

# Industry Revolution (4.0): Role of Big Data and Edge of Data Analytics

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## ABSTRACT

As human being move forwards with respective of the age, the maturity of the thought process becomes matured so that, they can tackle any problem in any situation easily. This indicates that, human beings are always changing their self from century to century to become a modern human being to survive on the earth. This survival factor itself introduced factories that manufacture the required things for the society and that phenomena gave birth to the Smart Industries. Industrial Revolution (1.0) introduced the approaches for the mass production, whereas the Industry Revolution (2.0) makes the use of appropriate resources and also concentrate on the proper use of electricity to make operations more efficient. The 21<sup>st</sup> century revolved with the Industrial revolution (3.0) with the world of Information Technologies with the full scope for creativity, innovation and ingenuity. As these three revolution passes, creativeness of human beings gave birth to the new baby that is Industry Revolution (4.0) that not only looking forward for utilizing intelligence but also more about working with large amount of data. Therefore, Industrial Revolution (4.0) is the world of big data and edge of data analytics. In this paper, the review is done that summarizes the biggest revolution with big data and its challenges.

**Key Words:** Data, Big Data, Data Analytics, Industry Revolution (4.0).

## 1. INTRODUCTION

All we are in the 4<sup>th</sup> cycle of revolution of industry where it is required everyone to become digitized in the wonderful and predictive imaginary world of data and data science. Each and every industry is running behind the data and wants to stay in the predictive imaginary world of data science so that they can plan, and execute the strategy to get the success in the world of business. In 2011, the phenomena Industry revolution (4.0) was proposed in Germany for proposing new high – tech ideas in the development process. The fourth industrial revolution will have indications towards the use of automated processes and the power of the digital world. The manufacturing industry requires the historical data to predict the type of manufacturing process will be affected in different scenarios. Beyond the manufacturing industry, different small to large scale companies requires to analyze the data, for example, the malls wants to do market basket analysis to promote the different required products based on the ever changing behavior of the customers. The banking industry wants to search for the customers who are hurrying in getting loans to satisfy the certain need factors of life style. The educational scenario, most of the times, management need to take a decision on the which program needs to start based on a variety of factors such as need, job scope, passionate, futuristic scenario, etc. This scenario clearly indicates that data is most important and need to collect it so that it will be qualified to implement certain activities with it. The data are collected by the different companies, organizations, industries by means of different data sources such as thorough the social media, banking transactions, online transactions, digital devices, etc. As an industry point of view, industrialist needs to work on such collected data and a big question raised in front of them that how to organize such data which is very large, that goes beyond the organization capacity. Such data not only in large, but it has varied in nature, such as plain textual data, audio, video streaming data, and image type of data with or without sound effects. In 2005, such type of data is big data and from that moment onwards every industry is moving around the big data. The concept big data is defined by the industry analyst Doug Laney as the three Vs: Volume, Velocity and Variety. The different industrialist viewed their definition of big data in their own way that it is massive data and different infrastructure is required handle such types of data [2]. The big data itself is the part of an industry revolution (4.0) which plays an important role in each sector of the industry. Rest of paper is organized as follows, in the section 2, the role of big data in industrial revolution is specified, in the section 3, edge of data analytics is described to give the overview of the importance of big data. The section 4 has included the conclusion about the study work.

