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Challenges and Opportunities of Big data in Health Care

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Abstract:

The term big data is referring to huge amount of structured and unstructured data. The concept of big data is based on three V's that are volume velocity and verity. Health care industry is produced huge amount of data every day. As all the things and industries become globalized, the health care industry also becomes digitalized. For the purpose to solve the human being health issue the research applies big data technique to analysis the huge amount of data. In this article complete review about using of big data health care industry is presented. The main purpose of this article is to discuss about all the challenges which create hurdle to create opportunities in implementation of big data.

Keyword: Big data, Health Practitioners, Health Care, Electronic Health Record.

1. Introduction

The massive amount of data in biomedical is create a big challenge for the scientist. The size of biomedical datasets are in zettabyte which create hurdle in the storage and analysis process of these datasets[1]. As the world becomes digitalized and the trends of smart city become more popular, the scientists more focus toward the big data techniques. Because these techniques help them to store and analyze the data in more efficient manners[2]. The medical big data sets contain text documents and images. The analysis of medical dataset help scientist in enhancement of living standards of human beings[3]. In this paper, review of medical big data is presented. The application challenges and benefits of big data is discussed in detail. During the implementation of big data techniques storage, data collection classification and security is the main challenges for the scientist. Big data applications in health care system are helpful to enhance the health standards.

2. Big Data

Big data is a term which is used by researcher and developers for the terabyte and zettabyte datasets on which traditional approaches of data mining are not applicable. Bigdata is

applicable on structured and unstructured data[3]. A one proper definition of big data is not available[4]. Different researcher defines it differently, some of them define big data with three V's volume, velocity and verity. But some researcher define it with five things that are volume, velocity, verity, complexity and variability[5]. The details characteristics of bigdata are shown in figure 1. Big data drive forms any type of data like videos, images and text data. There are various types of big data, where long-established database systems are based on the structured data.

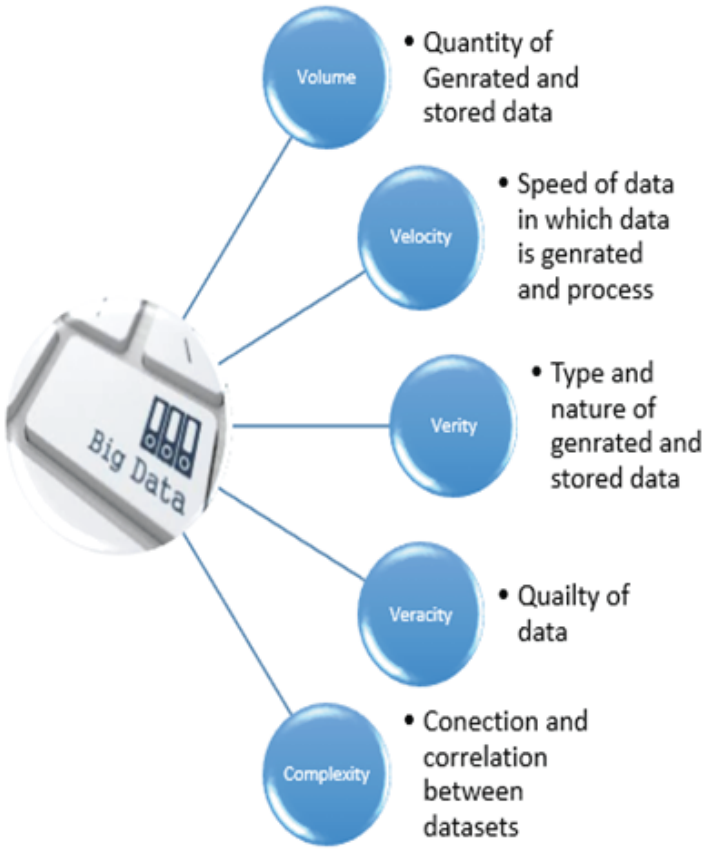

Figure 1: Characteristics of Big Data

Big data is categorized in the 5 V's: A one proper definition of big data is not available[4]. Different researcher defines it differently, some of them define big data with three V's volume, velocity and verity. But some researcher define it with five things that are volume, velocity, verity, complexity and variability[5].

