Chapter 4
Computational and Data Mining Perspectives on HIV/AIDS in Big Data Era: Opportunities, Challenges, and Future Directions

Ali Al Mazari
Alfaisal University, Saudi Arabia

ABSTRACT

HIV/AIDS big data analytics evolved as a potential initiative enabling the connection between three major scientific disciplines: (1) the HIV biology emergence and evolution; (2) the clinical and medical complex problems and practices associated with the infections and diseases; and (3) the computational methods for the mining of HIV/AIDS biological, medical, and clinical big data. This chapter provides a review on the computational and data mining perspectives on HIV/AIDS in big data era. The chapter focuses on the research opportunities in this domain, identifies the challenges facing the development of big data analytics in HIV/AIDS domain, and then highlights the future research directions of big data in the healthcare sector.

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INTRODUCTION

Recent quick raise within digital data's generation as well as the quick development concerns computational science permit us extracting recent insights from the massive sets of data, recognized as huge data, within a variety of disciplines, involving internet finance and business (Lee & Yoon, 2017; Lane et al., 2014).In the area of healthcare, discovering recent actionable insights has not been recognized widespread, even though many success achievement stories are mostly published in the academic journals and media (Edmunds et al., 2014). This postponed development of the big data technology in the sector of healthcare is unusual, taken into account a previous prediction, which is the big data technology's application that was predictable. In addition, the sector of health care could be one of the most important sectors predicted to be profited the most from the technology of big data (Murdoch & Detsky, 2013).

The growing gap among outcomes and healthcare costs is recognized as one of the most significant issues and there are many efforts under way in order to fill this gap within several developed countries (Savel & Foldy, 2012). It is demonstrated that the gap among outcomes and healthcare costs was analyzed in order to consider the poor management's result of insights from the research. The poor use of obtainable evidence, in addition to the poor imprison of care experience, each of which contributes to lead to wasted resources, missed chances in addition to possible harm to the patients (Curry, 2005). It has been proposed that the gap could be defeated through the improvement of a "continuous learning healthcare system" since an honorable cycle is shaped among the research as well as the healthcare's arms, and data could be utilized successfully (Rumsfeld, Joynt & Maddox, 2016). Consequently, an imperative demand to enhance patient outcomes and healthcare quality, developing the availability of data in addition to improving analytic capabilities are the big data era's drivers of healthcare (Rumsfeld, Joynt & Maddox, 2016; Groves et al., 2016). There are several challenges to defeat before the technology of big data has the ability to considerably enhance healthcare outcomes, quality and healthcare.

THE ERA OF BIG DATA IN THE DOMAIN OF HEALTHCARE AND MEDICINE

The Concept of Big Data

The "Big Data" term was first initiated into the computing world through Roger Magoulas from the publication of O'Reilly in 2005 to identify a huge amount of data, which the techniques of conventional data management cannot process and process because of the size and complexity of this data (Ularu et al., 2012; Chaorasiya &