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The Advances

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Contents

1.	Digital Education: <i>The Education of 2021 and Beyond</i> <i>Edward Roy Krishnan</i>	1
2.	Data Analytics & Data Science <i>Vis-à-Vis</i> Social Informatics Practice— <i>A Trend Report</i> <i>P.K. Paul, P.S. Aithal, A. Bhumali, K.S. Tiwary, Ricardo Saavedra and B. Aremu</i>	17
3.	Data Science: A New Door <i>Anubhav Kumar, Teklay Gebregzabiher, Solomon Gebremeskel and Haile Misgna</i>	37
4.	Data Mining Techniques and Tools <i>Ariyam Welday</i>	55
5.	Internet of Things and CloudIoT: Applications, Challenges and Trends <i>Mesele Niguse Teka</i>	75
6.	A Scheme for Securing Data in Digital Age Using Cryptosystem <i>Bijoy Kumar Mandal, Saptarshi Roychowdhury and Anwesa Das</i>	95
7.	Programmable Logic Controllers <i>Mahder Girmay</i>	117

8.	Agile Methodologies to Improve Healthcare Service Deliver	169
	<i>Shanu Verma, Rashmi Popli and Harish Kumar</i>	
9.	Detailed Study & Analysis of Cryptography Algorithms	195
	<i>Zelege Desalegn Woldemichael, Anubhav Kumar, Destalem Negusse and Abrhaley Teklay Haile</i>	
10.	New Technologies and Skills for Academic Lecturers with Successful E-Teaching Process: The context of Pandemics	217
	<i>Mustafa Kayyali</i>	
11.	Information Infrastructure: The Context of Meaning, Scope and Emergence—A Short Review	255
	<i>Sarmistha Chowdhury</i>	
12.	Introduction to Machine Learning: Advances and Challenges	271
	<i>Million Gebreegziabher</i>	
13.	Fog Computing and its Applications	291
	<i>Subhendu Chatterjee</i>	
14.	Green Cloud Computing : An Overview	313
	<i>Mahabubul Hoque</i>	

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Chapter - 2

Data Analytics & Data Science *Vis-à-Vis* Social Informatics Practice—A Trend Report

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ABSTRACT

Big Data is the need of the hour due to day by day data and information proliferation. Big Data is a large amount of generated data in different formats, mediums and ways. The technique to manage a large amount of complex data is called Big Data Management and here Analytics techniques play a leading role. Big Data is important in diverse areas and sectors and as a result various area have been developed in the Big Data space i.e. Business Analytics (Big Data applications in Business and Corporate), Health Analytics (Analytics or Big Data Applications in Healthcare, medical areas), Retail Analytics (Use of Big Data in retail areas), etc. Therefore, in areas such as Transportation, Governance, Education, Business, Manufacturing, etc. Big Data is applications that have emerged. Information Technology is an important tool and field for information solutions and therefore it is playing an important role in the modernization and development of society at a large. Hence Big Data and Analytics is considered as important in a healthy tool for proper Social Informatics practice. This paper is a documentary and deals with the basics of Big Data; its features and nature, general and emerging applications with reference to healthy Social Informatics practice.

Keywords: Big Data, Data Analytics, Complex Data, Information Science, Data Science, IT Applications, Information Systems

INTRODUCTION

The increasing amount of data and similar contents need proper management techniques and ways. According to IBM Marketing Cloud Study, it is noted that 90% of present data has been developed after 2016. There are different social media and data is increasing gradually. Some of the social media viz. Facebook, YouTube, etc. Further, mobile devices, IoT, Cloud Computing, Email devices have generated a good amount of data and this is increasing each and every day. The analysis of the existing report reveals how data is generated and developed viz. The usage of YouTube has been tripled in just 2014 to 2016 with 400 hours of video uploading in each minute. Further 4,333,560 users are watch videos from the YouTube in every minute. Similarly, Instagram users upload about 100 million photos and videos every day. 26 billion texts were sent each day by 27 million people in the US. Further traditional communication media viz. Email is also increasing rapidly. The Email statistics report (Radicati) 293 billion emails are sent in each day and moreover expected to increase 4.2% yearly. Similarly, the mobile data or tablet uses are noticeable and rapidly increased viz. in the year 2017 about 394 billion mobile internet users were there and in 2019 it has grown up about 5 billion; and this is 67% penetration of the total global populations. Similarly, intelligent and smart devices are lying on the Internet of Things (IoT) also generating data rapidly globally [5], [18]. Therefore, the Big Data Analytics play a leading role in managing such data and also developing societies and common life.

