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A Revisit to Challenges in Applying Big Data Analytics to Healthcare Sector

Aaditya Jain, Assistant Professor,
College of Computing Sciences and Information Technology, Teerthanker Mahaveer University, Moradabad, Uttar Pradesh, India
Email Id- jain.aaditya58@gmail.com

ABSTRACT: ***Big analytics in the healthcare industry is emerging as a potential subject for extracting insights from massive data sets and better health outcomes and lowering costs. Its potential is huge, yet there are still challenges to face. The implementation of Big Data Analytics (BDA) in medicine will enable the application of innovations in both medical care and health monitoring. The purpose of this study is to investigate the potential applications of Big Data Analytics in healthcare. The study is founded on a critical review of the literature, as well as the presentation of chosen findings from direct research on the application of Big Data Analytics in medical institutions. It demonstrates that medical facility choices are heavily data-driven. Therefore, this review aims to provide an insight into the challenges that are faced by big data adoption for healthcare.***

KEYWORDS: ***Artificial intelligence (AI), Big Data, Big Data Analytics, Medical, Healthcare.***

1. INTRODUCTION

The rise of big data promises new opportunities to comprehend and foresee settings or issues in healthcare. With the introduction of the Internet, big data in healthcare has developed rapidly. It is gathered not just in health-care environments but also through cyber-digital environments like conventional and wireless Internet, smart TVs, sensor cellphones, and RFID-based omnipresent networks, and social networks. The biggest factor of vast and diverse big data to be handled and evaluated is communication and information technologies. These large amounts of data, which may include text, video, audio, and any other electronic platform, may be processed to generate new and relevant information[1], [2].

Big data analytics has ushered in a new age of service improvement and problem - solving skills in healthcare. Big data analytics has lately sparked attention since it combines social predictive analytics with traditional analytics, despite the fact that data analytics has long been essential in research and medical practise. Prediction employing Google Flu Trends (GFT), which began in February 2013, has sparked attention outside of the healthcare sector, demonstrating the new applicability and value of social data and big data analytics. Big data is quite important in the healthcare business. Electronic health records (EHR) have become widely used in clinics and hospitals throughout the world during the last decade. This data can be used to get valuable clinical insights and a better understanding of patient illness patterns[3], [4]. There are few targeted applications of big data.

1.1. Healthcare Data Solutions

A massive volume of data may be stored methodically with the aid of big data. Physicians as well as other healthcare providers may now make educated judgments because they have access to a wide range of information [5]. Of course, the amount of data collected will increase exponentially, and newer technologies will be able to handle it fast and efficiently (Figure 1).

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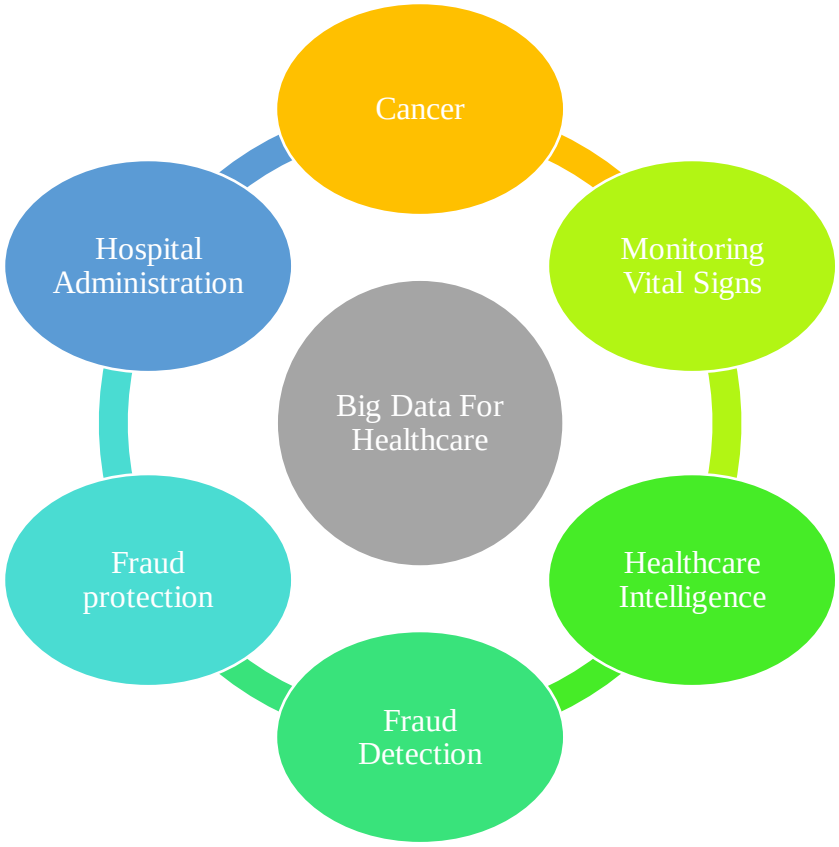

Figure 1: Illustrating the applications of Big Data for the Healthcare Sector.

1.1.1. Big data to fight cancer

Cancer is progressively paralysing individuals all around the world. Big data can aid in the more successful fight against cancer. Healthcare practitioners will be able to discover and diagnose illnesses earlier, assign more effective medicines based on a patient's genetic composition, and adjust drug dosages to reduce adverse effects and increase efficacy. It will also be useful for parallel processing and decoding the 3 billion DNA base pairs.

1.1.2. Monitoring patient vitals

The use of big data makes it simpler for healthcare personnel to function more efficiently. Aside from patient beds, sensor systems are utilised to continually monitor heart rate, respiratory rate, and metabolic activity. Any deviation from the norm is immediately reported to doctors and healthcare authorities[6].

