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An Enhanced Cloud Based Environment for Big Data Analytics in Health Care

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***Abstract* - Today, one of the promises of the growing critical mass of clinical data collection in electronic health record (EHR) systems is secondary use (or re-use) of the data for other purposes, such as quality enhancement and clinical research. The growth of such data is increasing dramatically in recent years. The analysis of the above data is usually called analytics (or data analytics).**
***Keywords:* Cloud, Big Data Analytics and Health Care**

I. INTRODUCTION

There are a large number of terms related to data analytics. A core methodology in data analytics is machine learning, which is the area of computer science that aims to build systems and algorithms that learn from data. One of the major techniques of machine learning is data mining, which is defined as the processing and modeling of large amounts of data to discover previously unknown patterns or relationships. The growing quantity of data requires that its users have a good understanding of its provenance, which is where the data originated and how trustworthy it is for large-scale processing and analysis.

II. THREE LEVELS OF ANALYTICS

1. *Descriptive* – standard types of reporting that describe current situations and problems

2. *Predictive* – simulation and modeling techniques that identify trends and port end outcomes of actions taken

3. *Prescriptive* – optimizing clinical, financial and other outcomes

III. CHALLENGES TO DATA ANALYTICS

There are, of course, challenges to data analytics. Data produced in routine care of patients may be limited in its use for analytical purposes. For example, such data may be inaccurate or incomplete. The research questions regarding data tend to be driven by what can be answered, as opposed to prospective hypotheses. They also note that data are not always as objective as one might like, and that "bigger" is not necessarily better. Finally, they raise ethical concerns over how the data of individuals is used, the means by which it is collected, and the possible divide between those who have access to data and those who do not. Similar concerns focused specifically on healthcare data. In healthcare and biomedicine, the field poised to lead in data science is informatics. It is clear that there are individuals and groups work with analytics and big data.

Fig. 1 Paradigm of Big Data

IV. BIG DATA IN HEALTH CARE

The types of data anticipated to be of use in Big Data Analytics include:

1. 80 percent of Health data or Clinical data is unstructured as documents, images, clinical or prescribed notes
2. Publications are used for clinical research and medical reference material
3. Clinical references are text-based practice guidelines and health product (e.g., drug and medicine information) data
4. Genomic data represents significant amounts of new gene sequenced data
5. Streamed data is an example of home monitoring, tele health, handheld and sensor-based wireless or smart devices are new data sources and its types

6. Web and social networking data consumes use of Internet data from search engines and social networking sites
7. Business, organizational and external data are administrative data such as billing and scheduling and other non-health data.

Fig. 2 Advantages of Big Data in Health Care

V. BIG DATA CHALLENGES IN HEALTH CARE

1. Leveraging the patient/data correlations in longitudinal records.
2. Understanding unstructured clinical notes or data in the right context.
3. Well organized in handling huge volumes of medical imaging data and extracting quality, useful information and biomarkers.
4. Analyzing genomic data is a computationally intensive task and it combines with standard clinical data adds additional layers of complexity.
5. Capturing the patient's behavioral data through the sensor equipments and various social interactions and communications.

VI. CLOUD BASED BIG DATA ANALYTICS IN HEALTH CARE

Cloud computing technology can be a benchmark to substantiate big data which may lead to discover of hidden patterns and trends to enhance knowledge for progression of disease. Cloud computing is the most appropriate architecture for large-scale storage and complex processing as required for Big Data and Big Data Analytics. Its advantages include flexibility, security, parallel processing, scalability and resources virtualization. Cloud computing can reduce the costs of automation and infrastructure maintenance, meanwhile improving operational efficiency and user access.

Fig. 3 Cloud based Big Data Analytics in Healthcare

VII. CONCLUSION

In recent years, volume of clinical data and the need for analytics continues to increase, systematic approaches will be required for sustained success. Clearly, it is a great promise ahead for healthcare driven by data analytics. The developing quantity of clinical and research data, along with methods to analyze and put it to use and it can lead to improve personal health, healthcare delivery and biomedical research.

Big data analytics in healthcare is a field from very large data sets provide improving outcomes, reducing costs. However, there remain challenges to overcome. Big data analytics has the capacity to develop into something in the future to transform the way healthcare providers use sophisticated technologies to gain insight from their clinical and other data repositories and make informed decisions. In the future, there exist widespread implementation and use of big data analytics across the healthcare organization and the healthcare industry.

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