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Big Data: A Challenging trend in Industrial Electronics

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Abstract: This research paper deals with the greatest challenge and opportunity that confronts today's world is the rise of Big Data in Electronics Industry. In the beginning of the Internet, even the world has ever known that everyone could connect to. But now everyone is visible to the world due to the rapid growth of electronic communication based on the Internet. Now a days, through Electronics and communication, the Internet of Things (IoT), which connects the Internet to everyday things and devices, is emerging as the wave in the development of Internet. Data can be acquired in Structured and unstructured pattern. Most of the databases based on the electronics system design, Sensors in Smart phones, human genome, the human brain, Internet commerce, or social networks that dwarf in size any databases. This paper reviews the applications of big data in Electronics Industry and explores the opportunities, challenges and benefits incorporating for various fields.
Keywords: Big data, IoT, Sensors, System designs

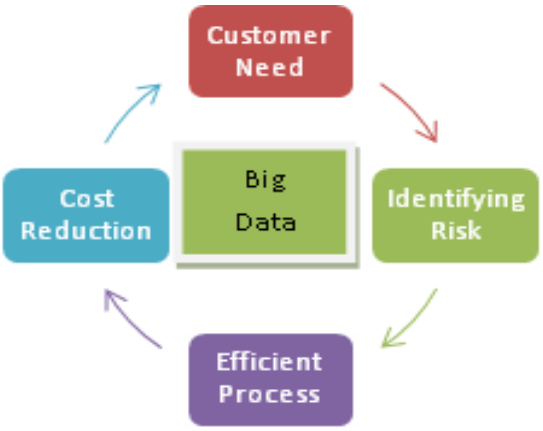
I. INTRODUCTION

In '90s the creation of data is spurred as more and more devices are connected to the internet. It is almost impossible to handle and manage and process a large set of unstructured data using traditional business intelligence tools. Now a day the open source is used by many organizations to crunch through huge amounts of data. As many social network sites started appearing and storing huge amount of data on a daily basis, Innovative startups slowly started to dig into this massive amount of unstructured data.

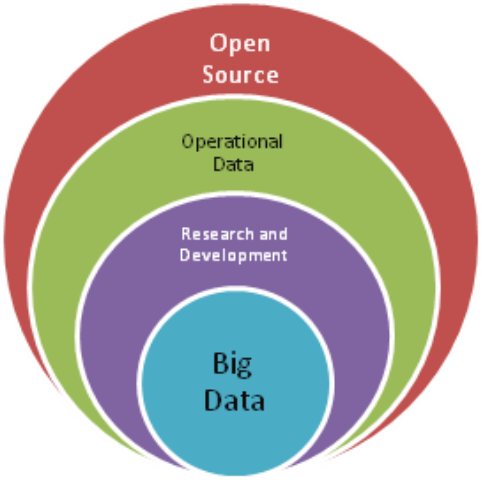
In the past few years, there has been a massive increase in big data startups; many companies are adapting big data and trying to figure out what kinds of usable information might exist in these large volumes of data. Big Data is formed of large, heterogeneous, complex, Unstructured, longitudinal, and distributed data sets generated from various instruments, sensors, Internet transactions and other sources. It is commonly characterized in three or more V's: volume, velocity, variety, and additionally value, veracity etc. (Iswarappa et al, 2015).

However, open access to data poses new problems of privacy and Confidentiality. Now a days in electronics industry System designers are set to use big data for optimum component matching and shorter time to debug. Currently over 300 billion electronic semiconductor devices are being manufactured and tested to improve the quality. Big data analysis plays an important role to isolate problems and finds the root cause of a problem more quickly to ensure optimum performance.

II. IMPLEMENTATION



Implementing Big Data analytics are simply too good for analyzing customer data from over 50 billion devices (Samadhi Mukherjee et al 2016), reducing test time through eliminating redundant and unnecessary tests, Increasing design complexity (e.g. System-on-a-Chip, multi-processor cores, embedded memory caches), reducing test costs by using advanced methodologies in process control, performance, increasing productivity by using automated rules that optimized manufacturing throughout and eliminate supply chain inefficiencies, and increasing visibility into their entire supply chain. In particular, predictive analytics and forecasting are now seen as important components in implementing big data initiatives and extracting more value from data (Chun-Wei Tsai et al, 2015).



III. CHALLENGES

Heterogeneity and Incompleteness of Data

Most of the challenges are related to understanding the data, coping with messy source of heterogeneous data and interpreting analytical results (Shen Yin et al, 2016). Understanding the properties of the big data sets requires knowledge, even after data cleaning and error correction, some incompleteness and errors in data are likely to remain. This incompleteness and errors must be managed during data analysis is a challengeable task in modern industry (Sangtani et ak, 2016).

Storage of Data

Now a days, there are sensors that send information back to the mothership, and this process generates massive volumes of structured and unstructured data (Alexandros Labrinidis et al 2012). The increasing in share of this data which is being stored on cloud services has become a big challenge. Innovations in storage of such huge volume of heterogeneous data, accessing and understanding the data itself a significant mile challenge.

