ARTIFICIAL INTELLIGENCE IN HEALTHCARE

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Abstract : the research paper "ARTIFICIAL INTELLIGENCE IN HEALTHCARE" is aimed at discovering and sharing knowledge about the possibilities, implementations and applications of AI in the healthcare industry. Artificial Intelligence is the major technology that evolves industries and bring about crucial changes. AI can easily manage very high volumes of data, process the information seamlessly and handle repetitive tasks efficiently. Although efforts to incorporate AI into the healthcare field has been in motion since the seventies, technology and AI is still severely under utilized. AI can provide services like medical imaging, virtual assistants, medicine development, diagnosis, clinical decision support, early diagnosis and much more. This paper also includes information about various existing AI technologies such as expert systems, trained chat models, pattern recognition algorithms and AI s. It is also focused on major companies and the services offered by their artificial intelligence. The future scope of Artificial Intelligence in healthcare is also summarised within this article.

IndexTerms- **Artificial Intelligence, Healthcare, Lack of I, Applications, AI Technologies, Mycin, PathAI, Future scope.**

INTRODUCTION

Artificial intelligence (AI) has been revolutionising a number of industries, and the healthcare industry has recently paid a lot of attention to it. By enhancing patient outcomes, boosting efficiency, and cutting costs, AI technologies like machine learning, natural language processing, and computer vision have the potential to revolutionise healthcare. AI-based tools can help medical professionals with a range of tasks, including patient monitoring, drug development, and treatment planning. Personalized medicine can also be made possible by AI-powered tools that analyse vast amounts of patient data to create custom treatment plans for each patient. The use of AI in healthcare does, however, bring up a number of ethical, governmental, and social issues that must be resolved. We will examine the various applications of AI in healthcare in this research paper, the advantages, difficulties, and potential future effects on the healthcare sector of its integration. We will also talk about the ethical, legal, and social ramifications of AI in healthcare, as well as the need for rules and guidelines to ensure that these technologies are used responsibly.

ARTIFICIAL INTELLIGENCE

The study of artificial intelligence (AI), a subfield of computer science, aims to build machines that are capable of learning, solving problems, seeing the world, making decisions, and interpreting natural language—all functions that are traditionally only performed by intelligent species like humans.

Rule-based systems, machine learning systems, and neural networks are the three groups into which AI systems can be divided. Rule-based systems function by adhering to a predetermined set of rules, but machine learning systems learn from data and gradually improve their performance. A form of machine learning system called neural networks imitates the structure and operation of the human brain.

Natural language processing, computer vision, robotics, and expert systems are a few of the many subfields of AI. The process of teaching computers to comprehend and produce human language is known as natural language processing. Computer vision is the process of teaching computers to comprehend visual data, such as pictures and films. Robotics entails creating and programming machines to carry out tasks in the real world. Developing computer programmes with decision-making and advice-giving capabilities is called an expert system.

AI has a large scope in a various industries, including healthcare, banking, education, transportation, and entertainment. AI systems, for instance, can be used in the healthcare industry to identify ailments, create treatment plans, and evaluate medical pictures. AI systems can be applied to trading, credit risk analysis, and fraud detection in the financial sector.

HEALTHCARE

The maintenance and enhancement of a person's physical and emotional well-being through medical diagnosis, treatment, and injury or disease prevention is referred to as healthcare. It entails a range of tasks and services carried out by healthcare specialists, including medical practitioners, nurses, therapists, and other allied health specialists who collaborate to ensure the well-being of their patients. Preventive care, primary care, specialist care, emergency care, and long-term care are just a few of the many services that make up healthcare. The purpose of healthcare is to increase people's quality of life, increase their life expectancy, and lessen the impact of illness and disability on society.

LACK OF AI & TECHNOLOGY IN HEALTHCARE

Despite the advantages, healthcare currently lacks the usage of artificial intelligence (AI) and other cutting-edge technology. This is partially because adopting these technologies in a complicated and heavily regulated business is difficult. Concerns about data privacy and the possibility of AI taking the role of human therapists are also present. Lack of standards in data gathering and storage is another issue. To be effective, AI needs a significant amount of high-quality data, because inadequate or erroneous data can provide biassed or wrong predictions. Concerns about data security and privacy also exist. Medical data must be shielded from cyberthreats and breaches since it is extremely sensitive. The employment of AI also brings ethical questions about informed consent, accountability, and openness. The expense of implementing AI in healthcare presents another difficulty. Although AI has the potential to eventually lower healthcare expenses, there may be a large upfront cost. Also, different healthcare practitioners can have different levels of access to AI technology, which could exacerbate already-existing healthcare inequalities. Additionally, patients and healthcare professionals are not sufficiently informed about AI and its potential uses. As a result, people may be reluctant to shift and adopt new technologies.

APPLICATIONS OF AI IN HEALTHCARE

In recent years, artificial intelligence (AI) has proliferated across the healthcare sector. It is a technology that can aid medical practitioners in diagnosing and treating patients more quickly and correctly, improving patient outcomes. Several of the most important uses of AI in healthcare are listed below:

Medical Imaging: AI can aid in the analysis and interpretation of medical imaging such as X-rays, MRI scans, and CT scans by radiologists and other healthcare professionals. The ability to immediately spot possible problems that a human eye might miss enables doctors to detect diseases like cancer at an earlier stage.

EHR Traversal: It can be difficult to traverse electronic health records (EHRs), which are digital representations of a patient's medical history. AI can assist physicians in properly and rapidly extracting pertinent data from these records, lowering the possibility of an inaccurate diagnosis or course of therapy.

