice Chairman, CSI Rajkot Chapter expressed a sincere thanks to expert and all participants and faculty members.

Event 2 : Knowledge Forum Session

Coordinators : Dr. Divyakant Meva, Prof. Nootan Padia & Prof. Dimple Chauhan
 Topic : Advanced Technologies
 Date : 08th February, 2020

Total 54 students have participated and presented their posters in groups.

Poster Presentation under Technical club and CSI Rajkot Chapter was held at Marwadi Education Foundation by FCA department. In this event, Students had to make posters on advanced technologies like machine learning, big data, cyber security, AI etc. and presented it to the judges. Finally four groups declared as a winner and awarded cash prizes to them.



Event 3 : Technical Workshop

Speaker : Mr. Bhavesh Atara
 Topic : Networking Fundamentals
 Date : 26th February, 2020



Total 60+ BCA students attended this workshop. It was started with welcome speech by Dr.Ashwin Dobariya, Vice Chairman,CSI Rajkot Chapter. Expert covered various topics on Networking like different Network devices, seven layers, IP Configuration and demo of networking tool. The overall coordination was done by Prof. Dimple Chauhan, Assist. Prof., FCA,MU.



CSI National Student Convention 2020

CSI Student Branch, Mody University of Science and Technology, Lakshmangarh

Reported by **Dr. N. Prasath**, Associate Professor, Dept. of CS and Engg., KPR Institute of Engg. and Technology, Arasur, Coimbatore - 641 407



CSI student branch of Mody University of Science and Technology conducted a 2-Day National Student Convention (CSI NSC 2020) of Computer Society of India (CSI) 2020 from 21st February to 22nd February at School of Engineering and Technology, Mody University of Science and Technology. The theme of the convention was "ICT for Sustainable Development". A total of 521 student participants, 100 faculty delegates and 25 Experts from industry and academia from national and international affiliation participated in this convention, which consisted of 11 events such as are Keynote Address, Panel Discussion, IOT Workshop, Hardware Model Presentation, Software Presentation, Website Development Contest, Application Development Contest, Poster Presentation, Paper Presentation, ICT Quiz, Coding Competition.

The 2-day event was commenced with an inaugural ceremony. The ceremony began with lamp lighting by dignitaries. The dignitaries present were The Chief Guest Prof. K. K. Aggarwal (Chairman-National Board of Accreditation, New Delhi), Guest of Honour Dr. Narendra S. Chaudhari (Vice Chancellor - Uttarakhand Technical University, Dehradun), Dr. A. K. Nayak (President- Computer Society of India), Prof. Kamesh Namuduri (University of North Texas- Denton, USA), Prof. Girish Kumar (IIT Bombay, Powai, Mumbai), Prof. Ramzi A. Haraty (American Lebanese University, Beirut, Lebanon), Prof. V. K. Jain ((Dean, Academics & SET Mody University) Dr Rajeev Pourush (Head ECE Deptt. SET) and Dr. Anand Sharma (SBC CSI Student Branch).

They inspired the students with their influential presence and advised them for achieving their aim without losing moral values. Dr. V.K. Jain, Dean-SET welcomed the students and dignitaries with his motivating words.

The day 1 of the events started with Keynote Address on the topic "Communication Technologies: application and its affect", the speaker were Prof. Girish Kumar (IIT-Bombay), Prof. Kamesh Namudri (UNT, USA) and Mr. Rajib Bose (IBM). The speaker shared their ideas and views on the topic.

Parallel all other events IOT Workshop, Hardware Presentation, Software Presentation, Website Development, Application

Development, Poster Presentation, Paper Presentation, and Coding Competition, also got started.

The day-1 ended with a mesmerising performance of students in cultural program in the presence of all the dignitaries, students and the participants, later a Gala Dinner was organised for everyone.

The day-2 started with the keynote addresses on the topic "Computing Technologies for Human Welfare", the speakers were Prof. Ramzi A. Haraty (American Lebanese University Beirut, Lebanon), Prof. S. Sanchez Vice-Chancellor, SRM IST, Dr D.K. Chaturvedi (Dayalbagh Educational Institute, Agra). The speakers shared their ideas and views on the topic.

The event was followed by the Panel discussion on the topic "Smart Technologies for future Advancement", the panel members were Dr. Mahesh Bunde(Principal and Director, Poornima College of Engineering, Jaipur), Dr. Mukul Verma(IET), Mr. Pradeep Rathi (CSI), Dr. Rohit Bhakar (MNIT) and Dr Vijay Janyani (MNIT).

The Software presentation which total of 69 participants with 32 teams, various innovative software projects was displayed. The event was evaluated by Dr. Mamta C. Padole(CSI), the winner of Software project presentation was team "VisionAR" , they won a cash prize of 3000 rupees and memento.

The Hardware presentation which witnessed almost 51 participants with 19 teams, various innovative hardware project was displayed. The event was evaluated by Dr. Santosh Yadav(CSI), the winner of hardware project presentation was team "SillyT", they won a cash prize of 7000 rupees and memento.

The Software presentation which total of 69 participants with 32 teams, various innovative software projects was displayed. The event was evaluated by Dr. Mamta C. Padole (RSC3, CSI), the winner of Software project presentation was team "VisionAR", they won a cash prize of 3000 rupees and memento.

The Coding Competition which witnessed almost 39 participants. The winner of coding competition was Sukriti Shah, she won a cash prize of 3000 rupees and memento.

The student displayed their creativity through poster presentation, the total no. of participant in this event was 32 teams with 64 participants, the poster were evaluated by Dr. Vishal Gaur (ECB Bikaner) and Mr. Pawan Tanwar (ECB Bikaner). The winner of this event was team "Tech3", they won a cash prize of 3000 rupees and memento.

The student displayed their creativity through poster presentation, the total no. of participant in this event was 32 teams with 64 participants, the poster were evaluated by Dr. Vishal Gaur (ECB Bikaner) and Mr. Pawan Tanwar (ECB Bikaner). The winner of this event was team "Tech3", they won a cash prize of 3000 rupees and memento.

In web designing contest participants showed their creativity through HTML pages, A total no. of 31 teams and 77 participants



participated in the event, the event was evaluated by Dr. Mamta C. Padole (RSC3, CSI). The winner was team "Rajshri", they won a cash prize of 3000 rupees and memento.

The App Development witnessed 6 teams and 17 participants. The participants developed various apps based on the theme. The event was evaluated by Amit Sanghi (CSI-Lakshmangarh Chapter), the winner was team "TechArmy" they won the cash prize of 3000 rupees.

Many student submitted their research and review paper in the paper presentation, the event was evaluated by Dr. Pradeep Rathi (RVP 6), The best paper was awarded to Jeeya Chouhan and Saumya Saraswat, They were awarded a cash prize of 3000 rupees and memento.

Student showed their General Knowledge in technical sector by participating in ICT quiz. The winner of quiz was Teena Taneja, she

won a cash prize of 3000 rupees.

The whole 2-day convention was successfully concluded with valedictory ceremony and prize distribution with Chief Guest Prof. S. Sancheti Vice-Chancellor, SRM IST, guest of Honour Prof. Kamesh Namuduri, (University of North Texas-Denton, USA) and Prof. Ramzi A. Haraty(American Lebanese University Beirut, Lebanon), Prof. R.K Vyas (Vice President CSI), Prof. Jayant Bhide (Regional Vice President-3 CSI), Prof. M. Venugopal Rao (Director, Mody University), Prof. V.K Jain (Dean, Academics & SET, Mody University), Dr Rajeev Pourush (Head ECE Dept. SET) and Dr. Anand Sharma(SBC, CSI Student Branch).

The winners were awarded with certificates and cash prizes and all the participants were felicitated with certificate of participation. At the end Dr Anand Sharma proposed a vote of thanks.



Seminar on “Introduction to Cryptology”

Organized by CSI Jabalpur Chapter at Mata Gujri Mahila Mahavidyalaya, Jabalpur

Reported by Arvind M. Nayak



A seminar has been organized on 31st January 2020 by CSI Jabalpur Chapter at Mata Gujri Mahila Mahavidyalaya, Jabalpur for their Student Chapter Members. The topic of the seminar was "Introduction to Cryptology". The Guest Speaker was Dr. Sraban Kumar Mohanty, Asst Professor from IITDM, Jabalpur. A total of 125 UG and PG students have attended this seminar and got the certificate as well.