Objective

The present paper entitled 'Data Analytics & Science *Vis-à-Vis* Social Informatics Practice—A *Trend Report*' is having the following aim and objective—

- ❖ To learn about the basic characteristics, nature of Big Data, Data Analytics, and allied areas.

- ❖ To know about the primary applications and emerging applications of Big Data and Data Analytics.
- ❖ To know about the basics of Social Informatics with reference to its role in the development and especially Big Data in healthy Social Informatics practice.
- ❖ To gather and report the trending applications of Data Analytics applications in diverse sectors and areas towards proper social enrichments (i.e. Social Informatics practice).

Big Data, Data Analytics & Science: An Overview

Data is important for everything and further, it is required in all the sectors like in the Healthcare sector, Government, Business and Industries, Agriculture and horticulture, Management, Education and Training, etc. For the increasing data and its proper management amount the techniques Big Data is growing and mainly dedicated in Managing large amounts and complex data management therefore here Big Data Management is needed to be powered by different analytical tools and thus it is also known as Data Analytics or Analytics [3], [4],[23]. The applications and concentration of Analytics in different sectors leads to various other areas viz.

- ❖ Business Analytics (i.e. applications of Big Data/ Analytics in Business & Industries).
- ❖ Healthcare Analytics (i.e. applications of Big Data/ Analytics in Healthcare and Medical Systems).
- ❖ Marketing/Retail Analytics (i.e. applications of Big Data/ Analytics in Marketing and Retail).
- ❖ Government Analytics (i.e. applications of Big Data/ Analytics in Government Analytics).
- ❖ Learning Analytics (i.e. applications of Big Data/ Analytics in Education, Teaching, and Learning).

The term Big Data application emerged in the year 1990 but major changes noticeable in recent past in different organizations and

institutes worldwide [1], [17], [32]. ‘Tera Data Corporation’ had coined the concept and in 1984 ‘Teradata’ being used in several structured and unstructured data management. There are many companies and organizations are engaged in Big Data Systems viz. Seisent IMC, Google, apache, Oracle, IBM, EMC, DELL and gradually the sector has grown-up. Similarly, in other sectors also dozens of terabytes to many Exabytes noticed due to data proliferation. In Generally Big Data holds the following features and characteristics viz.—

- ❖ The integration of nature, complexity, and the context of massive scale becomes possible with proper Big Data/ Analytics uses.
- ❖ Various high level of programming viz. Python or R programming, etc. are required in healthy Big Data practice.
- ❖ Mathematical Science and Statistics is needed in proper Big Data Management viz. artificial intelligence, machine learning, etc.
- ❖ As it is concerned with the complex and large number of data therefore proper arrangement is important.
- ❖ Discrete mathematics, fuzzy logic, etc are required in Big Data/ Analytics especially for the low information density.
- ❖ Database and Data Warehouse are important in healthy Big Data management tools and techniques [2], [6], [19].

Microsoft Corporation, Teradata Corporation, SAP, EMC, HP, Dell are engaged in healthy Big Data/ Analytics practice. Initially, only private organizations were engaged in Big Data and gradually in government sectors also. The applications of Big Data are based on the following features and attributes, majorly (also refer Fig. 1)—

Volume: The volume is the amount of data and that includes the text, multimedia content.

Variety: Big Data systems are dedicated to managing a different

kind of data viz. text, image, audio, video, etc and by the complex data management becomes true.

Variable: Inconsistency is also fallen under Bigdata and data analytics and therefore variable should be considered as important.

