

## Chapter 26

# Big Data Paradigm for Healthcare Sector

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### ABSTRACT

*The digitization of world in various areas including health care domain has brought up remarkable changes. Electronic Health Records (EHRs) have emerged for maintaining and analyzing health care real data online unlike traditional paper based system to accelerate clinical environment for providing better healthcare. These digitized health care records are form of Big Data, not because of the fact they are voluminous but also they are real time, dynamic, sporadic and heterogeneous in nature. It is desirable to extract relevant information from EHRs to facilitate various stakeholders of the clinical environment. The role, scope and impact of Big Data paradigm on health care is discussed in this chapter.*

### INTRODUCTION

Health care data are valuable resource which may consists of patient's demographics (age, sex etc...), treatment plans provided by a clinician, medical history of a patient, laboratory reports, radiology reports, billing data, insurance claiming requests etc. But the electronic storage, management and retrieval of health care data are difficult tasks as the health data are complex, voluminous, dynamic, sporadic, unstructured and heterogeneous (Wasan, S. K., Bhatnagar. V & Kaur, H., 2006). The activity of health care systems is reaching to terabytes even to petabytes and more in various cases. It is important to store such Big Data in an efficient distributed manner over computing nodes. Big Data analytics has the potential to improve health care at lower costs by gaining insights and discovering associative patterns within real time health care data. The aim of this chapter is to review a trial on modelling of big data analytics to expedite the large scale processing of electronic health data for various stakeholders.

## **BACKGROUND**

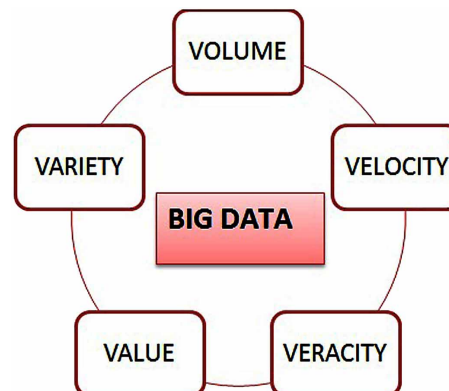
The Big Data revolution is nascent and there is a lot of scope for new innovations and discoveries. It has set the path of rapid change in technological world. The Big Data is impacting various areas like social networking, online education etc. including health industry. The major 5 V's associated with Big Data (Figure1) are listed as follows (Marr, B., and February 2014):

1. **Volume:** Health Care data is enormous.
2. **Velocity:** Health Care data is delivered at various speeds and is dynamic.
3. **Variety:** Health Care data is heterogeneous.
4. **Veracity:** Health Care data is enormous; thus it is important to maintain its relevance and trustworthiness to give best possible benefits to the patients.
5. **Value:** Health Care data is rich source of information and is useful if could be turned into valuable knowledge.

Various Big Data platforms may prove beneficial for decision-making process in treatment plans under digitized health care systems. The applications of real-time health care systems e.g. detecting viral infections as early as possible, identifying various symptoms and parameters swiftly, reducing patient morbidity and mortality etc. electronically would revolutionize healthcare.

*Premier* analyzes data various healthcare providers and enabling its members with high-performance, integrated and trusted information. *University of Ontario Institute of Technology (UOIT)* is using IBM big data technology to capture and analyze real-time data from medical monitors, alerting stakeholders to potential health problems for patients (Retrieved from <http://www-01.ibm.com/software/data/bigdata/industry-healthcare.html>). Various repositories such as *Microsoft Health-Vault*, *Dossia* are supporting health data analytics (Steinbrook, R., 2008). Various technology driven applications based on big data paradigm such as *Asthma-polis* developed for asthmatic patients for monitoring via GPS enabled tracker are emerging online. The *dashboard* technology is also emerging and *RiseHealth* is one such example

*Figure 1. V's of big data technology (IGI, 2014)*



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