This event was organized under the guidance the Chapter Chairman, Dr. Vipin Dhagat and the Student Chapter Coordinator, Dr. Satyendra Kurariya. Shri Arvind Mohan Nayak, Chairman - National NC has graced the occasion as Guest of Honour.

Dr Mohanty has explained the concept of:

- Encryption
- Decryption
- Plaintext
- Ciphertext
- TLS
- SSL
- HTTPS
- Cross Link

Shri Jitendra Kulkarni was instrumental in organizing the event. Prof Shajiya Khan has anchored the programme very nicely.



Students Project Competition (Semifinals)

Reported by Prof. J. Jerald Inco, Chennai Chapter Secretary



CSI-Chennai Chapter in association with IDE, University of Madras (UoM), Chennai organized a presentation on students project competition (semifinals) on Saturday 22nd February 2020 at 9.30 am at the conference hall, IDE, University of Madras.

Students from 30 Colleges and Universities from Chennai, Coimbatore, Trichy, Namakkal, Andhra Pradesh and Madhya Pradesh were registered for the students project competition. Out of 103 projects, 10 projects were selected for semifinals with the criteria including Innovation, Technology, Usefulness to citizens, Idea and Cost effectiveness from engineering and non-engineering each by the Academia Team – four Professors from Anna University, Chennai and two Professors from UoM, Chennai.

The presentation started with a welcome address by Hony. Secretary Prof. J. Jerald Inco and the inaugural address by Dr. S.

Sasikala, Associate Professor, IDE, UoM. The judges included Mr. Mahendranath Retd. Additional Manager from WABANG, Tableau and BI Expert Mr. Aswath Raj, Mr. Harish Vardhana from SP Robotics Lab, Mr. Jaya Keerthi from Neunets Technology, Bangalore and Mr. N. Rajaram, INDIAN Additive Limited, Chennai were introduced by Dr. A. Prema Kirubakaran, MC Member and were honored by Mr. Anantha Padmanaban, Treasurer, CSI-Chennai Chapter.

The bridge between Academia and Industry was accomplished through this event. The students were participated with their prototypes and models developed in their lab and were judged by the Professionals from Industry with an eye on Quality Assurance. It was the curtain raiser program to the celebration of CSI Day 2020 scheduled on March 07, 2020 at Hotel Palmgrove, Chennai.

CSI STUDENT CONVENTION

REPORTS

STATE STUDENT CONVENTION (HARYANA STATE)

Jai Parkash Mukand Lal Innovative Engineering and Technology Institute (JMIETI), Radaur (Region-I)



Jai Parkash Mukand Lal Innovative Engineering & Technology Institute (JMIETI), Radaur has organized one day State Level CSI Student Convention in collaboration with CSI on 15th February 2020. Prof (Dr) Ashutosh Kumar Singh, Professor & Head of Computer Application Deptt., NIT- Kurukshetra was Chief guest of this program. Prof (Dr) R S Chauhan, Director, JMIETI, Radaur presided over the function. During inauguration Prof Chauhan reported the highlights & achievements of the institute. Prof Ashutosh Kumar Singh discussed about Internet of Things and how to orient our workforce in a direction to achieve our individual goals. He explained his vision about the Interaction of Human with Machines and Machine to Machine. He motivated students to think out of the box, he also added another perspective to our thought regarding use of Intelligence Machine in our day today life that it is a boon to humanity as it can widely create more opportunities.

This convention has provided a platform to learn as well as to show skills in events like Technical Talk, Poster Designing using Photoshop, Technical Quiz competition, Programming & Debugging contest. The convention was attended by 226 students from 14 institutes. Mr. Vishal Garg, Convener, CSI paid thanks to the Guests and speakers of the convention and congratulated the team of convention for the success of state level function.

Mr. Abhshek Mehta from JMIETI, secured 1st Position, & Mr. Bhavuk from JMIETI secured 2nd position, Mr. Ankit from DCSA-KUK secured 3rd position, in the event of Code Mantra.

Ms. Divja Saini, JMIETI, secured 1st Position, Mr. Ankit from DCSA-KUK secured 2nd Position and Mr. Raman Sharma, DCSA-KUK secured 3rd position in the event of Kill the Bugs.

Mr. Nikhil Jain from GNLU-Mullana, secured 1st Position, Ms. Banty from JMIETI secured 2nd Position and Mr. Paras Dhingra-JMIETI secured 3rd position in the event of Quiz.

During convention, Dr. S K Garg, Mr. Vivek Sharma, Mr. O P Batla, Ms. Upasana Sood, Mr. Vishal Garg, Ms. Ruchi Gupta, Ms. Priyanka Kamboj, Dr. Pardeep Rana, Mr. Rajiv Bansal and others were present.



STATE STUDENT CONVENTION (JAMMU & KASHMIR)

Model Institute of Engg. and Tech., Kot-Bhalwal, Jammu (Region-I)



Model Inst. of Engg. and Tech. (MIET) organized the 5th CSI J&K Student Convention at its Kot Bhalwal campus. Mr. Kashyap Kompella, Co-author of Amazon Bestseller "Practical Artificial Intelligence" and CEO of Industry Analyst Firm rpa2ai Research was the Chief Guest on the inaugural function, while Dr. Harshit Kumar, Senior Research Engineer at IBM, India Research was the Guest of Honor. The theme of the convention was "Artificial Intelligence and Deep Learning". Over 200 students from CSE, IT and MCA departments from MIET and other institutions participated in the two-day event, which was sponsored by CSI. Highlights of the event included the "Project demonstration" by students and faculty in which ground-breaking innovative projects on Artificial Intelligence and Deep Learning by the students were showcased. Two more events "Codeathon" and "Paper presentation" were held on the first day. On the second day "Poster making" competition wherein 25 teams pitched their technical ideas were displayed to an eminent jury. MIET operates one of the largest CSI student chapters in North India with over 500 active student members.

Prof. Ankur Gupta, Director, MIET welcomed the dignitaries on the occasion and congratulated the CSE department for its initiative in organizing the Student Convention which is a unique event. He also encouraged the students to innovate and push the boundaries of technical excellence.

Mr. Kashyap Kompella, Co-author of Amazon Bestseller "Practical Artificial Intelligence" and CEO of Industry Analyst Firm rpa2ai Research in his address talked about the Page ranking algorithm and sited example of Prof. Rajeev Motwani, a Jammu born Professor who had reached great heights in the field of Artificial Intelligence. Prof. Rajeev Motwani was one of the co-

authors with Larry page and Sergey Brin and Terry Winograd of an influential early paper on the page Rank Algorithm. He laid stress on unicorn technical startups and inspired the students to be job creators than job seekers.

Dr. Harshit Kumar Senior Research Engineer at IBM, India Research in his address shared his research experience with the students in the field of Artificial intelligence and Deep learning. He talked about various techniques and algorithms used in Natural Language processing. He apprised the students with some of the shortcomings of chatbots and motivated the students to develop projects that can solve real life problems. He also highlighted the new feature Smart Compose that can now autocomplete entire email via Gmail. Assoc. Prof. Salim Qureshi, Head, CSE presented the formal vote of thanks while Ms. Mekhla Sharma, AP, CSE compered the event.



STATE STUDENT CONVENTION (ANDHRA PRADESH)

VR Siddhartha Engineering College, Vijayawada (Region-V)

CSI & The Department of IT, V R Siddhartha Engineering College had organized a Two-day CSI State Level Student Convention "Tech Bloom 2020" on 27th & 28th January 2020. The Main theme of the

event was "The Connected world & IOT". Prof M Surendra Prasad Babu was a chief guest & key note speaker for this event. He addressed the importance of Artificial Intelligence to the gathering. Along with chief guest Dr. A V Ratna Prasad, Principal, VRSEC, Dr. M Suneetha, Head of the Department, IT & Dr. D Rajeswara Rao, Head of the Department, CSE have lighted the lamp and started the event.