Drug Development: By analysing enormous volumes of data, AI can assist researchers in more swiftly and precisely identifying possible medication candidates. It can speed up the process of discovering novel drugs and cut down on the time and money required to bring them to market.

Customized Treatment: To develop individualised treatment recommendations, AI can examine patient information, such as medical history, genetics, and lifestyle factors. Better patient outcomes and more efficient therapies may result from this.

Virtual assistants: AI-powered virtual health assistants can aid patients with common healthcare activities like making appointments and managing their medications. They can also answer queries and offer people medical advice.

Clinical Decision Support: By evaluating patient data and offering treatment recommendations, AI can assist clinicians in making better judgements. Based on previous results, it can advise doctors on the best course of action and warn them of any problems or consequences.

AI TECHNOLOGIES

I. MYCIN AI: The first expert system, known as Mycin AI, was created in the 1970s at Stanford University. Mycin AI was created to help doctors identify and cure bacterial infections by making suggestions based on the patient's symptoms and medical background. Edward Shortliffe, Bruce Buchanan, and their Stanford University team created the Mycin system. The foundation of the system was the idea that rules and algorithms might reflect medical knowledge and be applied to patient data. Rule-based reasoning, heuristic search, and pattern recognition were only a few of the AI methods used by the Mycin system. It showed off AI's capabilities and paved the door for the creation of new and advanced medical expert systems.

II. CADIAG AI: A healthcare technology startup called Cadiag AI focuses on creating artificial intelligence (AI) and machine learning (ML) tools for making diagnoses and decisions in medicine. The company's platform is made to help medical professionals, especially those treating cardiovascular disease, diagnose and treat a range of medical disorders. The algorithms used by Cadiag AI evaluate patient

data to spot potential health problems using cutting-edge imaging methods like computed tomography (CT) scans and magnetic resonance imaging (MRI). The technology developed by the company is also intended to detect cardiovascular disease risk factors, such as excessive blood pressure and abnormal cholesterol levels. The platform from Cadiag AI offers a number of uses in the field of cardiology, including the ability to identify coronary artery disease, forecast cardiovascular risk, and help plan surgical procedures. Cadiag also has a lot of scientific proofs to back it up.

III. PATH AI: PathAI is a Boston-based healthcare technology company that specializes in providing artificial intelligence (AI) and machine learning (ML) tools to increase the precision and effectiveness of pathology diagnostics. PathAI was founded in 2016 by Dr. Andrew Beck and Dr. Aditya Khosla, who are both experts in the field of machine learning and computer vision. A sizable collection of annotated pathology images serves as the foundation for the company's platform, which is utilised to train deep learning models for the analysis of tissue samples. The technology developed by PathAI has numerous uses in pathology, such as the detection of rare diseases and genetic anomalies as well as the diagnosis and treatment of cancer. The business has capital from more than $300 million and collaborations with top healthcare and pharmaceutical businesses. Overall, using AI and ML techniques, PathAI has the potential to greatly enhance pathology research and diagnosis.

Others include:

WATSON: IBM created Watson, a machine learning and natural language processing system for analysing and interpreting massive volumes of data. It has been used to a number of industries, including finance and healthcare.

SOPHIA: Sophia is a humanoid robot created by Hanson Robotics that interacts with people and completes tasks using machine learning and natural language processing.

DeepPatient: DeepPatient is an artificial intelligence programme created by Mount Sinai Hospital that analyses electronic medical records and forecasts patient outcomes.

DeepMind Health: A division of DeepMind dedicated to applying AI to enhance healthcare outcomes, including creating algorithms to aid in disease detection and treatment.

FUTURE SCOPE OF AI IN HEALTHCARE

The potential application of AI in healthcare is vast and has the ability to completely transform the sector. Medical diagnosis and decision-making is one of the areas where AI can have a big impact. Large patient data sets can be analysed by AI algorithms, which might reveal insights that humans might overlook and help with diagnosis and decision-making. A person's medical history, genetics, and way of life can all be taken into account by AI to generate individualised treatment programmes that are tailored to the patient's particular requirements. Another application of AI in healthcare is predictive analytics. To find trends and forecast the likelihood of specific health outcomes, such as the risk of getting certain diseases, AI algorithms can examine enormous volumes of data. By using massive datasets to identify possible therapeutic targets and forecast the effectiveness of new medications, AI can also speed up the discovery and development of novel treatments. Additionally, AI-enabled wearables and other gadgets can monitor patients in real-time, giving healthcare providers ongoing data and warning them of potential health problems. In general, incorporating AI into healthcare offers the potential to enhance patient outcomes, boost productivity, and cut costs. Healthcare practitioners may make better decisions, offer more individualised treatment approaches, and enhance patient care with the use of AI.

CONCLUSION

In conclusion, the use of Artificial Intelligence in healthcare has grown rapidly in importance over time and has the potential to fundamentally alter and transform how care is delivered. AI has the potential to enhance patient outcomes, lessen medical errors, and boost the effectiveness and precision of healthcare systems. Additionally, it can help with the research and development of new medications. But there are also difficulties and issues that need to be resolved, such as ethical issues, privacy issues, and the possibility that AI will exacerbate already-existing healthcare inequalities. Although AI may not replace humans in the medical field any time in the near proximity, it cannot be ensured for the future. As AI develops, it's critical to make sure that its application is done so responsibly, ethically, and with an eye towards enhancing patient outcomes and fostering universal access to healthcare. Proper and thoughtful innovations and implementations of AI in healthcare will allow AI to make our lives so much easier.

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