Chapter 5

Generation and Management of Data for Healthcare and Health Diagnostics

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ABSTRACT

Healthcare Analytics deals with patient records, effective management of hospitals, and clinical care. But the big data available is still not enough for focused research as it is complicated to find insights from complex, noisy, heterogeneous, and voluminous data, which takes time and effort, while a small clinical data will be more effective for decision making. The health care data also varies in data collection methods and their processing methods. Data generated through patient records is structured, wearable technologies generate semi-structured data, and X rays and images provide unstructured data. Storing and extracting information from the structured, semi-structured, and unstructured data is a challenging task. Different machine learning techniques can simplify the process. The chapter discusses the data characteristics, identifying critical attributes, various classification and optimization algorithms for decision making purposes. The purpose of the discussion is to create a basis for selection of algorithms based on size, temporal validity, and outcomes expected.
INTRODUCTION

Healthcare has become an important and interesting field of study in recent years with introducing “Big Data”. Despite the money paid on healthcare, the number of health-related mortalities is still at an alarming high-level and steadily increasing. The exponential increase in the number and variety of health care centers equals the rate of increase in the exploding population. From small one-man clinics to a vast chain of hospitals and nursing homes, the increase in these establishments shows an increase in the number of issues in healthcare. Diseases and Disorders are increasing recently and created a booming business for hospitals. Changes in the way of living, lack of alimentary food, environmental degradation, diagnosis and consumption of medicines while not steering are major reasons for this increase. But nature and the huge unfold of the causes across disciplines produce an outsized quantity of data. Studying these data becomes difficult owing to the complexity, volume as well as the variety of the data.

Healthcare expenses are the highest ever in developed economies like the USA. Around 95% of the money spent is for personal direct medical care services and only a meager amount goes to mass approaches for health care improvement. This shows the attention the health care improvement is drawing from the society. Increasing the lifetime of an individual is important for healthcare. Here, history is an important source since it helps us to see the present and future. Healthcare data helps in predicting epidemics or issues with lifestyle changes.

The healthcare industry has experienced a drastic shift with developing technology. Also, there is a pattern shift in the healthcare industry from knowledge-based care to value-based care. Adapting the technology changes does not happen as the changes occur often than learning. According to Tom Burton, the President of Professional Services, USA, the healthcare industry is people-oriented rather than process-oriented. This led in the working style of the cottage industry. Healthcare quality relies on location and individuals and not technological progress. But to provide systematic and standardized healthcare, it is often necessary to strengthen the knowledge base and the training methods of the healthcare personnel. Clinical effectiveness is not the only issue, but to provide value-based care, it is necessary to reduce the waste and patient safety bringing us to the importance of the data analytics. With these variants, healthcare analytics have taken many forms, shapes, and sizes, thus complicating the issue more. The various methods of data analysis will require various forms of data as discussed by John Haughaom et .al (2014) and Russ Staheli (2014).
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