More than 200 students from various reputed institutes also had participated in this program. The students had organized many interdisciplinary technical events like Paper Presentation, Project Expo, Pair Programming, Tech Blind, Festive-D-Art, Open Mike, Ted Talks and Shutter-Up.



Dr. Salman Abdul Moiz, Regional Student Coordinator Region-V, Dr. J Rajesh Choudary, Chairman, CSI Vijayawada Chapter and Mr. Venkata Praveen Krishna Anne, State Student Coordinator for Andhra Pradesh are invited for the valedictory of the event. The dignitaries encouraged the students to participate in such activities which will help them improving their technical and communicational skills. Apart from student coordinators, the faculty coordinators Mr. Y Kalyan Chakravarti, Asst. Professor and Mrs. P Ramya, Asst Professor had took a step to encourage the students to participate in all the events.

Call for Contributions in CSI Adhyayan

(A National Publication dedicated to IT Education, Research and Student Community)

CSI Adhyayan is being positioned as a national publication dedicated for IT education, research and student community. This quarterly electronic publication performs the functions of a newsletter, a magazine and journal.

We take this opportunity to invite the contributions in this venture. Your invaluable contributions, suggestions and wholehearted support will be highly appreciated. We appeal to all our Chapters, Student Branches and member academic institutions for encouraging and motivating the students in terms of contributing innovative ideas, exploring new vistas of knowledge and new findings through CSI Adhyayan.

We especially invite news and updates from our member institutions and student branches.

Please send your article to the Chief Editor **Dr. Vipin Tyagi** via email dr.vipin.tyagi@gmail.com with a copy to the publisher Prof. A. K. Nayak in the email : aknayak@iibm.in

On behalf of CSI Publication Committee

Prof. A. K. Nayak

Publisher

STUDENT BRANCHES INAUGURATION REPORTS

VAAGDEVI ENGINEERING COLLEGE, WARANGAL (REGION-V)



CSI Student Branch was inaugurated at Vaagdevi Engineering College, Warangal recently. Student Branch conducted the election for CSI Student Executive Body on 23-11-2019. The elected Executive Committee members were inaugurated on 25th January 2020 in the presence of Prof SSVN Sharma, Dean, Training and Placement; Head of the Department, Dr R Naveen Kumar; Guest of Honor, Dr Janaki, Head of Department, College of Engineering; Prof G Ramesh, Associate Professor, Student Branch Coordinator and Dr J Srikanth, CSI Member. After the event, one day workshop in Collaboration with SmartBridge Educational Services Pvt Ltd on VMWare was organized. 329 students from ECE, EEE and CSE has participated. Prof G Ramesh, Prof G Aruna Kranti, & Prof K Sharmila Reddy has coordinated this event. Mr Jai Prakash Netha, Lead Academia Relations & Mr Sandeep Doodigani, Cloud App developer were the resource persons for the workshop.



ADHIPARASAKTHI ENGINEERING COLLEGE, MELMARUVATHUR, (REGION-VII)

The CSI Student Branch of Adhiparasakthi Engineering college, Melmaruvathur was inaugurated on 18th February 2020. The

Esteemed guest for the inauguration was Dr B Chidambararajan, Chairman, CSI Kancheepuram Chapter. The Blessing of Lord Almighty was invoked through a moolamandhiram song sung by college coir. To mark the beginning of the new Student Branch, the dignitaries lighted the holy lamp. Dr C Dhaya, HoD-CSE welcomed the gathering and introduced the Chief Guest. The CSI student



Office bearers were introduced by Ms P Sivakamasundari, AP-CSE. Dr J Raja, Principal, APEC and Dr S Jayashri, Director, APEC felicitated the Chief Guest. The Chief Guest in his inaugural address, stressed the importance and role of CSI student Branch for organizing professional activities. He also advised the students to enhance their technical knowledge and leadership qualities through the CSI activities. He also mentioned the benefits of having professional bodies and how to make use of them. The inaugural function concluded with the vote of thanks by Ms A Prathiksha, Student Secretary, APEC. More than 120 students were participated in the inauguration. The function concluded with the salute to the Nation by singing the National Anthem.



KANCHEEPURAM CHAPTER

CSI Kancheepuram Chapter organized the Chapter Level Student Convention on 6th February 2020 at SRM Valliammai Engineering College. Around 290 participants from more than 25 Engineering Colleges took apart in the event. The event was inaugurated by Dr. T P Ganesan, Director, SRM Valliammai Engineering College. Dr. B Vanathi, HOD-CSE, welcomed the participants. The Vice Chairman of CSI Kancheepuram Chapter, Dr. Rajeswari Mukesh briefed about the CSI Student Convention Event and about the active participation of students and staff members of CSI Kancheepuram Chapter. The Chapter Chairman Dr. B Chidambararajan proudly spoke on how the chapter has been playing a vital role in the CSI activities and mentioned that the CSI Kancheepuram Chapter had received more than 10 Awards in the 53rd CSI Annual Convention held at Bhubaneswar on 16th and 18th January 2020. He also motivated to keep up the good efforts and involvement shown by the colleges of the CSI Kancheepuram chapter. He gave a thoughtful speech to the participants through his encouraging words. The overall event was organized and coordinated by Dr. M Senthil Kumar, Hon Secretary, CSI Kancheepuram Chapter.



CSI Kancheepuram Chapter in association with the Department of Computer Science and Engineering of St Joseph Institute of Technology organized a invited Lecture on "Benefits of CSI

Membership" on 7th February 2020. Dr. J Dafni Rose, HoD-CSE welcomed the guest speaker Dr. M Senthil Kumar, Hon Secretary, CSI Kancheepuram Chapter for the event and also felicitated the Chief Guest.



The Session started with an appreciation from the speaker for their eagerness to know about the benefits of CSI and went on with briefing the structure of the National Executive Committee members of Computer Society of India. He also gave a glimpse of the membership fee structure for both the students and life members. He also made an elaborate presentation on the benefits of CSI to the students, Institutional and life members. He has clearly explained the different types of award nominations for students and faculty members in Computer Society of India. The event was coordinated by Ms M Abirami, AP-CSE of st Joseph institute of Technology.

Finally, Vote of thanks was given by Mrs L Madhuridevi, AP-CSE. More than 100 students and 20 faculty Members were benefited from this Guest Lecture. The Event was organized under the guidance of Dr B Chidambararajan, Chairman, CSI Kancheepuram Chapter.

**TRIVANDRUM CHAPTER**

The intra college Technical conclave "Industry to Campus" organized by CSI Trivandrum chapter in association with College of Engineering, Muttathara on 6th February 2020 at College premise.



Mr. Sunil Kumar I N, Former Senior Director of CDAC and Former Principal of ERDCI Institute of Technology was the chief guest. Eminent personalities from various IT firms were the speakers of the day. The Principal, HODs of various Departments, Staff and Students of CEM were also present. CSI officials including Mr. Neelkanthan GN, Former Chairman, Mr. Sreekanth P Krishnan, Former Chairman, Prof Babu, Former Chairman and Aswin P Chandran, Hon Secretary, CSI Trivandrum chapter graced the occasion.

The event started at 10 am with the welcome speech by Mr. Rakesh RJ, Secretary of CSI Chapter, Asst Prof. CEM. The Principal, CEM addressed the gathering. The inauguration was formally done by lighting the lamp by all the invitees on the dais. The first session of the day was handled by Mr. Satish Babu, Co-founder and President of INAPP Technologies on "Emerging Skill requirements in IT". He discussed about different career opportunities and gave an idea about company hierarchies prevailing in various countries. He also briefed that block chain, crypto currency and data science are the emerging next generation technologies.

It was followed by another session on "Building The Next Generation Skills" by Mr. Ajish M J, Manager Delivery Excellence Organization, TataELXSI. He discussed about Contextual Learning, Social Learning and various employment opportunities ahead of us.

Next session by Mr. Philip John Managing Director, CETRONICS Technologies Pvt. Ltd. provided us an insight on "Social Relevance on Computer Science and Engineering". He shared his ideas on areas like revolution in Electronics, IT and its influence in social life.

