

Chapter 21

Big Data Analytics in Health Care

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ABSTRACT

With the arrival of technology and rising amount of data (Big Data) there is a need towards implementation of effective analytical techniques (Big Data Analytics) in health sector which provides stakeholders with new insights that have the potential to advance personalized care to improve patient outcomes and avoid unnecessary costs. This chapter covers how to evaluate this big volume of data for unknown and useful facts, associations, patterns, trends which can give birth to new line of handling of diseases and provide high quality healthcare at lower cost to all citizens. This chapter gives a wide insight of introduction to Big Data Analytics in health domain, processing steps of BDA, Challenges and Future scope of research in healthcare.

INTRODUCTION OF BIG DATA ANALYTICS

Big data analytics refers to the process of collecting, organizing and analyzing large sets of data to discover patterns and other useful information. An enormous amount of data often referred to as Big Data is getting generated everyday by diverse segments of industries like business, finance, manufacturing, healthcare, education, research and development etc. Big data analytics will help organizations to better understand the information contained within the data and will also help identify the data that is most important to the business and future business decisions. Big data analysts basically want the knowledge that comes from analyzing the data. The healthcare industry historically has generated large amounts of data, driven by record keeping, compliance & regulatory requirements, and patient care. While most data is stored in hard copy form, the current trend is toward rapid digitization of these large amounts of data. Big Data includes huge volume, high velocity, and extensible variety of data. The data in it will be of three types. Structured data: Relational data. Semi Structured data: XML data and Unstructured data: Word, PDF, Text, Media Logs.

DOI: 10.4018/978-1-5225-7501-6.ch021

Big data is critical to our life and its emerging as one of the most important technologies in modern world. Follow are just few benefits which are very much known to all of us:

- Using the information kept in the social network like Facebook, the marketing agencies are learning about the response for their campaigns, promotions, and other advertising mediums.
- Using the information in the social media like preferences and product perception of their consumers, product companies and retail organizations are planning their production.
- Using the data regarding the previous medical history of patients, hospitals are providing better and quick service.

Big data technologies are important in providing more accurate analysis, which may lead to more concrete decision-making resulting in greater operational efficiencies, cost reductions, and reduced risks for the business. To harness the power of big data, you would require an infrastructure that can manage and process huge volumes of structured and unstructured data in real-time and can protect data privacy and security.

There are various technologies in the market from different vendors including Amazon, IBM, Microsoft, etc., to handle big data. While looking into the technologies that handle big data, we examine the following two classes of technology:

1. **Operational Big Data:** This includes systems like MongoDB that provide operational capabilities for real-time, interactive workloads where data is primarily captured and stored. NoSQL Big Data systems are designed to take advantage of new cloud computing architectures that have emerged over the past decade to allow massive computations to be run inexpensively and efficiently. This makes operational big data workloads much easier to manage, cheaper, and faster to implement. Some NoSQL systems can provide insights into patterns and trends based on real-time data with minimal coding and without the need for data scientists and additional infrastructure.
2. **Analytical Big Data:** This includes systems like Massively Parallel Processing (MPP) database systems and Map Reduce that provide analytical capabilities for retrospective and complex analysis that may touch most or all the data. Map Reduce provides a new method of analyzing data that is complementary to the capabilities provided by SQL, and a system based on MapReduce that can be scaled up from single servers to thousands of high and low end machines.

OBJECTIVE OF BDA

- Analyze disease patterns and tracking disease outbreaks and transmission to improve public health surveillance and speed response
- Patients must be encouraged to play an active role in their own health by making the right choices about diet, exercise, preventive care, and other lifestyle factors.
- Detect diseases at earlier stages and can be treated more easily and effectively
- Patients must receive the most timely, appropriate treatment available
- Providers and payers continually look for ways to improve value while preserving or improving health-care quality.
- Stakeholders focuses on identifying new therapies and approaches to health-care delivery

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