



## REVIEW ON BIG DATA CHALLENGES FOR 4G REVOLUTIONS

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**Abstract:** With the development of industries, we already know about the effects of third industrial revolution. Following the development of Cyber-Physical Systems (CPS) collaborated with Big Data, industrial wireless network and some other enabling technologies the fourth industrial revolution is being gradually rolled out. This paper discusses about the industrial revolution and the contribution of big data to create a new era known as industry 4.0. It focuses on various aspects of big data which is used to produce a collaborative community starting from production to sales it will be interconnected by using advanced technology such as embedded systems, wireless sensor network, industrial robots, 3D printing, data science, big data, cloud computing, Internet of Things etc., IT deeply focuses on Industrial big data pipeline for data driven analytics, huge scale of productivity, quick decisions based on sale history etc., for a large scale smart manufacturing industries. Survey of benefits by using big data in industries will be discussed.

**Key Words:** Big data, data science, Industry 4.0, Industrial big data ,cyber physical system, Self awareness and self maintenance machine, smart productivity etc.,

### I. INTRODUCTION

A Database is an organized collection of data of an organization, Database management system helps to manage the stored data. Traditional DBMS fails to process huge no of data that we are producing today. Nowadays companies are using computing power and algorithmic accuracy to gather link and compare large dataset, companies are experiencing rapid growth in the amount of data available, proper processing of data could reveal new knowledge, patterns, which helps in growth of decision making, productivity, services (etc). Hence it is essential to adapt a technology like big data to deal with upcoming challenges inadequate to the amount of data which we have today.

### II. FACTS ABOUT BIG DATA

Initially it is stated that characteristics of big data can be determined by 3V<sup>s</sup> that is Volume, Velocity, and Variety by Gartner, and later Zikopoulos mentioned value and veracity can also be added. When a big data is combined or added with a non big data the result will still a big data it is explained using an equation.

$$BD + NBD = BD$$

$$BD * NBD = BD$$

The growth of big data also increases the usage of technology such as cloud computing, mobile communication, electronic devices communication, Internet of things etc., which again contributes to increase the amount of data.

Technologies to handle big data

HADOOP	Open source distributed platform that can run on commodity hardware
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HDFS	Hadoop distributed file system
HIVE	Data warehouse implementation for hadoop
MAPREDUCE	Programming model in hadoop
PIG	Query language for hadoop like SQL

### III. DATA SCIENCE

Big data carries the opportunity to rapidly change the business model according to day to day decision making through data analysis. To manage these huge volumes of heterogeneous data sets new method of data science and predictive analytics have been developed. Data science is an application which uses quantitative and qualitative methods to solve relevant problems. It is also a combination of domain knowledge and predictive analytics. It is noted that companies are hiring employee as data scientist who has the knowledge of both predictive analytics and domain knowledge. Predictive analytics is a subset of data science.

#### 3.1 Comparative analysis of data science and big data in companies

Type of data	Volume	Velocity	Variety
Sales	Details of sale, cost, quantity, sold, time, date etc.,	Monthly transaction, Weekly transaction, Daily transaction etc.,	Direct sales, Online sales, Export etc.,
Consumer	Details of consumer,	Purchase details,	Mode of payment ,

	preferred products, Contact details etc.,	Previous transaction etc.,	Outstanding dues etc.,
Inventory	Details of products, Cost, tax details etc.,	Cost regarding to quantity, cost regarding to quality etc.,	Increase and decrease in cost , Discount sale, Season sale etc.,
Production	Stock Details, Needed quantity, Date and time of shipping etc.,	Previous history of sales etc.,	Feedback from customer etc.,

**IV. BIG DATA CHALLENGES IN CORPRATE SECTORS**

Due to rapid change in growth of big data companies are facing lot of challenges. In recent years the ratio of data stored in repositories is increased compared to data processing power. It is expected that data collecting technologies like sensor, networks, IOT will increase in future. Companies are finding difficulties in diverse communication standard, proprietary information management, automation system, heterogeneous data sources, inflexible governance policies regarding big data and cloud integration, data management such as big data integration and cleaning, big data indexing and query, big data analysis and mining. The following steps can be used to achieve effective use of big data

**Step 1: Data flow instead of stocking**

**Step 2: Data scientist can be appointed instead of analyst**

**Step 3: Core business and operational functions can be done instead of basic analytics**

**V. REVOLUTION OF INDUSTRY 4.0**

The industry 4.0 named by german government defines that this will be the future of manufacturing companies especially those countries whose 80% economy depends on manufacturing company cannot avoid this revolution.

