Survey on Artificial Intelligence on Healthcare

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ABSTRACT: Artificial intelligence has emerged as a breakthrough technology that is changing various sectors with healthcare being one of the biggest beneficiaries. This paper explores how artificial intelligence is transforming healthcare, looking at its uses, advantages and future prospects. The use of AI in health care ranges from personalized treatment planning, drug discovery and predictive analytics to medical imaging interpretation and administrative workflow optimization, thus enabling medical experts to make well-informed decisions aimed at improving patient outcomes. One of the most significant benefits of artificial intelligence in medicine is its potential to improve diagnostic accuracy and speed. Diagnostic tools run on AI platforms can identify irregularities and patterns on medical images at greater precision and faster rate than humans can do. This has made it possible to detect diseases like cancer, cardiovascular diseases as well as neurological disorders earlier than before hence offering prompt interventions with a better prognosis for patients. In terms of the future, artificial intelligence in healthcare has enormous potential to transform disease detection, treatment optimization, and the provision of healthcare. Technological developments in deep learning, natural language processing, and federated learning are expected to increase the potential of artificial intelligence systems in healthcare industry. In conclusion, artificial intelligence is a game-changer in the healthcare industry, presenting endless opportunities to advance clinical judgment, optimize patient care, and improve patient outcomes., Focused work on developing ethical AI and collaborative innovation can unlock the full potential of AI in shaping the future of healthcare.

KEY WORDS: Artificial intelligence, healthcare, drug discovery, diagnostic accuracy, disease detection, cancer.

I.INTRODUCTION

Healthcare is one of the most critical sectors in the broader landscape of big data because of its fundamental role in a productive, thriving society. The application of AI to healthcare data can literally be a matter of life and death.

Artificial Intelligence (AI) is revolutionizing healthcare by transforming how medical services are delivered and patient outcomes are improved. With the ability to analyse vast amounts of medical data, AI algorithms assist healthcare professionals in making accurate diagnoses, creating personalized treatment plans, and predicting potential health risks. In medical imaging, AI enhances the interpretation of scans and images, aiding in the early detection of diseases such as cancer. Moreover, AI-driven predictive analytics help in identifying patterns and trends in patient data, enabling proactive interventions and preventive care strategies. Virtual health assistants powered by AI provide round-the-clock support to patients, offering guidance on managing their health and accessing healthcare services. Administrative tasks are also streamlined through AI automation, reducing paperwork and optimizing resource allocation. Overall, AI in healthcare is driving improvements in efficiency, accuracy, and accessibility, ultimately leading to better patient care and outcomes. As a result, AI can play a crucial role in global public health as a tool for combatting epidemics and pandemics.

II. TECHNOLOGY IN HEALTHCARE

Technology in healthcare encompasses a wide range of innovations and advancements aimed at improving patient care, enhancing clinical outcomes, and optimizing healthcare delivery. This includes medical devices, telemedicine platforms, electronic health records (EHRs), wearable sensors, artificial intelligence (AI), and robotics, among others. Medical devices such as MRI machines, CT scanners, and robotic surgical systems enable precise diagnosis and minimally invasive treatments. Telemedicine platforms facilitate remote consultations, allowing patients to access healthcare services from anywhere, while EHRs digitize patient records, streamlining information sharing among healthcare providers and improving care coordination. Wearable sensors and remote monitoring devices enable continuous health monitoring, empowering patients to take control of their health and facilitating early intervention for potential health issues. AI technologies analyse vast amounts of healthcare data to assist in diagnosis, treatment planning, and predictive analytics, while robotics automate repetitive tasks in healthcare settings, freeing up healthcare professionals to focus on patient care. Overall, technology plays a crucial role in driving innovation and improving outcomes in healthcare, leading to more efficient, accessible, and patient-centred care.
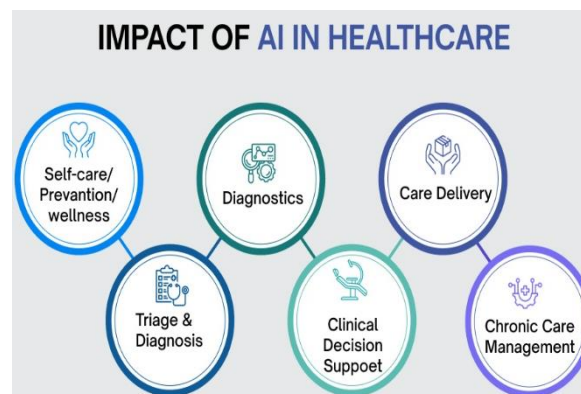
III. RISE OF AI IN HEALTHCARE

