IMPACT OF BIG DATA ANALYTICS IN HEALTH CARE SECTOR

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***Abstract*-The introduction of Big Data Analytics (BDA) in healthcare will allow using new technologies both in treatment of patients and health management. The paper aims at analyzing the possibilities of using Big Data Analytics in healthcare. In the current era of smart phones and wearable devices, vast amount of patient heath data files and sensor data are being generated. Big data Analytics plays a major role in solving issues and challenges that arises in healthcare sector. Big data can handle huge explosion of data which is found in healthcare sector. Everyday petabytes of data are getting generated through various devices, which can be if analyzed can give useful data driven solutions and insights for patient treatment. This paper gives an overview of different application area of big data analytics in Healthcare, challenges and the tools and technologies that could be used in healthcare clouds. Big data can change the healthcare industry and can improve the operational efficiencies, quality of monitoring the clinical trials.**

Keywords--- Big Data, Healthcare, Big Data Analytics,

I. INTRODUCTION

Big data analytics refers to the methods, tools and applications used to collect process and derive insights from varied, high volume of data sets. These data sets may come from a variety of sources, such as web, mobile, email, social media, and networked smart devices. The aim of big data analytics examines large amounts of datato uncover hidden patterns, correlations and othe insights. With current era, it's possible to analyse the data and get answers from it almost immediately – an effort that's slower and less efficient with more traditional business intelligence solutions. Usually, big data is a collection of data from many different sources and is often describe by five V*s* characteristics: Volume, Value, Variety, Velocity and Veracity. Big Data Analytics (BDA) is revolutionizing the healthcare sector by utilizing extensive datasets to enhance decision-making, optimize treatments, and improve patient outcomes. The process involves advanced techniques for managing and analyzing massive volumes of data that traditional tools cannot handle. This can empower physician and patient relationship and actively engage patients in the health- care sector. This paper stats a brief review, how big data analytics to overcome the challenges in an efficient manner in health care sector. . This study provides a context for understanding the significance of Big Data Analytics in healthcare, incorporating insights from the reviewed papers to emphasize its impact and future potential. This paper is organized as follows: Section II gives an overview of Existing methods. Section III describes the research methodology and section IV concludes this paper.

II. LITERATURE REVIEW

The integration of Big Data Analytics (BDA) in healthcare and other sectors has become increasingly significant. KorneliaBatko and Andrzej Ślęzak (2022) explore the implementation of BDA in Polish medical

facilities, emphasizing the transition to a data-driven approach. Their study, which involved a critical review of literature and a survey of 250 medical institutions, highlights how these facilities are increasingly utilizing both structured and unstructured data for administrative, business, and clinical purposes. The findings illustrate a notable shift towards data-centric decision-making, underscoring the benefits of BDA in enhancing healthcare services. Similarly, Srikanth Gangadhara et al. (2018) address the broader challenges associated with big data, noting that traditional data processing tools often fall short when dealing with large and complex datasets. They emphasize the importance of advanced analytical techniques such as predictive analytics and behaviour analysis, which are essential for deriving valuable insights and making informed decisions across various sectors. Additionally, D. P. Acharjya and Kauser Ahmed P (2016) provide a comprehensive overview of the challenges and research issues in big data analytics, detailing difficulties related to data management, storage, and analysis. They also review current tools and techniques, including statistical methods and cloud-based solutions, and call for continued research to develop more effective approaches for handling the complexities of big data. Collectively, these studies highlight the transformative potential of BDA and the need for ongoing innovation to fully leverage its capabilities

III. RESEARCH METHODOLOGY

Healthcare data is generated from various devices and a group of Genomic data, clinical data. Data is in various form semi-structured, unstructured. To process the unstructured data, big data and cloud computing go hand in hand. Open-source cloud platforms like Hadoop, MapReduce are used for the application of big data analytics in healthcare. The healthcare applications operate on and uses terabytes of streamlining data, images, audio, video, textual data, sensor data generated and efficiently processed. Big data analytics is of paramount importance in healthcare aspects like patient

diagnostics, fast epidemic recognition, and improvement of patient management. Application of big data analytics in healthcare in increasing day-by-day as the data that is being generated in the field of healthcare is tremendous. Due to this healthcare sector is moving towards deploying tools and technologies that must cope up with big data. Decision makers in healthcare organizations will be able to take meaningful actions according to the situation based on the insights derived from the big data analytics.There are many opportunities in healthcare sector for big data analytics to enhance the quality of various aspects of healthcare with the implementation of analytical techniques like descriptive, predictive, and prescriptive.

a) Medical diagnosis – Diagnosis of a disease by analyzing previous data may help in diagnosing the disease as an earlier stage and thus also reduce complications during treatment.

b) Community healthcare – Preventive steps must be taken before hand against the predicted risks of chronic disease among population by making people aware about contagious disease outbreaks.

c) Hospital Monitoring – Hospitals can be monitored in real-time that could help government to ensure optimal service quality. d) Patient care – Customized patient care services can be provided by the hospitals using big data analytics to provide rapid relief to the patients.

If there are opportunities in big data analytics in healthcare, then there are few challenges too. The implementation of big data analytics in healthcare has few challenges. Some of the common challenges in the area include:

(a) Initial Investment- It requires a lot of huge investment to deploy the infrastructure required to leverage the benefits of big data.

(b) Quality of Data – As this is an emerging field, so there are less of big data experts.

(c) Quality of insights – The medical healthcare data which is being generated is of poor quality and contains a lot of inconsistencies.

(d) Privacy and Security – It is a serious issue to give access and exposure of patient's data to unauthorized third party such as government agencies, insurance companies.