Fourth session focused on "Building a Career in Block Chain" by Mr. Jinu Babu, Global Head Services, Solutions and Platforms, TCS block chain. He discussed on Internet 1.0 and Internet 2.0 versions and considering block chain as future career option.



The final session on "Career in Software Testing" by Mr. BalamuraliL, Director, NEST Technologies introduced the students to concepts like Semiconductor FAB Automation, importance of testing in medical field, Avionic Services etc. and how the art of testing has evolved over years. The event was made more lively by

giving Staff and Students a chance to interact with the speakers after each session. All the speakers were presented with a memento as a token of appreciation. The event was concluded by vote of thanks by Mrs Bindhu JS, HOD-CSE, College of Engineering, Muttathara.

TIRUCHIRAPPALLI CHAPTER



CSI Tiruchirappalli Chapter jointly with IEI organized Seminar on "Digital Image Processing Applications in NDT" by Deepesh, Senior Manager NDT Lab / Quality, BHEL, Tiruchirappalli on 4th February 2020 at the Institution Building.

ABSTRACT:

- Digital image processing techniques are well known in a wide range of applications such as medical, law enforcement, space research, defence etc. However, in the case of conventional NDE for industrial applications, there has been only a sluggish shift towards the application of these technologies.
- The primary challenge has been the requirement of high sensitivity of NDE in the case of critical applications. However, the development in the field of materials, manufacturing processes, and electronics have led to the transformation of conventional NDE methods to advanced digital imaging technologies.
- These systems can significantly enhance the productivity and reliability of NDE methods by providing instantaneous and high-quality digital images, which can be subjected to a wide range of operations for precise detection and characterisation of defects. However, care must be exercised to use these techniques appropriately as the wrong use may lead to severe quality issues.
- This lecture introduces the basic image processing applications in NDE, particularly in radiographic applications.



CSI Tiruchirappalli Chapter jointly with IEI organized Seminar on "Automation Process in Fuel Depot" by Mr. Mohammed Ghouse, General Manager, Micromax Systems Pvt. Ltd. Tiruchirappalli on 11th February 2020 at the Institution Building.

Integrated Terminal Automation System/Depot Automation System provides monitoring, control and management of the entire product handling process, right from receiving to storage and distribution.



Generally, Consumer vehicles are loaded from Fuel outlets with fuel like Petrol, Diesel or LPG. The Fuel outlets are loaded with Tank trucks filled through Terminal Automation System in Depot or Terminal. Fuels include Motor Spirit (MS), Diesel, Aviation Turbine Fuel (ATF), Naphtha, Superior Kerosene Oil (SKO), Furnace Oil etc.

Depot Automation is a process in which a Supervisory Software System (Depot Automation System) automates certain manual processes in a terminal. Supervisory Software system consists of number of sub systems which perform validations in every stage from Entry to Exit of a Tank Truck (TT). Depot automation provides a comprehensive range of products and solutions for Inventory Management and Tank Terminal operations offering open connectivity and modular design. Automation avoids the pilferage of fuel and provide number of Management information reports(MIR) and data charts.



The Business Session of the MC Meeting of the CSI Tiruchirappalli Chapter was held on Thursday the 13th February 2020 in the BUTP Hall, Khajamalai, Tiruchirappalli.



VELLORE CHAPTER



CSI Vellore Chapter organized Two day's workshop on "TechEx" on 24th & 25th January 2020 at VIT University. The kick-started this workshop with Mr. Vineeth, Developer from agora.io who demonstrated the effect of latency in real time communication and their company's solution to this common problem. He covered the basics of web development followed by parallel sessions on Machine Learning and mobile technology. These trending topics kept the crowd engaged and provoked their minds to think outside the box. Towards the end, the workshop moved onto the design section in which Ruchica and Sanjana gave everyone an overview of what design is and about UI/UX while Fardeen told everyone the difference between a good UI/UX and a bad one. The workshop was attended by around 70 CSI members went back with an insight on the current and upcoming tech and future opportunities. Organized by Dr Govinda K, Past RVPVII and Prof Sendhil Kumar K S.

FROM CSI STUDENT BRANCHES

REGION-II

Supreme Knowledge Foundation Group of Institutions, Hooghly



9-1-2020 to 15-1-2020 - Hands-on workshop on PC Maintenance

REGION-III

Auro University, Surat



13-2-2020 & 14-2-2020 – Workshop on Android App Development using Android Studio

REGION-III

Jaypee University of Engineering and Technology, Guna



28-12-2019 to 3-3-2020 - Week of learning
(Html Css and JavaScript on progate)



REGION-V

Kallam Haranath Reddy Institute of Technology, Guntur



30-1-2020 - Seminar on Artificial Intelligence & Deep Learning



2-2-2020 to 5-2-2020 - Workshop on Oracle Database

Vidya Jyothi Institute of Technology, Hyderabad



15-2-2020 - Coding Competition CODEIT

Madanapalle Institute of Technology & Science, Madanapalle



13-2-2020 to 15-2-2020 - Workshop on Python Programming for InfyTQ Certification

REGION-V

CMR Technical Campus, Hyderabad



14-2-2020 - Hands on Workshop Building Chatbots

NBKR Institute of Science and Technology, Nellore



27-1-2020 & 28-1-2020 - Workshop on Python Programming

Malla Reddy College of Engineering, Secunderabad



30-1-2020 – STTP on Machine Learning and its applications using Python

Usha Rama College of Engineering & Technology, Telaprolu



3-2-2020 - Technical Event

Anurag Group of Institutions, Hyderabad



15-2-2020 – Event on Internet of Thing

Malla Reddy College of Engineering & Technology, Secunderabad



1-2-2020 - One Day Seminar On DEVOPS

Chalapathi Institute of Engineering and Technology, Guntur



1-2-2020 - Aptitude and Reasoning Test



7-2-2020 - Guest Lecture on Artificial Intelligence

REGION-V

NMAM Institute of Technology, Nitte



8-1-2020 – Workshop on R Programming



9-1-2020 – Event on Lip Sync

S G Balekundri Institute of Technology, Belgaum



29-1-2020 to 31-1-2020 - FDP and workshop on Machine Learning with Python



6-2-2020 - Seminar on Role of Entrepreneur in Economical Development of India

New Horizon College of Engineering, Bangalore



12-12-2019 to 14-12-2020 – Faculty Development Program on Cyber Security and Digital Forensics by Mr Subodh Gajare



19-12-2019 to 21-12-2019 - International Conference on Innovative Research in Engineering, Management and Sciences (ICIREMS-2019)

CHRIST (Deemed to be University), Bengaluru



10-2-2020 – Workshop on Data Science



14-2-2020 – Workshop on Wireshark

REGION-V

St Joseph Engineering College, Mangaluru



10-2-2020 to 12-2-2020 - FDP on MATLAB and its applications in the areas of Image Processing, Computer Vision and Deep Learning

Srinivas Institute of Technology, Mangalore



11-2-2020 - Technical Talk on Cyber Security and Forensic

B.M.S. Institute of Technology & Management, Bangalore



14-2-2020 - Industry Institute Interaction

GSSS Institute of Engineering & Technology for Women, Mysore



18-2-2020 - Awareness Program on Higher Studies

REGION-VI

Sipna College of Engineering and Technology, Amravati



1-2-2020 - Seminar on Internet of Things - An Emerging Technology



5-2-2020 - Seminar on Japanese Language Awareness

REGION-VII

Ramco Institute of Technology, Rajapalayam



20-1-2020 to 24-1-2020 - Boot Camp Course on Angular JS



15-2-2020 - Guest Lecture on Software Test Automation

REGION-VII

Sri Venkateswara College of Engineering, Sriperumbudur



6-2-2020 - Guest Lecture on Data Analytics using R

S A Engineering College, Chennai



27-1-2020 to 29-1-2020 - Short term course on PHP Web Development

SRM Valliammai Engineering College, Kattankulathur



10-2-2020 - Seminar on Cyber Safety



12-2-2020 - Seminar on DevOps

Prathyusha Engineering College, Tiruvallur



1-2-2020 – Industry Expert Interaction on Machine Learning



15-2-2020 - Campus Connect student workshop on INFYTQ

IFET College of Engineering, Villupuram



21-1-2020 - Motivation Program



25-1-2020 - Guest Lecture on Internet of Things (IoT)