## 2. ROLE OF BIG DATA

Industry 4.0 follows the three revolution history in the world of industry development. In the first revolution, the steam engine was introduced in factories to drive the mechanical loom in 1780s. The second revolution of Industry was happened during 1980's. In the second revolution of Industry, the proper utilization of labour was done based on required Mass production and approaches were introduced to the proper use of electrical energy. In the 1960s, embedded systems and Information Technology pushed industries to the third revolution of Digitization [5]. The fourth revolution, Industry 4.0 is mainly made the use of information technology such as Cyber Physical Systems (CPS), Internet of Things (IoT), Internet of Services (IoS), and Internet of People (IoP). This revolution changes the overall scenario of the industry from way of traditional factories in smart manufacturing industries. It provides direct access to the controlled processes which are connected to programmable logic controllers (PLCs), supervisor control and data acquisition system (SCADA), distributed control systems (DCS), manufacturing execution systems (MES) and enterprise resource planning (ERP) [5]. The major resources big data are mentioned are: 1) Social Media 2) Black box 3) Online transaction systems such as Banking systems, online, market, etc.. 4) Stock exchange 5) Power Grid 6) Transport Data 7) Search Engines. The major sources of big data are given by [3] shown in figure number 1.

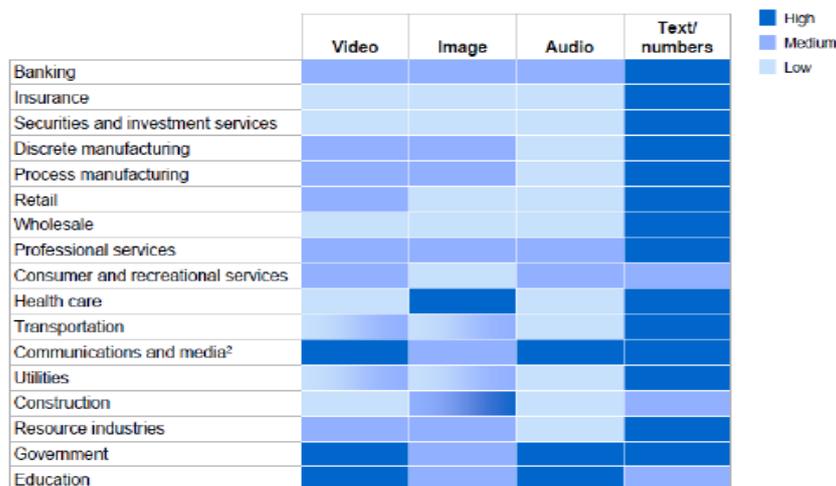


Figure Number 1: Major Resources of Big Data

The four dimensions of big data which are 1) Totality 2) Frequency 3) Exploration and 4) Dependency. By means of totality which is also defined as immediacy, it will be possible for the industry to get required data immediately and in what frequently data is generated so that the large volume data can be explored by their self to identify dependency factors so that industry leaders can apply the strategy required to run the business successfully. The role of big data in Industry Revolution (4.0) is very vital in the following way:

- 1) The manufacturing industry requires the efficient analysis of big data to play business in the billions of dollars for the next coming years.
- 2) The equation of Industry Revolution (4.0) is Big Data plus Artificial Intelligence, which will play important role in creating some of the new smart jobs.
- 3) Industry (4.0) revolution is viewed as all types of machines and devices interacted and communicated with each other because of the Internet of Things (IoT) and if we place the Artificial Intelligence (AI) near to IoT on the top of the big data then it will be resulted into some of the innovative decision making devices and machines. Therefore, big data, Artificial Intelligence and Internet of Things are new face of the Industry Revolution (4.0).
- 4) Big data, Internet of Things (IoT) and Artificial Intelligence (AI) will make human's work very smart.

As big data plays vital roles in the context of different industries, also while utilizing the power of it, there is need to work out some of the challenges of the big data also, which are: 1) Capturing of data, 2) Cleansing of data, 3) Storage, 4) Sharing, 5) Transferring of data, 6) Analysis 7) Presentation of data. Industrial Revolution (4.0) requires mainly presenting the qualified data in the way that the industrialist can understand it. To face these challenges the different areas in the context of big data need to work out and has to give focus on having human resources with

such types of skills. These areas define as specific domain in the 21<sup>st</sup> century, which are: 1) Basic Analytical Programming 2) Data Integration 3) Data Quality and 4) Predictive Modelling 5) Basic Data Modelling 6) Data Visualization. There is also need to have the ability to apply the data visualization with the basic analytics so that industrialization will have ample opportunities to get an overview of the required qualifies data to take certain decisions to run the business. So that, the data analytics also play an important role in the Industry Revolution (4.0) that can be referred as the stylishness of the big data.