Veracity: Quality is important therefore perfect accuracy need to manage under the attributes of veracity.

Velocity: This is simply the speed of the data generation and management with proper scale depending upon the need [6], [12], [29].

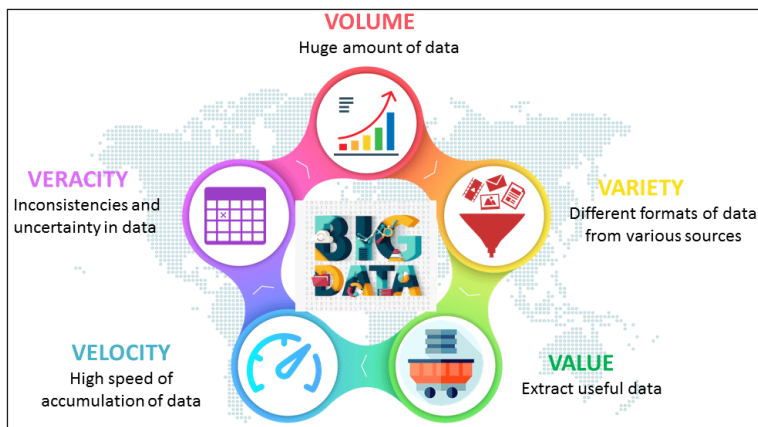


Fig. 1: Depicted five Vs of Big Data

Social Informatics, Big Data, and Social Development

Information Science is an important field of fields and is dedicated to information and technological solutions. There are varieties of application sectors and areas of Information Science and among these important are Medical Information Science, Geo Information Science, Chemical Information Science, etc. Information Science is also known as Informatics and

therefore Information Science and Informatics are deemed to be considered as same. Social Informatics is an area of Information Science. This is considered as an area of practice, study and research and primarily dedicated to social and cultural aspects of IT and Computing. Social Informatics is dealing with the IT/ Computing related subjects viz. Information Science, Information System, Information Technology and also a few other allied areas and subjects viz. Cognitive Science, Psychology, Social Sciences, Management to reach the goal or for healthy Interaction in between Human Being and Technology. There are many professionals whose functions depend on Social Informatics; directly and indirectly viz. social scientists, social workers, social analysts, social security Administrators, etc. [8], [28], [30].

Social Informatics (SI) is considered as more than application and is considered as the utilization of Computing and Information Technology into Society. Society is purely connected with the interaction of information and technology and here SI plays an important role. Information transfer and technology transfer is important for the development of a knowledge society. As far as the features and nature are concerned Social Informatics (SI) deals with the following viz.—

- ❖ It is the interdisciplinary study area and based on the uses, design, and consequences of IT.
- ❖ It is an interdisciplinary field and dedicated to the healthy and proper Socio-economic development
- ❖ Effective and proper development of the social/cultural fields, Social Informatics (SI) is worthy and important.
- ❖ Technology and Society can match and may be in the same place as the Social Informatics (SI).
- ❖ The end users can get healthy benefits using social technologies.
- ❖ Social Informatics (SI) is important in the better liaison of technology, IT, Computing with the Society and Humanities.

- ❖ Social Informatics (SI) is close to the Digital Humanities, Digital Society, etc [9], [30].

The field of Social Informatics (SI) is therefore important in developing society using IT and Computing. Initially, it was only engaged with the core areas of IT viz. Web Technology, Multimedia Technology, Networking Technology, Software Technology, Database Technology, etc. but gradually various latest technologies become important viz. Cloud Computing, Big Data, Internet of Things (IoT), Human-Computer Interaction, UXD, Robotics, and Intelligent Systems, etc. Here Big Data/ Analytics also plays a leading role in developing healthy societal enhancement [10], [11], [16].