The data for this review article is collected form springer, IEEE, Google scholar and PUBMed by using "Bigdata in health care" and "Bigdata health care applications" queries. The literature review process with inclusion and exclusion process is shown in figure 2. The year of selected review article is between 2014 to 2018.only 25 articles are selected form Million of articles as shown in figure 2.

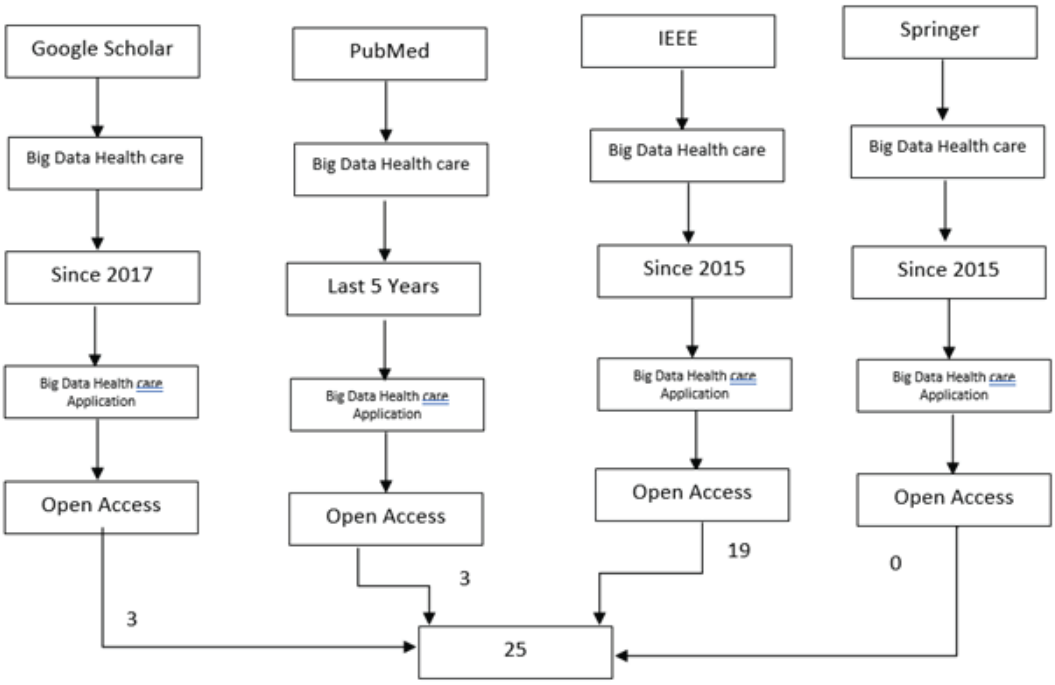

Figure 2: literature review process with inclusion and exclusion process

3. Related work

Big data and smart device revolutionized the health care system as shown in figure 3. As the world become global village the concept of Silicon Valley is more popular. In Silicon Valley all the work is done on digital devices. Health is an important issue which address by the scientist. The digitalization of health sector is helpful to secure many lives. For this context many are already done.

