

Chapter 11

Big Data Applications in Healthcare

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ABSTRACT

Big data is in every industry. It is being utilized in almost all business functions within these industries. Basically, it creates value by converting human decisions into transformed automated algorithms using various tools and techniques. In this chapter, the authors look towards big data analytics from the healthcare perspective. Healthcare involves the whole supply chain of industries from the pharmaceutical companies to the clinical research centres, from the hospitals to individual physicians, and anyone who is involved in the medical arena right from the supplier to the consumer (i.e. the patient). The authors explore the growth of big data analytics in the healthcare industry including its limitations and potential.

INTRODUCTION OF BIG DATA

Big data has become a hype in the analytics industry and draws a lot of attention from worldwide. Big data is not being created now, it was present from the beginning. It is just that more and more data is being generated now in this technology-driven world. Big data is simply the old form of data being processed in traditional data warehouses with addition to real time and operational data stores. It is not only too big in size to be processed using traditional tools but also available in varied number of forms

(Datastax Corporation, 2012). Reports suggest that every day this world generates 2.2 million terabytes of new data out of which 10% is structured and 90% is unstructured data. Also, with the introduction of latest technologies in this digital world, over 90% of the data is created in the past 2 years.

As discussed above, Big data is defined using three different dimensions – Volume, Variety and Velocity. In the end, the main challenge lies in getting the relevant knowledge and information from the data that can be used to take right decisions Oracle (2013).

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BACKGROUND: BIG DATA ANALYTICS IN HEALTHCARE INDUSTRY

A few decades ago, the flow of information in the healthcare industry was relatively simple with minimal usage of technology. Nowadays, technology has become much more advanced, and the flow of information has become more complicated. Today, data mining and big data analytics is being used to manage inventories, develop new drugs, manage patient's records, cost of medicines, and administer clinical trials. The methodologies involved in the data extraction and information retrieval process are the same as other sectors, but the usage and relevance of that data has changed to suit the needs of hospitals, pharmacy companies, healthcare organisations, medical research labs and drug trial clinics. Unfortunately, data collection methods have improved, but the techniques used to process it are still lagging behind (Ranjan, 2007).

Role of Big Data in Healthcare Sector

Big data is being actively used in the healthcare sector these days to change the way decisions are made. It is changing the entire healthcare ecosystem by providing cost-effective measures, better resources and measurable value around the globe. As per the KPMG (2012) report, 70% of the healthcare data is generated in Europe and North America and by 2015, world is expected to generate 20 Exabyte of healthcare data. Big data market in the healthcare sector has become so massive that in 2010, it contributed to 7% of the global GDP and reduced around 8% of the healthcare global expenditure by providing better solutions. Below figure shows various initiatives and developments that are taken by various agencies around the world, to revamp the healthcare sector using big data.

Chapter objectives include:

- Differentiating hype about Big Data Analytics from fact and application
- Discussing specific application to Healthcare
- Outlining limitations and opportunities

MAIN FOCUS OF THE CHAPTER

Impact of Big Data Analytics on the Healthcare Industry

The impact of big data from the patient's point of view can be divided into 5 value based components, where this value is derived from the total cost applied and the impact or outcome it has on the life of patients. These value based components are also called pathways, as they provide guidance for further improvement along each of these pathways . The pathways are:

1. **Right Living:** Patients can now take control of their own lives by monitoring their health, and making decisions towards a healthier lifestyle. They can read the results of data mining and plan their proper diet and exercise regime that will enable them to remain healthy (Groves, 2013).
2. **Right Care:** According to this path, all the healthcare points will have the same data about the patients, from a common database, that will help them in coordinating efforts to help the patients in the same manner, and ensure that no glitches occur, like duplication of effort and wrong strategies (Groves, 2013).
3. **Right Provider:** This pathway defines that patients should always be treated by the right professional, a person who is best suited to

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