### 3. EDGE OF DATA ANALYTICS

Data analytics (DA) is the way of presenting the analyzed data from the large voluminous data sets. The analysis is done by using different types of software tools and technologies. The data analytics technologies are used by the different industries to make right business decisions at the right time. Such tools and technologies handled by the experts and play a role in the predictive analysis and forecasting of the business called as data scientist. Edge of data analytics involves three different working styles which are: Data Scientist, Big Data Specialist and Data Analytics. Among these three styles, the data analytics is the incredible area of the Industry revolution (4.0). There are four types of analytics, which are: Descriptive Analytics, Diagnostic Analytics, Predictive Analytics and Prescriptive Analytics.

1) **Descriptive Analytics** – It is used to get answers of current situations as what happened. For example, in education field, management of university require to know that how many of students got placement in last 2 years and what types of skills they had possessed so that according to it, they will have plans to apply different strategy to increase the percentage of placement for coming years. The descriptive analysis done the analysis of the historical data to give valuable information about the past, so that the present decisions will be taken. Although the information provided by this type of analytics only indicates whether this information is right or wrong and because of this most of the highly data driven industries do not use descriptive analytics only but the data generated from it will combines with other types of data analytics.

2) **Diagnostic Analytics** – The diagnostic analytics is used to get the answers of questions as to why something happened. By means of this analytics, it will be possible to identify the data pattern involved in the given data set based on the data decencies. In respect of the education field, for any education leader needs to know what types of students will admit to what types of programs around the region as my college, institutions or university is located with the help diagnostic analytics. This analytics provides detailed information about the data, their dependencies and pattern involved with it.

3) **Predictive Analytics** – It is used to identify the frequencies of happing. It depends on the findings of diagnostic analytics to discover tendencies to be happening, clusters along with the immunities and will future predictions which will be useful in forecasting process. To get accurate forecasting, it is required to carefully treat the data with continuous optimization. However, it indicates that before going to predictive analytics, the data must be qualifies and integrated to get proper predictions. The industries may use predictive analytics to identify effective factors after changing the brand of any products.

4) **Prescriptive Analytics** – It is used to decide to prescribe a set of action need to apply to rid of a future problem. This analytics uses historical data as well as external information due to the use of statistical algorithms involved with it. This analytics uses different sophisticated tools and technologies such as machine learning, business rules and algorithms, to implement and manage analytical view of the data.

Besides, there are also different analytical types are used frequently by the industries such as Self Service Analytics, Approachable Analytics, Sentimental Analytics and In Memory Data Analytics. In fourth revolution, Self Service Analytics play important role since it is not important for a business leader to depend on the data scientist fully, they can take certain decisions based on the presented data. Sentimental Analytics play important role to analyze emotions, feelings of the human beings to take certain decisions. So that, there are certain industries who drive their business based on the sentiments of the customers may go for such types of analytics. Most of the time, this analytics collect data from the social community web sites and will provide the set of decisions to the business leaders.

### 4. CONCLUSION

In this fourth revolution, there are ample opportunities are coming up for each industry to become an Eagle to avoid the rain of problems about handling the big data by flying above the clouds with the support of tools and technologies

provides by the experts in the context of big data and data analytics. In this review work, we have tried to put up important role of Big Data for Industrial Revolution (4.0) along with the Data Analytics tools and technologies. The data is big and need to take big advantages of it which is the main aim of the industry. This problem will be tackled by industrialist either by having human resources those will makes the use tools and technologies available or to have experts to develop software tools and technologies to get required analysis of the big data. Therefore, this occurrence gives a road map of role of big data along with different types of data analytics, which is required to utilize the power of valuable data that is big data.

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