From an industry point of view big data is going to play an important role in future. Industry revolution can be classified into four categories such as: i) First industrial revolution (18<sup>th</sup> -20<sup>th</sup> century) depends on water and steam power. ii) Second industrial revolution (20<sup>th</sup> century to early seventies) depends on mass production, labor and electrical energy.iii) Third industrial revolution (early seventies to present day) depends on electronics and information technology for automation. iv) Fourth industrial revolution (future) depends on big data and cyber physical space.

In this industry 4.0 factory, machines are connected as a collaborative community. Machines and resources will communicate to each other in a social network, by using big data companies can manufacture intelligent products known

as smart products. Smart products will have knowledge about how they produced it also has the capability of collect and transmit data automatically. This huge amount of data (big data) will be collected and analyzed in real time. The main aim of employing big data is to achieve transparency, productivity, fault free, cost efficient, desired performance and quality. Discovery of new technologies enters into industry development to achieve highly automated assembly lines. Cyber physical system based manufacturing and service innovation are two inevitable trends.

Outcome by using Big data: An report based on a survey states that the following development is achieved by using big data in large scale manufacturing companies

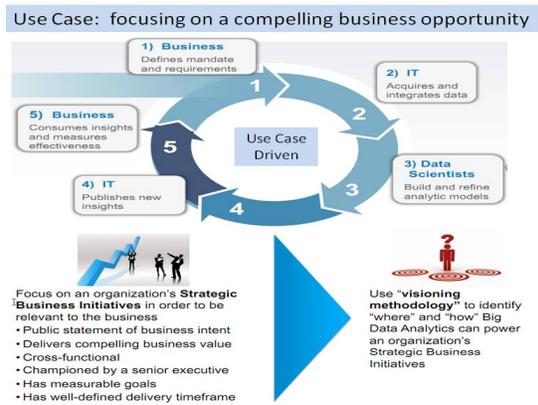
- 51% customer centric outcomes
- 50% cost reduction achieved in product development
- 18% operational optimization
- 15% risk / financial management
- 14% new business models were found
- 7% reduction in working capital is achieved
- 4% in employee collaboration is achieved

The highest benefit is gained in detecting customer centric operations, these information gathered in many ways used to detect customer needs and future behavior to provide better service to them.

**a. NEED OF INDUSTRIAL BIG DATA**

Big data has been data mining science human generated content has been a boost to the social network, various new technologies such as big data, cyber physical system and intelligent analytics are teaming together to enhance production management and transformation. There is a need for self aware and self maintenance machine for industrial big data. With the help of IOT and emerging sensing technology connects system and humans together to populate a big data environment in industry. Self maintenance machine should have the capability of assess its own health, degradation and similar information from other peers, should have smart maintenance and to avoid potential issues. Self awarded machine should access current or past condition and to react to assessment output. Both can be achieved by data driven algorithm to analyze the data collected by the machine and to convert into useful information. These machines lack because of two reasons

- i)Lack of closely coupled human machine interaction
- ii) Lack of adaptive learning and full utilization of available information



## b. BIG DATA IN SMART MANUFACTURING

The term smart manufacturing refers to a future state of manufacturing, which can be done effectively with the help of big data. Real time transmission data can be processed through big data which results in manufacturing intelligence. As a result in future data driven analytics should be developed to industrial maintenance. The future of smart manufacturing requires big data pipeline for integrating, processing and analyzing industrial equipment data.

## VI. CONCLUSION

The above paper we used many concepts to describe about industry 4.0 which is also known as future of industrial revolution that will play an important role in growth and up gradation of traditional industries. It proposes the predictive manufacturing in the future industry where machines are connected as collaborative community, challenges on Industry 4.0 with various enabling technologies. It clearly shows the impact and expectations on fourth generation industries. This research focus on various aspects and characteristics of big data , big data tools which is suitable to handle the overflow data along with the survey of impact of big data in industries . Smart manufacturing can be achieved to fullfill demand, improve the participation and new ideas of whole society effectively and strengthen the

competitiveness of smart manufacturing industry, these new ways, new technologies, new needs will help us to move forward towards smart manufacturing, green manufacturing and urban manufacturing.

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