FROM CSI STUDENT BRANCHES

REGION-VII

Jeppiaar Institute of Technology, Sriperumpudur



9-1-2020 - Event on Blind Coders

K.L.N. College of Engineering, Pottapalayam



15-2-2020 - Guest Lecture on Digital Marketing

National Engineering College, Kovilpatti



14-2-2020 - Awareness program on Competitive Exams



20-2-2020 - Contest on Code Hunter

Panimalar Institute of Technology, Chennai



10-1-2020 - Guest Lecture on Domain Specific Learning Path



10-1-2020 - Guest Lecture on Self-Motivation and Self-Startup

Ilahia College of Engineering & Technology, Muvattupuzha



6-2-2020 & 7-2-2020 - Workshop on
Developing Programming Logic through C

Student branches are requested to send their report to
sb-activities@csi-india.org

Chapters are requested to send their activity report to
chapter-activities@csi-india.org

Kindly send **High Resolution Photograph** with the report.



Glimpses of CSI National Student Convention



A view of the inaugural function of CSI National Student Convention 2020 at Mody University of Science & Technology, Rajasthan



Key note speakers addressing in CSI National Student Convention 2020 at Mody University of Science & Technology, Rajasthan



A view of the Valedictory function of CSI National Student Convention 2020 at Mody University of Science & Technology, Rajasthan

Honorary Fellowship Award

Dr. Priya Ranjan Trivedi



Dr. Priya Ranjan Trivedi (70) is the world renowned environmental scientist, institution builder and a charismatic leader with more than 45 years of teaching and training experience in different areas of ecology, environment, disaster management, sustainable development, peace studies, conflict resolution, human rights, intellectual property rights, ecological tourism, geriatric care and institution building strategies.

He is the Founder Chancellor/Plenipotentiary of the State University "The Global Open University Nagaland" and Founder Chancellor of the "Indira Gandhi Technological and Medical Sciences University", Arunachal Pradesh. He has been responsible for the establishment of many universities and professional / vocational institutions in India as well as in other countries of the world. He has authored the World Encyclopedias on emerging subjects like environmental sciences, remote sensing, health care, global peace and security, production and operations management, materials management, bioinformatics, green business management, geriatric care, habitat and population studies etc.

As the President of the Confederation of Indian Universities (CIU) created during the NDA regime in the year 2004, Dr. Priya Ranjan Trivedi has tried to unite all the 1100 universities in the country for optimising the available resources in the country with a view to stopping the duplication of efforts in the area of higher and tertiary education. During his visits to different countries including USA, UK, Italy, Spain, France, Germany, Sri Lanka, Nepal, South Korea, Mongolia, Zambia, Uganda, Ethiopia, Maldives, Indonesia, Russia, Poland and Thailand, Dr. P R Trivedi has been transferring the appropriate technologies of institution building from India to the rest of the world. He has received more than 55 international and national awards and appreciations conferred upon him in many countries of the world for his outstanding contribution in the areas of alternative dispute resolution, diplomatic studies, interfaith studies, spiritual development etc.

Dr. P R Trivedi has designed a masterplan paradigm for leading India by

providing appropriate guidance to the Government of India in the areas of skill development, entrepreneurial leadership besides managerial competence among the young boys and girls by advocating the slogan "Catch Them Young" so that they could finally become didactics to educate their fathers, mothers, teachers and colleagues, rather the entire neighbourhood with no worries and miseries in the country.

Dr. P R Trivedi is the first person in India to have thought of vocationalising the existing careers of young boys and girls by giving them employment centric education with a view to solving the problems relating to employment as well as unemployability. He has designed more than 2100 skill-based courses with self-instructional study materials for ensuring perfect training in order to achieve the milestone of producing 550 million skilled persons in the country by the year 2025. Dr. P R Trivedi has envisaged that the two main problems of our country i.e. unemployment and pollution has to be tackled by creating environment friendly and sustainable jobs by designing a job creation policy which could be sustained by the mother earth of our country.

Dr. P R Trivedi has been duly credited for designing and launching the Post Graduate Diploma in Computer Applications besides short-term job-oriented skilling courses on Computer Operations, Computer Programming and Computer Maintenance way back in the year 1979-1980. He has also brought out the 50 Volume Encyclopedia of Information Technology running into more than 15,000 pages jointly brought out by the Computers (India) Limited, The Global Open University Nagaland and Indira Gandhi Technological and Medical Sciences University, Arunachal Pradesh.

Dr. P R Trivedi, who was instrumental for the establishment of CSI Patna Chapter in 1986 and became the founder Chairman of CSI Patna Chapter.

In grateful recognition for his enormous contribution in ICT education and strategic planning for ICT in distributed environment at Indian academia, business and industry, and for his service to CSI, the Awards Committee is pleased to bestow the Honorary Fellowship Award upon Dr. Priya Ranjan Trivedi during 16-18 January 2020, at the Annual Convention in Bhubaneswar.

Mr. Sanjay Mohapatra

Chairman, Awards Committee, CSI

Bhubaneswar, 16-18 January 2020

Prof. A K Nayak

President, CSI

Honorary Fellowship Award

Mr. Anirban Mukherjee



He has experience in various fields. After studying B.E. and M.E. in Electronics and Telecommunications Engineering, he took up his first job with Hindustan Computers Limited, where he rose to head the Software and hardware support of the region within 4 years. In 1992 he changed job and joined the Corporate office of CESC Limited from where he retired as senior management staff in 1995. Since then, he joined Techno India Group as its Vice President. Now he works as the Advisor to the Managing Director of the Group.

He joined CSI in 1981 and served the society in various capacities. He was Head of Educational Sub Committee for eight years at a stretch and was one of the instrumental persons to generate huge funds which enabled Calcutta Chapter to purchase its own premises. He was Member of Organising Committees of CSI'86, Silver Jubilee CSI'90 and Organizing Secretary of CSI'94. All these were hugely successful and iconic events. Mr. Mukherjee also organized different Regional, National and Division level events which were grand successes.

He was Calcutta Chapter Secretary for two terms and its Vice Chairman for one term.

He was visiting lecturers of Jadavpur University, University of Calcutta and

nearly ten Engineering colleges and acted as head of two Management Departments.

During his service, he led his teams to develop and implement hundreds of software projects, many among them were firsts in the Indian context.

Discharging his social responsibilities, he crisscrossed Eastern India in general and Orissa in particular to make faculties, students and people aware about different aspects of computer hardware and software. He was instrumental in opening the first Chapter and student branch in Orissa and North East.

Happily married to Minaksi for nearly forty years, both his daughters – Moumita and Avishikta are established IT Engineers with IBM and TCS respectively.

He spends his spare time in gardening, travelling and wildlife photography.

In grateful recognition for his enormous contribution in ICT education and strategic planning for ICT in distributed environment at Indian academia, business and industry, and for his service to CSI, the Awards Committee is pleased to bestow the Honorary Fellowship Award upon Mr. Anirban Mukherjee on the Seventeenth Day of January 2020, at the Annual Convention in Bhubaneswar.

Mr. Sanjay Mohapatra
Chairman, Awards Committee, CSI

Bhubaneswar, 16-18 January 2020

Prof. A K Nayak
President, CSI



Big Data Analytics – usage in various fields

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Big data analytics impute to the scheme of scrutinizing large quantity of data, or big data. The content for this analysis is accumulated from a wide range of sources. The information collected by this process is used to crack patterns and relations that might be imperceptible, and also provide judgement about the person who created it. Big data analytics is helpful in evaluating huge amount of transaction data that classic business systems were inadequate to tackle. Refined software programs are used for big data analytics in making that business tick.