Big Data and Analytics in Diverse Sectors: The way for Social Development—The Trends

Big Data/ Analytics is a worthy application in diverse areas and fields and today many professionals are directly and indirectly associated with the Big Data. However, Big Data/ Analytics is helpful to the organizations to make more healthy and informed business decisions by analyzing large amounts of data. Here Data Analyst, Data Scientist, Predictive modelers and other analytical professional play a leading role. Information seeking behaviors, information need, user interest can be learned by using the proper tool and here in this regard web servers logs, social media uses, internet click and search patterns, text from the users email, mobile phone details considered as important [4], [13], [22]. Today Big Data is applicable and emerging in diverse fields as depicted under (*also refer Fig. 2/ Source: Digital Vidya*) viz.—

In Government, Politics & Administration

Big Data/ Analytics is perfectly useful in Government and administrative sections at large and initially among different Government US plays an important role led by Barack Obama.

In India also during 2014 (before general elections) and 2015, the Political Party called BJP used Big Data/ Analytics to create awareness of their activities using IT and here Big Data/ Analytics is considered as important according to the experts. Further apart from politics Big Data is also useful in managing large amounts of data generated by different kinds of ministries, departments, and their intra and intercommunications. To gather large amounts of citizen's data and further initiative by the government Big Data/ Analytics an amazing tool and its uses are rising.

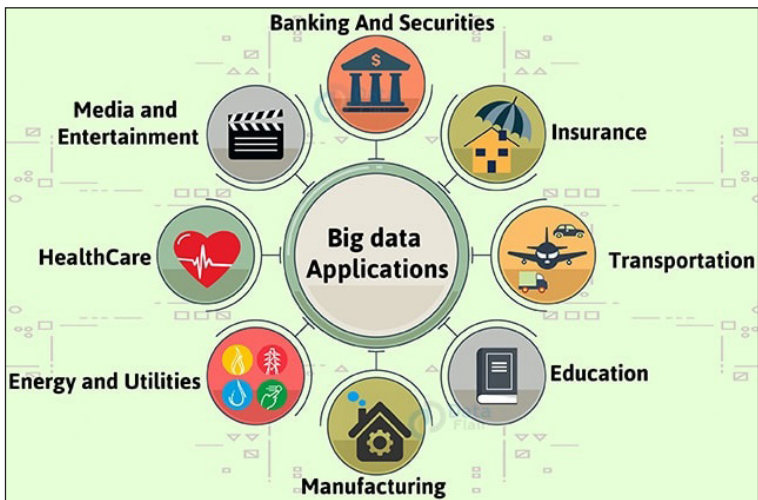


Fig. 2: Basic Big Data Applications in diverse areas

In Healthcare and Medical Systems

Big Data/ Analytics is a worthy application in healthcare and medical systems due to wider and more emerging applications. Though it is difficult to make the direct decision of operation and treatment in other areas, it is applicable viz. patient data generation and future use, medical health information management, pharmaceutical management, marketing of medical tools and medicines, etc., better health and hospital

chain management, interdepartmental connections, in nursing informatics practice, etc. In certain cases, physicians and medical professionals can take the help of Big Data/ Analytics tools for immediate decision making. For managing complexity, diversity, and timelines Big Data/ Analytics is important. There are many ways to use Big Data in healthcare viz. cure to cancer to detecting Ebola and much more effective treatments. Identifying unusual patterns of certain medicines, past history of a health organization, patient history, and so on.

In Retail and Marketing Sector

As far as the Retail and Marketing sector is concerned Big Data/ Analytics is very important and worthy in different areas viz. various social media, users search engine queries, loyalty programs are important to get the information regarding users' needs. Today users are purchase by electronic means by their websites, portal and apps and here user's data, their interest and choice become stored. Many organizations viz. Snapdeal, Amazon, Walmart and other companies are using customers data and this is important in further business activities and business promotions. The previous data is also helpful to make users' database and to sale/ marketing products or even designing and development of the new products in a future context. Therefore, each data with the help of Big Data/ Analytics can be managed and used perfectly [3], [14], [15].