1.1.3. Smoother Hospital Administration

Big data makes healthcare management considerably more efficient. It aids in lowering the cost of care measurement, providing the greatest clinical assistance, and managing the at-risk patient group. It also assists medical specialists in analysing data from various sources. It assists healthcare personnel in determining patient variations and the effects of therapy on their health.

1.1.4. Healthcare Intelligence and Fraud Detection

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Big Data may be utilised to improve healthcare intelligence. This will assist hospitals, payers, and healthcare organisations in enhancing their competitive edge through the development of smart enterprise solutions. Big data assists in the prevention of a wide variety of errors on the part of health administrators, such as incorrect dose, incorrect medications, and other human errors. It will also be extremely beneficial to insurance firms. They may avoid a wide spectrum of fraudulent compensation claims.

2. DISCUSSION

The value of big data in healthcare is apparent, but its adoption is fraught with difficulties. Deloitte has completed the State of AI study to assess how various firms across the world use/plan to use AI. According to this report, AI prices are still one of the most significant barriers[7], [8].

2.1. Implementation costs

Costs continue to be a significant barrier to implementing big data in healthcare. To profit from big data analytics, health clinics will have to purchase equipment, acquire computing software and tools to process the information, and purchase/develop customized solutions. A tailored patient engagement system that works with big data, for example, can cost at least $120,000.

Salary payments are yet another expense on the list. Companies will have to recruit data scientists and train their staff about how to interact with information, that is also paid time which workers spend studying rather than performing real work. Although there is no way to avoid upfront outlay, institutions can avoid unwelcome surprises in the future if they plan for all conceivable expenditures (including indirect ones) ahead of schedule.

2.2. Data aggregation and cleaning

Patient data comes from a variety of sources, including payors and other medical institutions where patients have gotten care. Bringing the data together will necessitate coordination among several stakeholders as well as agreement on a certain data format. Big data is also diverse and unstructured. To make this data appropriate for analysis, organisations will need to use categorization algorithms. Furthermore, one must clean the gathered information to assure consistency, accuracy, and correctness. Cleaning can be done manually or automatically using logic principles. An individual also need to figure out how to deal with new data that arrives in real time. Medical imaging big data needs an special kinds of attentiveness when it comes to storage and processing[9].

2.3. Security

As previously said, security breaches are widespread in the healthcare market, and they are costly both economically and in terms of brand. It is critical to choose well-trusted providers for big data in the healthcare technologies and to incorporate encryption and authentication measures. It is also critical to safeguard any connected devices on the healthcare system. When required, limit access to particular programmes to preset endpoints only, and restrict the authorised personnel. Organizations must train their employees on data usage guidelines. According to statistics, human error accounted for 31% of data theft in the healthcare business. As a result, it is critical to describe how and where to obtain data safely and safeguard personal mobile devices (if used for work).

2.4. Communication gap and Organizational issues

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Another typical problem of big data in healthcare is misunderstanding between data scientists as well as data consumers. Physicians can struggle to define the data they require and how they prefer to preserve and retrieve it. As a consequence, they will not comprehend the formats developed by data scientists and will resist fully utilising this data and analytics[10]. Big data is transforming the healthcare industry, and then becoming a data-driven organisation necessitates changes in the corporate success as well as the way it makes decisions and does business. It will be impossible to avoid hiring additional employees. Existing personnel will also require training and a time of adaptation. Some businesses may be compelled to rebuild their IT infrastructure, which would incur additional costs and training hours (Figure 2).

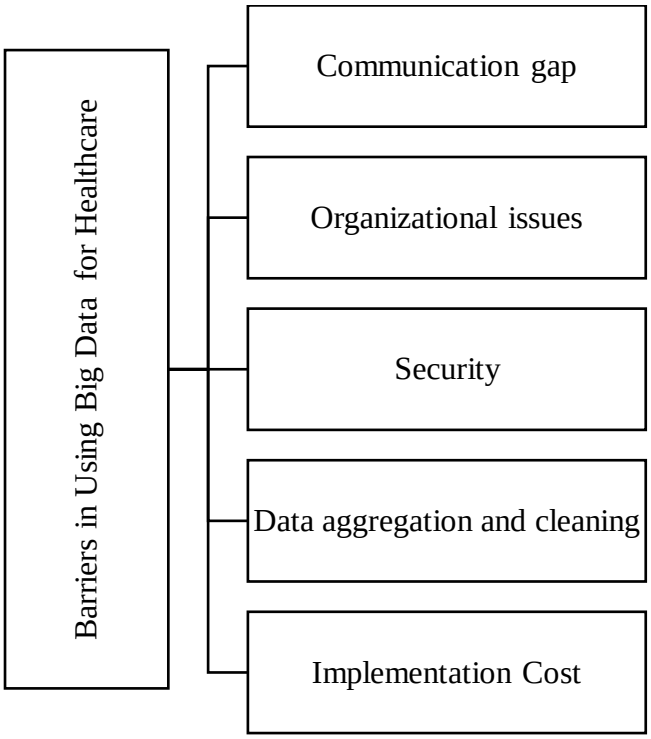

Figure 2: Illustrating the different barriers to the implementation of Big Data for Healthcare.

3. CONCLUSION

Healthcare is starting to undergo a revolution thanks to big data, which provides ways and solutions to both enhance the health of individuals and the efficiency and effectiveness of healthcare institutions. In order to develop the best basis for individualised health optimisation for each person's prevention, diagnostics, and disease treatment, considerable data must still be collected and analysed in a timely manner. In order to realise the full innovation capabilities of information as well as advancement technology on wellness, interested parties must work collaboratively and make adjustments in their design and performance. Accomplishing efficient and commensurate governance of health-related information would be critical to the future healthcare systems.

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