The researcher give the concept of a smart city for health care system by using cloud computing and deep learning techniques[6]. CC offer ability and function like compute, store, and applications via inter-net. In the broad-spectrum, to render smart phones energy efficient and computationally capable, major changes to the hardware and software levels are required. This causes the cooperation of developers and manufacturers [16].In other article the researcher introduce the block chain with the combination of IOT techniques for automated health care system[7], [8]. Big data and machine learning algorithm make resolution in health care sector. Machine-Learning, then again, approaches issues as a specialist advancing through residency may: by taking in principles from information. Beginning with patient-level perceptions, calculations filter through immense quantities of factors, searching for mixes that dependably anticipate results. In one sense, this procedure is like that of conventional relapse models: there is a result, covariates, and a factual capacity connecting the two. Be that as it may, where Machine-Learning sparkles is in dealing with huge quantities of indicators — some of the time, strikingly, a larger number of indicators than perceptions — and joining them in nonlinear and exceedingly intuitive ways [15]. The combination of big data and machine learning algorithms are used to develop a

perfect system for health care applications. These systems are able to diagnoses, predict and cure the diseases[9].

In today society smart phones are available every. Almost every person knows how to operate smart phone. The scientists do a lot of work on smart phone health care applications by using big data. These application are easy to use and help to save many lives[2], [10].

Especially, Big-data investigation in medication and human services empowers examination of the enormous datasets from a huge number of patients, distinguishing clusters and relationship between datasets, just as creating prescient models utilizing information mining strategies [14].

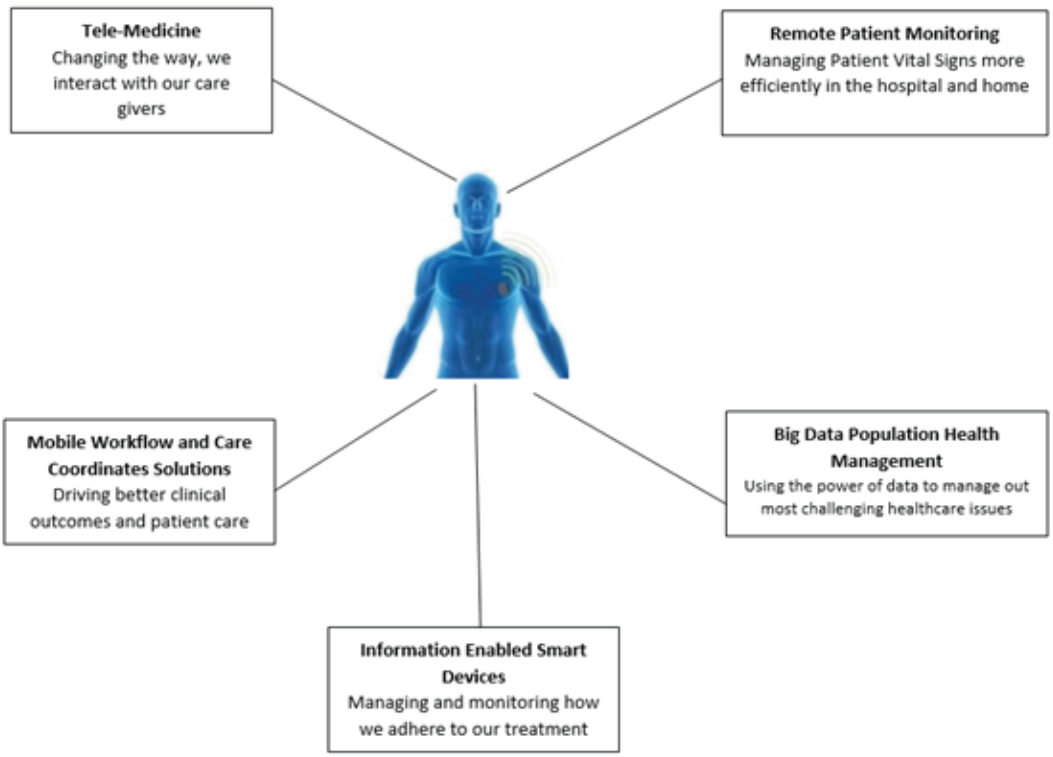

Figure 3: Big data technology in health care system

4. Challenges

Big data and medical information base big data is two different things. Medical base big data are more complex and hard to maintain[11]. A few of challenge which are occur during implantation of big data techniques on health care application are as following.