The rise of AI in healthcare has been a gradual yet profound evolution, driven by a convergence of technological advancements, increasing computational power, and a growing recognition of the potential benefits AI can offer to the healthcare industry. Artificial intelligence (AI) is rapidly transforming the healthcare industry in India, bringing unprecedented tools for diagnosis, treatment and patient care. AI expenditure in India is expected to reach $11.78 billion by 2025 and add $1 trillion to India's economy by 2035, as per a World Economic Forum report. The AI in Healthcare Market is projected to grow from $14.6 Billion in 2023 to $102.7 Billion by 2028. Initially, AI applications in healthcare focused on medical image analysis, such as the interpretation of radiological scans, which laid the foundation for further exploration and development. As AI algorithms became more sophisticated and capable of handling complex data sets, their utility expanded to encompass predictive analytics, personalized treatment recommendations, and administrative task automation. Moreover, the proliferation of electronic health records (EHRs) and the digitization of healthcare data provided a rich source of information for AI-driven insights and decision-making. Additionally, collaborations between healthcare institutions, technology companies, and research organizations have accelerated the adoption of AI in healthcare, fostering a culture of innovation and collaboration. As AI technologies continue to advance and demonstrate their efficacy in improving patient outcomes and operational efficiency, their integration into healthcare systems is poised to become increasingly widespread and transformative.
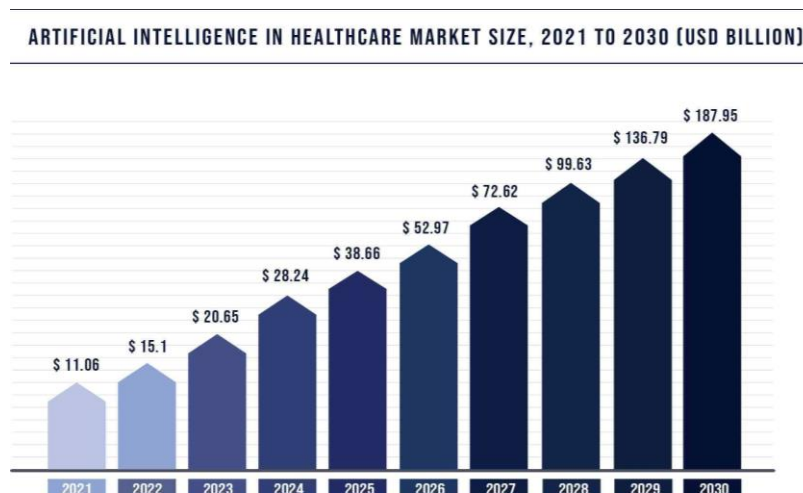
Fig 3.1 Growth of AI in Healthcare market
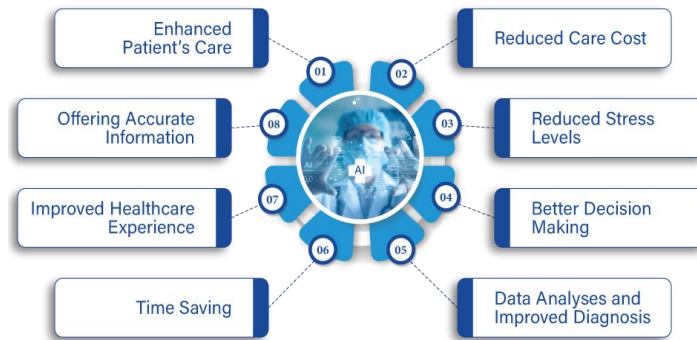
IV. IMPACT OF AI IN HEALTHCARE