Introduction

Currently predictive and user behaviour analytics are considered as the advanced data analytics method to extract value from information. The perception of big data has been brought in before many years. Most of the business organizations recognized and discovered that they acquire entire data which gets accumulated in their business, which enables them to put in analysis phase to obtain suggestive valuable data from it. Obviously, big data analytics is involved in making that business tick. In this article utilization of the technology-big data analytics in different organizations were discussed.

Types of applications:

Banking industry:

Banks store the history of daily business transaction. The quantity of data procreated by banks are huge in number. However, recording and securing such a colossal portion of data is a job for bankers. Organizing and recording these data is worthless unless there is an idea to make use of such a huge amount of data. Thus big data analysis helps

- the bankers to personalize the services needed by the customer
- to scrutinize the market trends and conclude on reducing or increasing interest rates for various personals across the world
- Data entry errors from manually filled forms can be shortened to a minimal as big data point out deviations in customer data too.
- Narrowing the frequency of counterfeit or questionable transaction that might advocate anti-social activities or terrorism



Fig. 1: Big Data Analysis in Banking

Government:



Fig. 2: Big Data in Government

By carrying out a big data platform, governments can access wide range of appropriate information significant to their daily functions. Big data analytics allows governments to make decisions immediately also to monitor those decisions to implement

changes when required. Big data analytics have effect on governments – local, national and global. It improves transparency and efficiency in public management. The prosperities of big data for governments are speedy and made better decision making, enhanced productivity, improved transparency and cost reduction, eliminating fraud, removing waste and abuse, reduce crimes and security threats and improved emergency response.

Health care:

Source of Big Data in Health Care

Health care industries use big data analytics in more efficient manner. Managing patient details and records, health chart and plans, insurance and patient visit details can be tedious process but it can be full of key insights once big data analytics are applied. Thus by analysing structured and

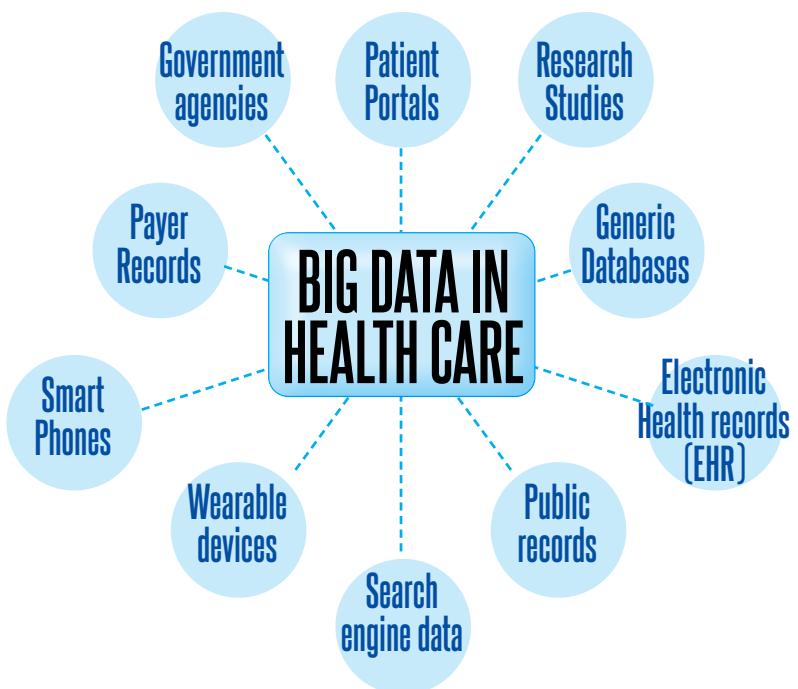


Fig. 3 : Sources of Big Data in Health Care

unstructured data health care providers can provide lifesaving diagnoses and treatment immediately. Through this health tracking, not only patient's heart rate, sleep, and exercise can be monitored, but also a patient's pulse, blood pressure and glucose levels. This data analytics in health care industry have become more pro-active and forward-thinking healthcare industry. And also limiting the professionals time spend in the hospital.

Manufacturing:

The manufacturing industries is deeply moved by big data's potential and trend due to quantity and nature of data produced. In big data **risk management**, **order configuration**, **product quality**, daily production tracking, maintenance and testing is carried out. There are many different supply managements in which big data provides significant help. The manufacturer provides

a choice to share the data to their existing customers and partners which creates an effective communication. The build to order approach provides productive and economical business model. Main motive of BTO provides a better platform to analyse customer behaviour and sales data to improve the product quality several numbers of tests are required. The test reports are stored as key to reduce to test to provide the pattern and predictive analysis instead for performing all tests.

Conclusion:

The big data analytics provides a more educated decisions and targetlings on business operations moving forward. Big Data Analytics is a powerful shield for the future. The information that are collected, enforced, and organized to users accomplish a human's days, weeks, or even months.

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FROM CSI STUDENT BRANCHES



Bioinformatics: An Overview

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1. Introduction

Bioinformatics is an interdisciplinary subject primarily involving advanced branches of biology, computers and statistics. Fields such as molecular biology, genetics, computational techniques, mathematics and statistics amalgamate to create bioinformatics. It is use of computational techniques for solving biological problems. There is a need to develop statistical/computational model from biological processes and drawing inference from the model. The biological modeling is performed at the molecular level. The steps included in the bioinformatics solution are:

- Formulate the biological question
- Generate biological data
- Collect statistics of interest from the biological data
- Construct the computational model
- Solving the computational problem using an algorithm
- Verify and validate the computational algorithm through testing
- Answer the biological question.

2. Applications of Bioinformatics

The applications of Bioinformatics are in the following areas:

- Genomics:** Genomes are nothing but the DNA in body cells. Genomics is the study of whole genomes of an organism. It involves construction of recombinant DNA in laboratories and understanding DNA sequencing. Bioinformatics is used to analyze the structure and function of genomes (DNA). Using bioinformatics in genomics, tasks such as DNA feature prediction and Sequencing Data Analysis can be performed.
- Proteomics :** This branch of biotechnology is used analyze the composition, role and interplay of proteins produced by the genes of a particular cell, tissue or organism.

It applies techniques of molecular biology, biochemistry, and genetics. It is used for performing Protein 3D Structure design, Drug Design, Annotate proteins on basis of function, Functional enrichment analysis, Clustering analysis, Network analysis, and Proteomic analysis. All of these techniques involve statistics and processing of statistical data using computational techniques.

- Systems Biology:** The study of interactions between DNA, RNA, proteins and cells of a biological organ or system. The primary objective of the study is to identify the properties of cells, tissues and organisms functioning as one unit. These typically involve metabolic networks or cell signaling networks. Bioinformatics helps in Gene Set enrichment and Pathway Analysis.

- Phenotype:** The physical traits of an organism depend on its genes. In genetics, we study genotypes and phenotypes. Genotypes are the genes of an organism. Phenotypes are the physical characteristics of the organism which differ because of variation in genotype and environment of the organism. Biotechnology involves statistical correlation between the genotypes and phenotypes.

3. Computer Science in Bioinformatics

Bioinformatics studies living things at molecular level. Computer Science is used to build the computational models from the molecular data. Computers are used for collection, organization and interpretation of biological information. The biological information is processed using software programs. These programs utilize Computer Algorithms, Graph theory, Artificial intelligence, Data mining, Soft computing, Computer simulation and Image processing.

- Computer Algorithms: many computer

algorithms are used for processing of biological information.

- Graph theory: The structures of genomes, proteins, phenotypes can all be represented using graphs.
- Artificial intelligence: Machine learning is used for processing biological information and generating meaningful interpretation. Machine Learning and data mining techniques such as hidden Markov models, neural networks and clustering are widely used in bioinformatics solutions.
- Data mining: Mining techniques are used to handle huge data involved in bioinformatics and identify patterns.
- Soft computing: Neural networks, fuzzy logic and genetic algorithms are used to process biological information.
- Computer simulation: it is used to visualization the structures and functioning of genes, organs and organisms.
- Image processing: It is used to study the features from medical images, classification of images, 3D shape reconstruction and agricultural disease detection.
- Databases: data relating to DNA and protein sequences, molecular structures, phenotypes and biodiversity are readily available in form of empirical data or predicted data in computer data bases.
- Since bioinformatics involves a lot of data, bioinformatics based solutions use a lot of statistics and statistical tools.

