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# BIG DATA IN HEALTH CARE : Management, Analysis and Future Potential

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***Abstract***— 'Big Data is a vast body of knowledge that has amazing potential. Because the topic has so much untapped potential, it is now of utmost relevance. Various governmental and corporate sectors use this big data to create, analyse, and store information for a variety of purposes. To maintain track of medical examinations, hospital records, patient records, etc. as well as information about the tools used in hospitals for diagnosis, numerous big data resources are employed in the healthcare sector. Another important source of big data pertinent to public healthcare is biomedical research. To get useful information from this data, it must be managed and analysed properly. If not, using big data analysis to discover a solution quickly resembles trying to find a needle in a haystack.

**Keywords:** Healthcare, Biomedical research, Big data analytics,,Personalized medicine, ventures

## 1. INTRODUCTION

Information is the basis for new ideas and improved structure. We constantly need rigid facts to build upon in order to generate anything new. Making the distinction between the universe's old and new phases is made easier by having reliable knowledge. Because of this, gathering data is a crucial responsibility today. Large organisations used to preserve records of data in the past, but today tiny businesses are producing data for their convenience. We can track the current situation using data, and we can also predict the future using data that has already been collected. As a result of today's organisations' data overload, managing mountains of data is becoming increasingly challenging. So, organizations are facing data deluge.

Even if it is difficult for the corporations to handle the data, technology advancements have helped us generate an increasing amount of data. As a result, the term "Big Data," which aids in managing

massive and unmanageable data, was developed. It's necessary to create fresh approaches to organize and obtain significance accurate information For the big data that has been stored, social demands must be met. Healthcare, like any other industry, is collecting data at a phenomenal rate that simultaneously offers both benefits and issues.

## 2.BIG DATA SYSTEM

Big data, as the term implies, cannot be managed by conventional software or web-based platforms. It overburdens and exceeds the capabilities of conventional software in terms of data storage, processing, and analytical capacity. There are many definitions of big data, but Douglas Laney's is the most well-known and widely accepted. He saw that big data is continuously flowing in three areas: volume, speed, and variety (commonly known as 3 Vs). Volume makes up a significant portion of big data. Its description also mentions velocity and variety in addition to volume. Velocity refers to the pace at which data is acquired, or the speed at which data is being gathered and made available for use in the future. Big data diversity refers to the type of data gathered.

Big data has recently gained enormous popularity across the globe. Big data is being produced and analysed for a variety of objectives in almost every field of research, whether it is in industry or academia. Managing organised and unorganised data is the most difficult challenge associated with big data. Such large amounts of data are too much for conventional software and other systems to handle. Therefore, in order to manage such massive amounts of data, we need specialised software and applications. To make sense of this massive volume of data, it would be necessary to implement revolutionary fusion techniques and artificial intelligence (AI) algorithms. Automated decision-making with the application of machine learning (ML) techniques like neural networks and other AI approaches would be a major accomplishment.

However, managing huge data will be difficult without such software and technology. In order to manage data and turn it into actionable insights, we need to create better procedures and web applications. Big data information and insights can be used to inform important social decisions if the right analytical and storage tools are at hand.

## 3. LITERATURE SURVEY Healthcare as big respository

A multifaceted system called healthcare was created with the sole purpose of preventing, diagnosing, and treating human health problems or impairments. Health experts (physicians or nurses), healthcare facilities (clinics, hospitals for the delivery of medications and other diagnosis or treatment technologies), and a funding institution supporting the first two are the main parts of a healthcare system. The health professionals work in a variety of fields related to health, including nursing, psychiatry, physiotherapy, dentistry, and many more. Various levels of healthcare are necessary depending on how urgent the

problem is.

The first point of contact for primary care, skilled professional acute care, sophisticated medical investigation and treatment, and extremely rare diagnostic or surgical treatments are all provided by professionals (quaternary care). Health professionals are in charge of various types of information, including patient medical history (information pertaining to diagnoses and prescriptions), medical and clinical data (such as data from imaging and laboratory examinations), and other private or individual medical information, at each of these levels.

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Historically, either handwritten notes or typed reports were used to keep such medical records for a patient. Even the outcomes of medical exams were kept in a paper filing system. The earliest case records for this procedure may be found in an Egyptian papyrus document from 1600 BC, proving that it has been around for a very long time.

The clinical case records "freeze the episode of disease as anovel in which patient, family, and the doctor are a part of the storyline," in the words of Stanley Reiser.

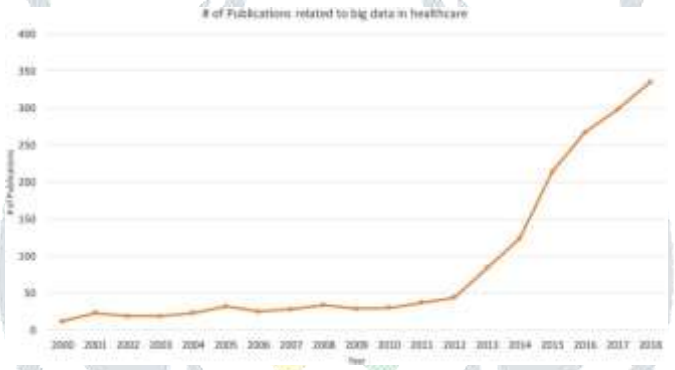
**How Big data works in biomedical research?**

A biological system, like a human cell, demonstrates complex molecular and physical interactions. A biomedical or biological experiment typically collects data on a smaller and/or simpler component in order to understand the interdependencies of numerous components and events of such a complex system. As a result, it takes several reduced trials to produce a comprehensive map of a particular biological phenomenon of interest.

This suggests that the more data we have, the greater our comprehension of biological processes will be. This concept has greatly accelerated the development of current approaches.