In Social Media and Communication Analytics

Social Media is generating lots of data each and every day and time. Today there are areas where Big Data/ Analytics is useful in social media. Social Media is able in providing valuable and real-time insights regarding the markets. Big Data/ Analytics is useful in various areas viz.—

- ❖ *Personalization* (In this context Big Data/ Analytics is useful in two ways viz. gathering of data regarding consumer/

users and other hand by this, users' interest, choice, can be gathered)

- ❖ Decision-making (Social media is helping to learn about the users and therefore it helps in decision making)
- ❖ Effective Marketing and Campaign (Regarding a product, services, etc. social media is important and helpful)

Product Insight (Within a moment any product's information is basically spread over using social media and here Big Data/ Analytics is worthy) [10], [20], [24].

In Education, Training, and HR

Education is an important sector and there are lots of uses of Big Data/ Analytics in education, training, and similar activities. A student normally has different data viz. programs, courses/ papers, universities, enrollment year, student ID, exam results and grades and in all these Big Data/ Analytics is worthy and important. Therefore, with the help of Big Data, these data can be managed and can be beneficial for organizations and institutions. Further for analyzing the behaviors of the student Big Data/ Analytics can be considered as important and valuable. Moreover, in student monitoring, exam preparation, evaluations, feedback analysis also Big Data/ Analytics is worthy. The recent educational mode viz. online mode and blended mode of learning are one of the active users of Big Data/ Analytics as there are potentiality of offering courses to a large number of students [11], [25]. Here using Big Data is also worthy in some of the other educational activities viz. find out of the student dropout, predictive analytics, carrier insights, smarter student activities become possible with Big Data support.

In Transportation

As far as transportation is concerned Big Data/ Analytics is worthy and important in this field as well due to various reasons.

Recently transportation sectors are also using a different kind of electronic tools and Information Technology components and among these important are include—

- ❖ Use of GIS tools.
- ❖ Use of Remote Sensing tool.
- ❖ Use of Basic Computers for ticketing, booking
- ❖ Use of IT tools in Tourism and allied areas, etc.

Therefore, from these sectors, huge amounts of data are generated and this trend is growing rapidly. Recently a large amount of data is generated due to location based social networks. Big Data/ Analytics is applicable in three important contexts viz. in *government* it is useful in traffic control, route planning, smarter transport systems. In the *private sector*, some of the uses are revenue management, logistics, shipments, supply chain management. Regarding *individual* context, Big Data/ Analytics is expected in route planning, fuel, and time saving, best travel arrangements, and so on [6], [21].

In Energy and Power Management Sector

Big Data/ Analytics is applicable in the energy management and power sector as well. There are many contexts from which these days a huge amount of data generating viz. smart meter; this is generating a huge amount of data after a certain time. Big Data is also allowing for better asset and workforce management. There are many companies dedicated to offering Big Data Providers in energy management and power sector viz. Alstom Siemens ABB and Cloudera. Further day by day users of basic electrical services are increased and all these are stored in computerized form and from a large scale with the help of Big Data/ Analytics the required data can be found out effectively.

In Entertainment and Media

In the entertainment and media segment, Big Data/ Analytics is worthy applications. Entertainment and media are about the art and science and to find out the required information in real time situations Big Data/ Analytics is appropriate. In cinema, movies and videos viewer and their choice are not the same and to find out the respective choices electronically Big Data and similar tools can be used. In media, huge amounts of data are being generated every day in different formats and here Analytics can be considered as a valuable tool for real time and actual information gathering. Further, in news there are lots of information are generated each day and finding such later may be a difficult task and here Big Data/ Analytics uses are increasing rapidly.

In Fraud detection

As far as fraud detection is concerned Information Technology plays an important role and here in this context Big Data/ Analytics is also treated as emerging. In transaction processing, fraud detection Data platforms are able to analyze claims and transactions in real time [12], [29]. Further Data Science tools are also important in finding or detecting anomalous behavior from a user and that can be helpful in detecting fraud and also helpful in the organizations and institutions and police and similar departments/ divisions.

In Call Center Analytics

At present context almost all the organizations and institutions are using in-house or collaborated call centre to deal with the consumers and other stakeholders; and in this context IT and Computing is useful. Further with Big Data/ Analytics, many other potentialities become reality as the call centre is dedicated to finding and gathering various kinds of information. Moreover, call centers are also offering information based on the need of

the consumer therefore for real information and on time Data Analytics uses are important and worthy.