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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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An Aerial Perspective on Green Computing

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Introduction:

In this highly accelerated world, all are moving towards the technological advancements, which are essential. But the quality of E-waste produced is quite large. It is noticed that huge amount of E-waste is due to mishandling of energy and equipment in IT. To manage the E-wastes, a new technology was introduced few years back which is Green Computing.



Fig.1 : Green Computing

Green Computing refers to designing a computer in such a way that its impact on the environment is limited but its efficiency remains the same. In other words, Green Computing is construction of efficient and environment – friendly computers. Thus, this paper deals with some of the approaches and technologies in Green Computing. And also describes the initiatives taken and the challenges in the research field.

Green Computing Technologies:

Some of the technologies initiated by the company VIA technologies in 2001 enriched green computing. Some of the technologies are:



Fig. 2 : Green Technologies

1. Carbon-Free Computing:

Gases such as carbon dioxide, methane are increasing Earth's temperature leading to consequences such as melting of glaciers, raising of sea levels, floods, droughts, etc... Thus, an initiative to reduce carbon footprint made by the users is required.

2. Solar Computing:

Solar energy is a renewable energy source. Utilizing it efficiently is also implemented via technologies. Even though, the cost of installation of solar cells is high, once installed it saves more power. Understanding this, the company switched to solar computing.

3. Lead – Free Computing:

European Union introduced a policy called Restriction of Hazardous Substances Directive (RoHS) in February 2003. Due to its effect, hazardous material such as lead is restricted for usage in manufacturing of any kind of electrical or electronic equipment. For this, VIA technologies, initiated lead – free computing. i.e. they introduced a new composition consisting of copper, tin and silver.

4. Energy – efficient Computing:

Energy - efficient computing is achieved when low power consumption and small form – factor is achieved. The introduction of efficient processors by VIA technologies

allows it to adopt solar operated devices as well as emit less carbon at its operation.

Like VIA technologies many organizations are switching to green computing technologies.

Green Computing Approaches:

1. Green data centres:

Ordinary data centres consume more power for operations such as backup, cooling mechanisms etc., but a green data centre manages the system efficiently and consumes limited power for all its operations. Thus, the design of a green data centre should satisfy,

- i. Simplicity
- ii. Modularity
- iii. Flexibility
- iv. Scalability

2. Cloud computing:

Cloud computing is using the cloud services and features over the internet. Cloud computing technology achieves its services in 3 ways such as,

- i. **Infrastructure-as-a-Service (IaaS)**
In this virtual/physical machine is provided as a service.

ii. Platform-as-a-Service (PaaS)

Platforms for computations such as operating system, server, database, etc... are provided as a service.

iii. Software-as-a-Service (SaaS)

Software required for end-users can be owned from clients. Providers provide the software application and it is used by the end-user through the client. In this software is provided as a service.

Cloud computing also provides various deployment models such as,

a. Private Cloud

Private cloud is owned privately by some organisation for specific purposes.

b. Public Cloud

All the resources such as hardware,

software and infrastructure can be accessed publicly over the internet.

c. Hybrid Cloud

Hybrid cloud constitutes both private and public cloud.

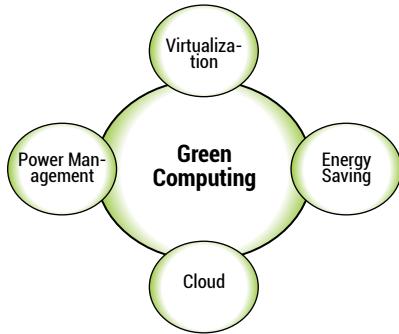


Fig .3 : Green Computing Approaches

Green Computing Inventiveness:

In the field of information technologies, many initiatives towards green information and communication technologies i.e. green ICT have been introduced. Some important initiatives are:

1. Improved Data centre:

As we all know that all the information in IT is stored in efficient data centres. Improvisation of data centres include applying proper cooling methods to data centres such as improving airflow, supply of concentrate cold air to servers and usage of water-based air conditions in racks and server arrangements.

2. Better Storage methods:

Data from the organisations are generated on a large-scale. Hence storage drives are used for storage of data. Power sources for energising these drives are also on a huge usage. To reduce this, we can use large capacity storage drives and should perform proper audits in data centres to avoid data redundancies.

2. Virtualization techniques:

Server forms and data centres used by the organisations utilize large space. All data servers are used in a huge amount. By using virtualization, a virtual platform is used and also load balancing techniques would make efficient use of servers.

2. Using thin clients:

Thin clients are a virtual desktop that uses separate mouse, monitor, and keyboard for each users but CPU is a shared by all the users.



Fig. 4: Green Initiatives



Fig. 5: Types of E-Waste

2. Use of renewable energy sources:

Usage of renewable energy for data centres such as solar energy leads to efficient consumption of energy.

Green Computing Research Difficulties:

High performance computing systems such as super computers, real time computers etc... Consume large scale of power as well as cooling mechanisms. In

this age of computers, it is inevitable to stop the use of computers. Natural resources are getting exploited on a higher quantity for computing systems.

Researchers consider this as an important challenge. Some other research challenges are discussed below:

1. Design of data centres:

The design of large data centres should be made energy efficient. The concept of

PUE is used as a standard for this. PUE stands for Power Usage Effectiveness. But designing large data centres in an efficient manner is really a challenging task.

2. Green Software:

To improve sustainable development in IT, the developers started learning Green Software movement. Many companies started moving towards Green Software.

2. Data centres cooling using wireless sensors:

Data centres are considered to be backbone for organizations. Power efficiency and data centre management can be improved using wireless sensor network.

2. Green Maturity Model:

Green computing considers energy reduction as a best measure. The green characteristics at each level in virtualization are depicted by Green maturity model.

2. Reduction of complexity in architecture:

The architectural complexity of the system means the component dependency in the system. A better mechanism such as Intel's core 2 duo can be used which consumes power to run only necessary components for any computations.

Conclusion:

Being unaware of environment is considered as a socially irresponsible activity. Our act of more energy consumption for devices and E-waste disposal leads to increase in global warming. Thus, to protect our environment this technology is introduced. Green Computing is a



Fig. 6: Green Key Concepts

technology that ensures proper resource utilization with eco-friendly features. Thus, the four approaches listed below are the key concepts in Green Computing such as,

- Green use
- Green disposal
- Green design
- Green manufacturing.

Hence, this paper discusses the key concepts of Green Computing and its essentials such as approaches, technology, initiatives and research challenges.

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Green Computing: Future of Computers

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Green computing has started to spread in the past not many years, extending developing comprehensiveness. Other than the regardless of what you look like at it affectability to ordinary issues, such intrigue moreover starts from money related needs, since both vitality costs and electrical necessities of IT industry around the globe show a consistently making model. Green figuring, the assessment of fit and eco-satisfying dealing with assets is under the idea of normal affiliations, and relationship from different endeavors. Generally, relationship in the "PC business have come to appreciate that practicing biological care is to their most noticeable favored position, both to the degree publicizing and diminished expenses".

1. Introduction:

Green computing is the term used to "signify productive utilization of assets in computing". It is otherwise called Green IT. Green Computing is "Where organizations adopt a policy of ensuring that the setup and operations of Information Technology produces the minimal carbon footprint". It is "the study and practice of designing, manufacturing, using, and disposing of computers, servers, and associated subsystems".

1.1 History:

The expression "Green Computing" was presumably begat soon after the "Energy Star" program started path in 1992. One of the primary consequences of green computing was the "Sleep mode"

capacity of PC screens. As the idea created, green computing started to incorporate meager customer arrangements, vitality cost, bookkeeping, virtualization rehearses, e-Waste, and so on.

For a PC move, it is essential to know it everything to know to be locked in with green figuring. Basically, the "whole green point came about a huge number quite a while back when the news that the earth was not a boundless resource really hit home and people started understanding that they expected to do their part to verify nature". In a general sense, the beneficial usage of PCs and handling is what green registering is about. The triple essential concern is what is critical with respect to anything green and the proportionate goes for green computing.