IV. CHALLENGES FACED BY HEALTHCARE INDUSTRY:

In the current era, Healthcare industry is facing multiple challenges ranging from new disease outbreaks to maintaining optimal operation efficiency. Healthcare sector is rapidly increasing and necessity to manage patient care and innovate medicines has increased. Big Data Analytics can solve these healthcare challenges through the vast amount of data available in the healthcare sector like financial, clinical, R&D, administration and operational data. Here are the few challenges faced by the healthcare industry and ways how Big data Analytics can help and change the scenario

1. Health Tracking – In the world of IOT, basic wearable's can track and detect patients sleep, heart rate, exercise, distance walked etc. i.e., one can track daily reading of these factors.

Apart from these there are new medical innovations that can monitor the patients' blood pressure, pulse Oximeters and many more. The continuous monitoring of the body along with the sensor data collection allows healthcare organizations to keep people out of the hospital as they can identify the potential health issue and can provide care before the situation goes worse.

2. Reducing Cost – Hospitals do not get an idea how many staff members do they require, so they end up booking either over or less staff members. Big Data Analytics can help in saving costs for hospitals. Predictive Analytics can help resolve this issue by predicting the admission rates of patients and help with staff allocation. This will help hospital to utilize their investment to the maximum. Healthcare industry also believes that predictive analytics will save organizations 30% more in annual costs.

3. Assisting High-Risk Patients – If hospital records are digitized, then data can be accessed to understand the pattern of many patients. This would help in understanding the patients who visit the hospital repeatedly, frequently and their chronic issues. This understanding can help hospitals to give patient care better and provide insight into corrective measure to reduce patients' frequent visit to the hospital. This can also help healthcare organizations to keep a list and check on high-risk patients and offer them customized care.

4. Preventing Human Errors – Many times it has been observed that health professionals tend to either prescribe a wrong medicine or dispatch a different medication by mistake to the patients. Big data analytics can help physicians who cater to many patients in a day. Big Data

5. software analyzes user data and the prescribed medicine. This can confirm the data and can approve the prescribed medication to reduce mistakes and save lives.

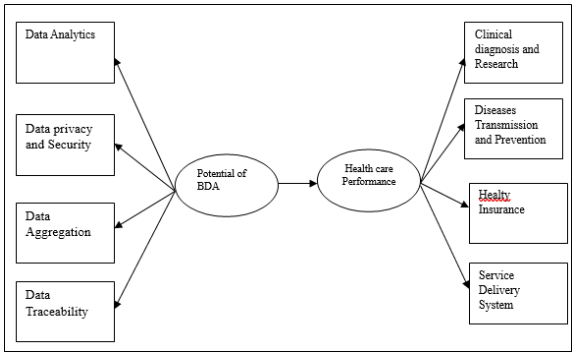
Big Data Analytics can contribute in these areas and can improve the operational efficiency of the industry. Various big data analytics capabilities in the healthcare:

1. Clinical diagnosis and Research: Diagnosis of disease is the major area which need high attention in healthcaremanagement. So much huge volume of data is being generated related to patient-illness details, medication, and treatment schedules etc, this data needs to be analyzed so that it could be transformed into value-added data for improved decision making by the doctors and health experts.

2. Health Insurance – It covers the medical claims of a person incurring medical expenses. Predictive analytics is used to identify the need for having medical coverage. This also helps to understand the organizations the disparity that exists in the society in health coverage. Blockchain technology offers the traceability and offers a significant role in the health insurance domain.

3. Service delivery system – Various health workers are the input to the health system that determines the quality- of-service delivery. They ensure that the system must meet the minimum quality standards. It is essential to identify the most relevant quality indicator and monitor the efficiency of healthcare system.

Fig.1. Framework: Big Data Analytics in HealthCare Sector



IV. CONCLUSION

A systematic review is aimed to investigate the applications, benefits, challenges of implementing big data analytics in healthcare. Many research articles are reviewed and analyzed thoroughly. The study highlighted that BDA plays a vital role in improving the performance of healthcare organization operations. Big data Analytics in healthcare is evolving as a promising field for providing insights from very large datasets and improving outcomes while reducing costs. Implementing healthcare analytics with efficient organizations, streamlining and analysis of big data will ensure accurate diagnosis of disease, reduction in cost and mistakes, appropriate Medicare treatment and would be very beneficial for the overall healthcare delivery. But the major challenge that hinders the implementation of big data in healthcare is the data privacy, data security concerns of data. BDA should look forward for removing these loopholes using more advanced tools and technologies. The basic aim of this paper is to discuss the role of big data tools and technologies in healthcare. Required tools and technologies of big data will accelerate the progress of health sector and will provide results for analyzing massive amount of data.

REFERENCES

[1]. Sachin S. Kamble, Angappa Gunasekaran, Milind Goswami & Jaswant Manda[2018], "A systematic perspective on the applications of big data analytics in healthcare management", International Journal of Healthcare Management.

[2]. Nishita Mehta, Anil Pandit[2018], "Concurrence of big data analytics and healthcare: A systematic review", International Journal of Medical Informatics.

[3]. Kornelia Batko and Andrzej Ślęzak, "The use of Big Data Analytics in healthcare", Journal of Big Data volume 9, Article number: 3 (2022).

[4]. Srikanth Gangadhara "A review paper on big data analytics with its applications", Journal of Emerging Technologies and Innovative Research.

[5]. D. P. Acharjya and Kauser Ahmed P, "A Survey on Big Data Analytics: Challenges, Open Research Issues and Tools", International Journal of Advanced Computer Science and Applications(IJACSA), Volume 7 Issue 2, 2016.