In Banking and Finance

As far as Banking and Financial sectors are concerned Data Science and Analytics are highly used and therefore separate fields even evolved viz. Banking Analytics, Financial Analytics, etc. However, in general in the banking sector each and every day numerous consumers are added with different kinds of data and information. And on time such data in the complex situation is possible to retrieve using Big Data/Analytics. As most of the services are offered by a third party therefore it is essential to be careful regarding the privacy issue. With the help of Big Data/Analytics uses various data of the customer are possible to gather viz. personal details, earning, savings, etc, and therefore they can get possible data instantly based on need and it can help in further decisions.

In Agriculture and Allied Areas

As far as agriculture and allied sectors are concerned Big Data/Analytics is worthy in pre-production of the agriculture and post production of the agricultural systems. These days the IT applications in agricultural systems increased rapidly and therefore there are different contexts in data generation. All these data and information need to store properly and with the help of analytics required data can be managed from the complex situation as well. Data like temperature, water levels, soil condition, growth and output of the plants or crops, the environmental condition can be evaluated using analytical tools.

In Automobile

As far as automobile condition is concerned there are emerging uses and potentiality in the use of Big Data/Analytics in the sector

of the automobile. In analyzing the trends to understanding the supply chain management, users demand on the automobile the example of Big Data is noted. Similarly, in self-driving cars, robotics, and artificial intelligence are being used and here the uses of Big Data noticeable in managing the data for current and future references [3], [11].

In Telecom and allied sectors

In telecom sector also, the use of Big Data is important to note and such applications are increasing rapidly. In android smartphones, I Phones huge data are generated each day and here Big Data/ Analytics is worthy to manage. Further users perception, their need and behavior can be studied using Big Data by their gathered data. Smartphones are these days responsible for generating huge amounts of photos and multimedia contents and these are manageable using Big Data Application effectively. As far as the telecommunication sector is concerned big data is being used in users data storage and further uses, in revenue generating services, to analyze the users behaviors in particular services and products, in market trend finding and analysis, healthy and proper decision making and so on. Real-time predictive analytics can be helpful in this regard as well.

CONCLUSION

The applications of Big Data/Analytics are rising rapidly in different basic and emerging sectors. Big Data has enormous benefits. Big Data is playing a leading role in societal progress and development similar to basic Information Technology components. Businesses, government, organizations, mass media, entertainment, politics, transportation, healthcare, education and training, etc. can be empowered with IT and here analytics and similar technologies are very much worthy and important. As Social Informatics is about the applications of the different IT Components in the society therefore similar to other

emerging technologies (viz. cloud computing, Internet of Things, Robotics, HCI, Usability Engineering) big data and analytics play a leading role in digitalization and digital society building, as depicted in Fig. 3.

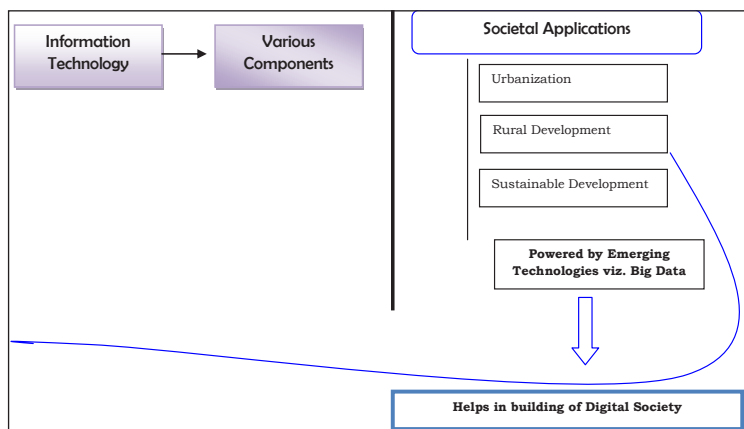


Fig. 3: IT & Computing applications towards healthy Social Informatics practice

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