4.1. Confidentiality

The security of medical big data is very sensitive issue. It's very important to secure medical data base from cybercrime, phishing and hacking[12]. Because these kinds of databases also contain personal information like credit card history, personal address phone number etc. Appropriation of big-data in social insurance, fundamentally increments security and patient protection concerns. At the beginning,

understanding data is put away in data-centers with changing degrees of security [17].

4.2. Access

The main challenge for medical big data scientist is access of data. To create medical big data datasets scientist needs huge amount of internal and external data of different hospitals and clinics. But the organizations are not ready sharing their customer information with third party because consumers have legal right to in case of unethical handling of his data.

4.3. Data Classification

Medical big data is consist of huge amount of heterogeneous and less structured data[13]. So, data scientists analyze and visualized the data and make the classification of according to their requirements. Clinical databases store a lot of data about patients. Data-mining strategies connected on these databases endeavor to find connections and examples among clinical what's more, obsessive information to comprehend the movement and highlights of specific sicknesses. The achieved information can be utilized for early determination. In the clinical databases, infection cases are genuinely uncommon as contrasted and the ordinary populaces [18].

4.4. Data Modeling

For the best results it is very important that the medical dataset only contain relevant and accurate information. The data modeling for extracting correct information from medical big dataset is a challenging job. Data Modeling is the way to describe the database models and describing or specifying the use of database structures [19]. Today the dominating technology is Relational-DB since 80's [20].

4.5. Storage

The size of medical big data datasets are intera byte and zettabyte. It is compulsory to have enough storage space to upload or generate the data at some time. The storage devices have ability to store word documents, X-ray MRI and CT scan reports.

4.6. Communication

The communication between user and scientist is very important. The communication between scientist and big data collector and end user create a great problem. Because of this gap big data collector is not able to collect accurate information which leads to bed analysis of big data algorithms. This bed analysis caused the great loss of end user in health care application.

4.7. Data Nature

In medical big data datasets play a vital role. The medical big data datasets must contain information of healthcare system and outside the healthcare system. The main problem is that hospital and clinics only contain unhealthy person's data but in big data techniques health individual's information is also required.

5. Benefits

In health care system big data techniques are applications play a vital role to improve the health quality. Medical big data datasets provide many benefits a few of them are as following.

5.1. Patient care

Big data datasets are used to design electronic health care systems. These systems are helpful to do the statistical analysis of patient body.

These statistical figures are leads toward right treatment.

5.2. Operational efficiency

The big data application smart applications are assisting to the hospital staff in the management. These applications are assisting the doctors toward the correct disease diagnostician process, correct and right amount of medicine prescription. All these things play a role in the enhancement of the medical offices and medical researcher's performances.

5.3. Finding a cure

The pharmaceutical companies examine the analysis the medical big data datasets to find the cure of dieses. The big companies spend a lot of money for this purpose for example a few years back the scientist create the world largest database of DNA because they think that this help them out to learn about the dieses nature and cure of disease.

5.4. Prediction

The medical bigdata datasets contain the information of some pervious patient record and healthy people records. This information is helpful to analyze the health condition of a normal human being. Because of these kind analyses the doctors can diagnosis the diseases on time and also able to stop the cause which lead the patient to death. These types of applications are best for heart and blood cancer patient.

5.5. Reduce cost and time

Now the scientists can create and store the large database because of bigdata techniques. These databases are helpful in the analysis of blood samples and another statistical test. Which are used to diagnosis the dieses. So, by using these databases

Conclusion

Big data algorithm can be game changes in health care system as it has potential to identify different kind of diseases. But it is not an easy task for big data scientist. This review article is about the challenges and opportunities of big data. The size of medical datasets is in zetta byte so the storage of data in medical big data applications are the main issue. Scientist also face some other challenges like data collection, classification and security but the advantage of medical big data is force them to play with these challenges.

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