The impact of AI in healthcare is profound, reshaping the landscape of medical practice and patient care. One of its most significant contributions lies in diagnosis and treatment, where AI algorithms analyse diverse medical data with unparalleled accuracy, aiding clinicians in making faster and more precise diagnoses. This leads to tailored treatment plans that optimize patient outcomes. Additionally, AI enhances patient care through remote monitoring and virtual health assistants, providing continuous support and guidance beyond traditional healthcare settings. Operationally, AI streamlines administrative tasks, freeing up healthcare professionals to focus on patient care while also optimizing resource allocation and reducing costs. Furthermore, AI fuels medical research and drug discovery by analysing vast datasets to identify patterns and correlations, leading to breakthroughs in understanding disease mechanisms and developing more effective therapies. Overall, the impact of AI in healthcare is multifaceted, promising improved patient outcomes, enhanced efficiency, and continued innovation in the field.

Fig 4.1 Impact of Healthcare

V. ADVANTAGES OF AI IN HEALTHCARE

Artificial Intelligence offers numerous advantages in healthcare, revolutionizing the industry in various ways:

A. Enhanced Diagnostics: AI algorithms are able to accurately interpret medical pictures, including MRIs, CT scans, and X-rays. This helps healthcare providers identify irregularities and diagnose diseases earlier than they would have using traditional approaches.

B. Personalized Treatment Plans: AI can assist in developing personalized treatment plans that are suited to each patient's requirements by evaluating patient data and medical records.

C. Efficient Administrative tasks: By automating administrative processes like appointment scheduling, insurance claim processing, electronic health record management, and invoicing, AI-powered technologies can free up healthcare workers' time for more crucial patient care duties.

D. Drug Development: Artificial intelligence algorithms have the capacity to evaluate enormous volumes of chemical and biological data, which can speed up the process of finding new drugs. This may result in a more rapid and economical identification of possible therapeutic candidates.

E. Reducing Medical Errors: Artificial intelligence systems can help healthcare professionals diagnose and treat patients more accurately, which lowers the chance of medical errors and enhances patient safety.

F. Cost Reduction: AI has the ability to lower healthcare expenses for both parties by automating jobs, increasing productivity, and assisting in the early diagnosis and prevention of diseases.

Fig 5.1 Benefits of AI in Healthcare

VI. APPLICATIONS OF AI IN HEALTHCARE

A. <u>Virtual Health Assistants</u>: Virtual health assistants are responsible for a number of things, including responding to the queries of routine patients via calls and emails, managing medical information of the patients and covering sensitive data, scheduling appointments with doctors, sending follow-ups and clinical appointment reminders to the patients, etc. Overall offering the patient a personalized experience

B. <u>Health monitoring & wearables</u>: Wearables monitor physical parameters, such as strain, pressure, temperature, heartbeat, and other biological variations in the body. Additionally, the AI-powered devices equipped with smart sensors can help in early diagnostics, remote patient monitoring, managing chronic conditions, and in some cases, can assist in handling emergency health issues.

C. <u>Early Diagnosis of Fatal Blood Diseases</u>: Artificial Intelligence proves to be of immense help when it comes to diagnosing possibly fatal blood-related diseases at an early stage. With the help of AI-enhanced microscopes, doctors are now able to scan for harmful substances and bacteria in samples of blood, such as Staphylococcus, E. coli, etc., at a much faster rate compared to the speed in manual scanning.