This ponders social obligation, budgetary sensibility and the impact on nature. Various associations simply focus on an essential worry, instead of a green triple fundamental worry, of money related common sense with respect to PCs. The idea is to make the whole strategy enveloping PCs friendlier to the earth, economy, and society. This suggests makers make PCs in a way that mirrors the triple fundamental concern determinedly. At the point when PCs are sold associations or people use them in a green way by diminishing power use and disposing of them suitably or reusing them. The idea is to make PCs all the way a green thing.

1.2 Green Computing Strategies - Key objectives:

Core objectives for a Green Computing Strategy could include:

- Minimizing energy consumption
- Purchasing green energy
- Reducing the paper and other consumables used
- Minimizing equipment disposal requirements
- Reducing travel requirements for employees/customers".

2. Approaches to Green Computing

These days so as to accomplish social mindfulness and advancement of green innovation arrangements, principle four integral methodologies are utilized:

- (i) "Green Use
- (ii) Green Disposal

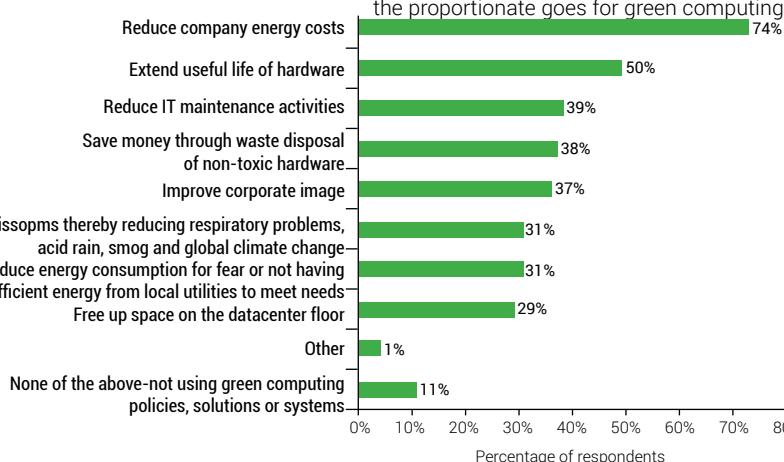


Fig. 1 : Reasons for adopting green solutions

- (iii) Green Design
- (iv) Green Manufacturing"

(i) Green Use:

"Reducing the power usage of PCs, information structures and their periphery subsystems in normally warm manner".

The incredible significance is to comprehend the full life cycle of registering assets, while applying green figuring. Following are the zones and practices that clients can actualize for amplifying helpfulness and mineralizing negative ramifications for condition:

• PC power management methods:

Lower impact use "furthermore infers lower heat dispersal, which grows structure security, and less imperativeness use, which puts aside money and reduces the impact on the earth". The "Advanced Configuration and Power Interface (ACPI), an open industry standard, empowers a working system to clearly control the power saving pieces of its shrouded hardware".

• Virtualization:

In the customary IT foundation servers are devoted to explicit figuring capacities like stockpiling, correspondence, database, etc. Virtualization dispenses with the requirement for a devoted server to run applications – it empowers simultaneously to run numerous working frameworks on a similar equipment stage and the framework at greatest conceivable execution.

(ii) Green Disposal:

"Refurbishing and reusing existing old PCs and other electronic related contraptions".

The methodology of green innovation transfer incorporate revamping and reusing old existing processing hardware and legitimate reusing of old, undesirable or broken PCs and its subsystems. Because of solidarity of negative impacts on condition emerging from ill-advised way to deal with transfer, this part of green registering is among one of the most significant:

• Reuse:

Indeed, even old PC should keep on being utilized as long as it meets the necessities of client. PC frameworks which essential capacities are outdated and neglect to address the holder's issue can be given to somebody who needs to utilize it or need it for its useful parts.

• Refurbish:

By reconditioning and supplanting IT

equipment parts client can delay its use. Old hardware can be reestablished so as to keep up its capacities; it additionally can be up reviewed for getting new usefulness. Reasons of such activities can be persuaded by lower cost of renovated gear – these days more enterprisers are happy to purchase reestablished equipment, and such market is developing.

• Recycle:

PC reusing "alludes to reusing or reuse of a PC or electronic waste additionally; parts from obsolete frameworks might be rescued and reused through certain retail outlets and civil or private reusing focuses".

(iii) Green Design:

In increasingly broad viewpoint partner associations, government workplaces and environmental affiliations in order to make inventive organization, business and regulatory techniques that can improve common quality while updating monetary headway. In "limited and practical point organizing power viable and eco-obliging PCs and its subsystems like servers and cooling equipment".

Green design is the "production of structures which are vitality effective sound, agreeable, adaptable being used and intended for long life". Green structure ought to minimally affect the earth, both as far as items and materials utilized in the development however in the usefulness of the structure.

Principle region in green plan is:

• Eco-friendly design:

Eco-accommodating structure is the plan of processing assets that meet the stringent confinement of for example Vitality Star empowering further usage with decided force supply and force the executives prerequisites (counting unique modes and stipends). "The Energy Star gadgets can be modified to shut down to a low electric state when they are not being used, sparing vitality and run cooler which encourages them last considerably more"

(iv) Green Manufacturing:

Process of making of PCs and related devices fuse procedures for collecting and biodegradable fragments for immaterial or no impact on condition. This system licenses giving financial preferences like long stretch cost venture assets, and business process efficiency improvements.

So as to accomplish objectives set by

the possibility of ICT maintainability entire procedure of making ICT foundation ought to be considered. Negligible effect on the earth ought to be one of the key presumptions for IT makers during the procedure of structure and creation of all ICT segments. Significant IT organizations are as of now applying green guidelines to their own activities so as to: increase new income openings and advance social and natural duty affecting clients and market rivalry.

Primary region in green assembling of PCs is:

• Use of bio-items:

Biodegradable and inexhaustible materials frequently require less vitality to deliver in contrast with customary poisonous materials. Producers' utilization a wide range of kinds of plastic in PCs, which makes is very changeling do reuse.

3. Recent Implementation of Green Computing

3.1 Blackle

Blackle is a "web search device site constrained by Google Custom Search". Blackle "seemed reliant on the possibility that when a PC screen is white, showing an unfilled word page or the Google presentation page, your PC uses 74W". Right when the screen is dim it consumes simply 59W.

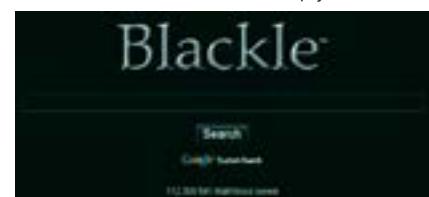


Fig. 2 : BLACKLE: The Black Google

3.2 Zonbu Computer

The Zonbu is another, essentialness gainful PC. The Zonbu uses "just 33% of the force of an ordinary light". The contraption runs the "Linux working structure using a 1.2 GHz processor and 512 MB of RAM".



Fig. 3 : Zonbu Computer

3.3 Fit-PC

Fit-PC is the "size of a soft cover and completely quiet, yet fit enough to run Windows XP or Linux". Fit-PC is "intended to fit where a standard PC is excessively cumbersome, boisterous and power hungry". Fit-PC draws just 5 Watts, expending in a day less force than a conventional PC devours in 60 minutes.



Fig. 4 : Fit-PC

3.4 Sun Ray thin Client

Thin Clients like the Sun Ray use far less force than standard work territories. A Sun Ray on a "work zone eats up 4 to 8 watts of force, considering the way that most of the staggering computation is performed by a server". Sunrays are particularly suitable for cost-sensitive conditions, for instance, call centers, guidance, human administrations, authority communities and cash.



Fig. 5 : Sun Ray thin Client

4. Future of Green Computing

The "plan towards green IT should fuse new electronic things and organizations with perfect efficiency and each and every conceivable decision towards imperativeness venture reserves". That is attempt sagacious associations are laying complement on moving towards "Eco Friendly Components in Computers, the use of eco-pleasing supportable parts will transform into the standard rather than the exception in future".

About the Author



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