Figure 1. Working Flow big

Consider the volume of data that has been produced since the application of effective technologies like next-generation sequencing (NGS) and genome-wide association studies (GWAS) to the decoding of human genetics. NGS-based data enables access to previously unreachable depths and significantly transforms the experimental setting.



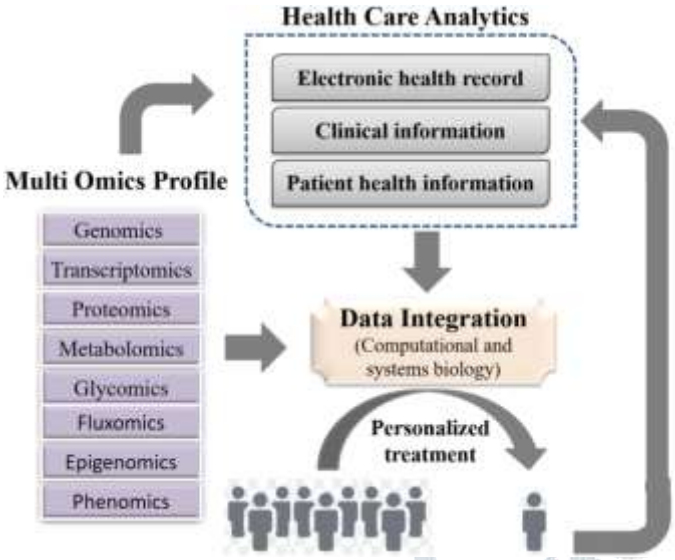
The '-omics' era was ushered in by the notion that enormous data sets can give us a significant amount of information that is frequently concealed or unrecognised in smaller experimental approaches. The field of "omics" has advanced significantly since researchers can now investigate an organism's entire "genome" in "genomics" investigations in a certain amount oftime rather of just one "gene." Similarly, under "transcriptomics" investigations, we may now investigate the expression of all the genes or the complete "transcriptome" of Big data analytics are now used in healthcare and clinical practises as the modern healthcare community has recognised the potential of big data. Supercomputers and quantum computers are assisting in rapidly reducing the time it takes toextract meaningful information from massive data.

Approaches, and discovering and mitigating big data-related fraud. The handling, sharing, and security of private data are among the federal concerns that almost all of them have to contend with.

Researchers are diving into biomedical big data despite the infrastructure challenges in the hopes of uncovering fresh and useful knowledge that can advance the current state of healthcare services. A fresh and original approach to the analysis of healthcare big data includes clinical trials, the combined analysis of pharmacy and insurance claims, and the or occurrence. In order to achieve new ideas, one frequently finds

themselves evaluating a significant amount of data gathered from several studies. A steady increase of publications on the use of big data in healthcare attests to this fact (Fig. 2). The analysis of such large amounts of data from the medical and healthcare systems can greatly aid in the development of new healthcare policies.

The most recent technical advancements in data gathering, collection, and analysis have increased hopes for an impending revolution in customised medicine.




## 4. Conclusions and potential outcomes

Today, a variety of biomedical and healthcare instruments provide a large amount of data, including smartphone apps, mobile biometric sensors, and genomics. We must therefore be aware of and evaluate what can be accomplished with this data. For instance, the study of such data can offer new perspectives on how to enhance healthcare by procedural, technical, medical, and other means. A examination of these medical practises suggests that patient-specific medical specialties or customised medicine are currently being used to their full potential. The study of EHRs, EMRs, and other medical data using big data in combination is continually improving the prognostic framework.

The businesses offering clinical transformation and healthcare analytics services do help to provide better and more productive results. These businesses share objectives such as lowering analytics costs, creating powerful Clinical Decision

Several reputable consulting firms and healthcare organisations have correctly predicted that the big data healthcare business will expand exponentially over the coming years but in a short period of time, we have seen a variety of analytics in use that have had a big impact on how the development of biomarkers. The discrepancy between structured and unstructured data sources is exploited by big data analytics. The transition to an integrated data environment is a recognised challenge. It's interesting to note that the big data tenet stronglyrelies on the notion that the more information available, themore insights can be drawn from it and predictions can be madeabout what will happen in the future.

Healthcare business makes decisions and performs. Experts in computational design have been compelled to

develop novel methods to evaluate and understand such vast amounts of medical data within a set timeframe due to the exponential growth of medical data from many disciplines.

Data scientists now have a problem in carefully integrating and putting into practise the large number of medical data that has been gathered across disparate platforms. Therefore, it is argued that a further healthcare revolution is required to combine bioinformatics, health informatics, and analytics to support customised and more effective treatments.

In order to generate relevant information, it is also necessary to comprehend the kind (structured, semi-structured, unstructured), complexity (dimensions and attributes), and volume of the data. Big data's boundless potential is its greatest value. The emergence and adoption of big data within the last few years has resulted in significant breakthroughs in the medical field, from the management of medical data to drug discovery programmes for difficult-to-treat human diseases including cancer and neurological disorders.

Big data, contrary to popular belief, will complement and strengthen the current pipeline of medical advancements rather than displace skilled labour, subject matter experts, and intellectuals. It is easy to see how the health care business has changed from a larger volume base to a tailored or individual particular area. Technologists and other professionals must therefore comprehend this changing environment.

Big data analytics are predicted to advance toward a predictive system in the upcoming year.

This would entail forecasting future developments in a person's health on the basis of recent or existing information (such as EHR-based and Omics-based).

Similar to this, it may be assumed that structured data gathered from a certain area may result in the creation of population health data. Together, big data will improve healthcare by enabling epidemic prediction (in relation to population health), delivering early disease condition alerts, and assisting in the identification of innovative biomarkers and clever therapeutic intervention tactics for a higher standard of living.

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