D. <u>AI in Gene Editing</u>: CRISPR-Cas9 is an emerging technology in the healthcare domain, CRISPR-Cas9 can edit the DNA sequences to correct defects in genes and treat diseases. It can also predict the genetic alterations associated with the diseases and thereby reduce the risk of ineffective treatment and false diagnosis for patients with different genetic diseases

E. <u>Development of New Medicines</u>: Coming up with new drugs for clinical trials takes a lot of time and money. The unique benefit of Artificial Intelligence technology allows healthcare professionals to scan pre-existing medicines and use them to redesign medication in a way that allows them to fight against specific diseases. This makes it cheaper to develop new drugs.

F. <u>Robot-assisted Surgery</u>: Robot-assisted surgery has gained a lot of popularity recently. Several hospitals are implementing robotics that assists them in completing tasks that require precision, control, and flexibility. It is used in tasks, including open-heart surgery, exceeding human capabilities.

Fig 6.1 Health monitoring & wearables
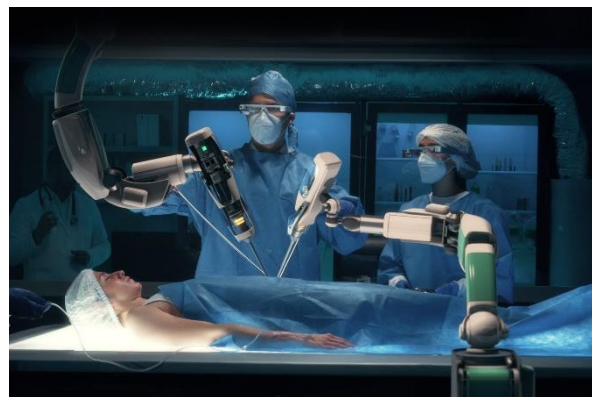
Fig 6.2 Robot assisted Surgery

VII. Patient Experience

The integration of AI into healthcare can also greatly enhance the patient experience by streamlining appointment scheduling, providing remote monitoring solutions, and offering personalized treatment plans based on individual medical records. Chatbots can respond to routine medical inquiries and provide guidance on when patients should seek professional care. This helps minimize stress and saves time for both patients and healthcare providers. In a discussion held at the HIMMS conference of March of 2023, industry leaders discussed AI's role in "bringing affordable healthcare to the doorsteps of individuals who live in areas with poorly equipped health care systems. Today, smartphones have the capacity to be equipped with electrocardiogram and ultrasound functionalities that can be utilized in impoverished areas for diagnostic purposes." Helping to not only improve patient care but also expand patient access.

VIII. Future Scope of AI in Healthcare

In the upcoming years, hybrid models where professionals receive support for diagnosis, risk factor detection, and treatment planning but retain ultimate responsibility for patient care will present valuable potential for AI in healthcare. By analysing the risk involved, this would make it easier for doctors and patients to use these tools, and it would also make it easier for healthcare professionals to achieve operational efficiency and quantifiable progress in patient outcomes. Despite the

aforementioned difficulties, artificial intelligence (AI) is taking over this sector and will eventually help healthcare providers by lessening their workload. AI is also getting better at identifying people from a distance who cannot afford to visit large hospitals. It would be simple to expand the effective medical services to underdeveloped areas. There is still more work to be done in AI, but the future of AI in this sector appears bright, feasible, and exciting.

IX. CONCLUSION

With the introduction of more innovative and new generation AI tools, healthcare is more advanced in the sense of more awareness, efficiency in delivering care, identification of developing complications, accurate diagnosis of diseases ahead of time, and most recent approaches for interventions. With AI being found in every industry today, integrating AI development to develop products from scratch or in the existing healthcare products need an expert intervention. Partnering with an AI development company can help healthcare leaders build new products, integrating the power of AI. It opens up gateways to individualized treatment approaches tailored to the needs of individual patients. It offers multiple advantages over traditional analytics and other clinical decision-making tools. Data becomes more precise and accurate allowing the healthcare industry to have more insights into the diagnosis and treatment processes thereby improving patient outcomes. AI can bring an era of exceedingly high clinical quality with extraordinary breakthroughs in the care of patients.

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