Customer needs

The increasing complexity of smart products, users demand, and stiff competition are driving the focus of electronics manufacturers on product quality and productivity. They need to think about the format of the data; mounds of page scans or data that are presented out of context may not be very useful. These companies are struggling to improve their operations to increase their production yield, operational efficiency, and product quality towards customer need. This has been driving demand for Big Data solutions over the past few years and as part of their evolution, electronic original equipment manufacturers, particularly those highly quality-sensitive such as automotive, networking, and smart electronics, are moving in the direction of Big Data product analytics and predictive analytics.

Data Processing

However, the enormous amount and variety of data electronics manufacturers deal with, lack of control over manufacturing data and standardization, making it a challenging task for these organizations to extract value from the data they collect. Engineer's waste time trying to locate the data they need for analysis and contextualizing it to perform analytics and finally act on it.

In addition to these challenges that are common across industry verticals, most electronics manufacturers have adopted a highly complex supply chain typically consisting of multiple contract manufacturers and semiconductor suppliers. To realize the benefits from Big Data analytics, these companies thus require insights throughout their distributed operations, including into facilities they might not own.

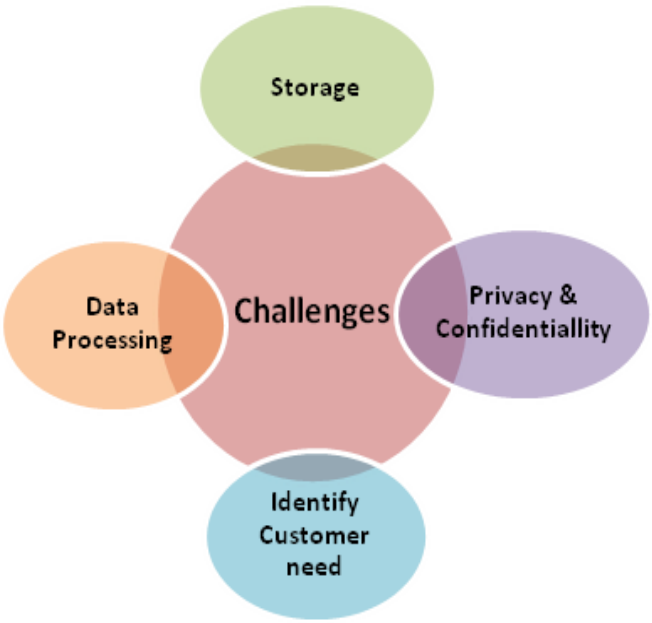
Privacy and Security

Many companies are moving toward open data access, in which all official data will be available online. This open access to data poses new challenging problems of privacy and security (MadhukarDayal et al 2014). However, companies should be cognizant of the threats to privacy and confidentiality that Big Data Pose.

Data Uncertainty

Big data come with some amount of uncertainty, and the proper interpretation of data in the context of uncertainty is by no means easy or routine.

The System designers will face problem as they try to figure out what kinds of usable information might exist in these large volumes of uncertain data and how to combine them with more traditionally collected data (Michael G. Hilgers et al 2015).



IV. FUTURE TREND

Big data has the potential to attract ever-growing attention of the industrial communities, As Big Data gets bigger, and companies find themselves in direct competition like networking, data storage, cloud computing, wireless, and cellular and security. In future trend, systems that support large volumes of both structured and unstructured data will continue to rise and the market will demand platforms that help data custodians govern and secure big data.

Some possible future trends of big data for modern industry include to:

- Big data becomes fast and approachable: Options expand to speed up Hadoop.
- Growing interest to analyze additional sensor data to move from preventive to predictive techniques (Ritu Agarwal et al 2014)
- Cloud based storage helps to hold large simulation and testing file
- A Shift Towards Data-Driven Cultures - information sharing and data mining optimizes the efficiency of equipments and manufacturing processes
- The Internet of Things Taking Off - The possibilities for the Internet of Things are basically endless. Now a day's sensors have become so smart, cheap, small and easy-to-connect to IoT platforms (K.R.Kundhavai et al 2015).
- The convergence of IoT, cloud, and big data create new opportunities for self-service analytics

The overall big data trend in Industrial electronics is constantly evolving and companies are getting better in benefiting from their data.

V. CONCLUSION

In the world of Big Data, as Industries move online, data records become a useful and searchable source of information in which all official data will be available online in a huge volume. Big Data is not merely the amount of bytes. It offers opportunities toward deeper insights, so as to make business easier and to answer questions that were previously considered beyond our reach.

However, Big Data is beyond the capability of conventional software tools to capture, manage, and process the data within a tolerable time period. The challenges include the obvious issues of heterogeneity of data, storage, processing of unstructured data, confidentiality, data ownership, privacy and security at all stages of the analysis. These technical challenges are common across a large variety of application domains; these challenges will require transformative solutions. Nevertheless, Big Data is still in its infancy stage, and more insightful and comprehensive studies are expected to address issues from different perspectives, including those concerning hardware, software, analytics, and visualization. Big data presents huge opportunities for electronic industries to power next phase of growth. The present studies suggest that fundamental research towards these technical challenges achieves the promised benefits of Big Data.

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