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Artificial Intelligences Role in Healthcare

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Abstract

Artificial intelligence (AI) is the computational understanding and production of intelligent things Computer science branch. AI is becoming a popular computer science discipline since it improves human existence. AI has outperformed humans in various areas, and healthcare is a promising one. AI may improve illness prevention, diagnosis, and therapy. Cancer, neurology, cardiology, and diabetes utilise AI. This study provides a healthcare AI overview. AI has shaped this sector. The rise of healthcare data and analytics technologies has changed healthcare. Support vector machines, deep learning neural networks, and natural language processing handle structured data. NLP processes unstructured data. Healthcare AI status is reviewed. AI can also quickly and accurately identify patient safety issues including suboptimal treatment or hospital-acquired disease. A few active AI healthcare research projects show a more cohesive, human-centered future. This study will also examine how AI and machine learning might assist specific patients save their lives.

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Introduction

Healthcare has lately relied on AI. AI has improved healthcare. "Will AI replace Doctors in the future?" is also debated. It's unlikely soon. It aids regional clinical decision-making. The expanding availability of medical care information and the quick development of massive data investigation tools have helped appropriate AI applications in medical services. When driven by appropriate clinical queries, practical AI algorithms may locate clinically usable information in enormous volumes of data, aiding clinical decision-making[1].Doctors and health administrations under tremendous strain due to changing demographics, logistical demands, faculty shortages, rising morbidity, and data innovation interest and standards.

Artificial intelligence in medicine and clinical research is becoming increasingly visible. The research found AI-enabled health solutions promising. Governments and innovation groups are investing in clinical AI [2]. AI-assisted medical devices are a priority for the FDA. AI-powered medical services delivery may affect medical services organisation, clinical decision help, patient follow-up, and medical care interventions. Innovative healthcare services use cutting-edge technology like cloud computing, iot, and AI to provide a more productive, helpful, and customised medical services framework. Through mobile phone or wearable device apps, these innovations allow people to take responsibility for their health. AI may provide patient-level health data to physicians for study and use in screening, early disease identification, and treatment plan assurance. [3]

Medical AI overview

Recently, AI approaches have sparked debate about whether AI doctors will replace human doctors. We don't think AI will replace doctors anytime soon, but it may help them make better clinical judgments or perhaps take over specific healthcare functions (eg, radiology). The current success of AI in healthcare is due to the growing availability of healthcare data and the quick development of big data analysis technologies. Powerful AI algorithms guided by appropriate clinical queries may reveal clinically useful information buried in enormous amounts of data, aiding clinical decision making. [4,5] This article reviews AI in healthcare and its future. We briefly cover four medical investigator-relevant aspects:

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- Healthcare AI motives
- AI-analyzed data
- AI systems that provide clinically relevant findings
- AI-targeted diseases.

AI advantages

Relieving, dividing up, replacing, and complementing are four ways AI affects the workforce, including healthcare (Fig. 1).

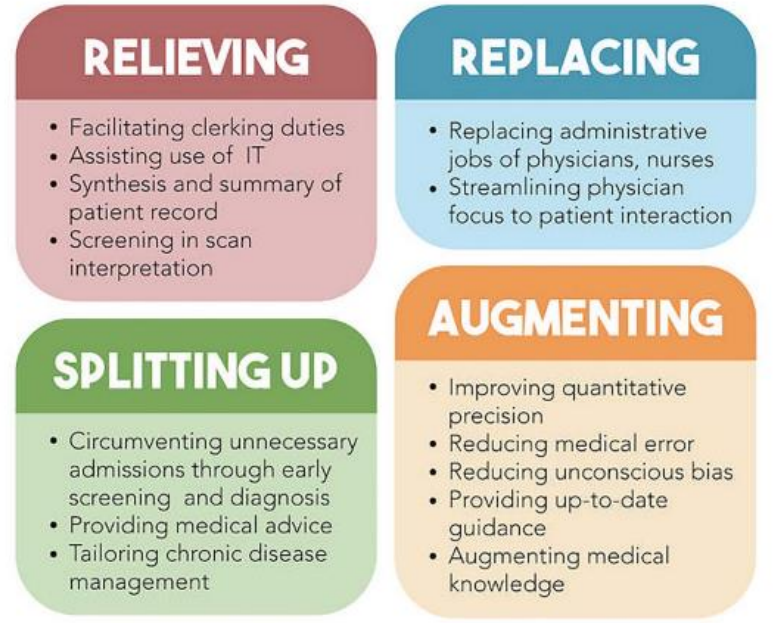

Fig:1 Eggers' healthcare AI benefits

AI development challenges

Healthcare AI has challenges. Machine learning algorithms and neural networks need plenty of data to train. We seldom receive pure, impartial data. Healthcare data might be noisy, biassed, incomplete, or uneven. Hospital data may not generalise to another model. Thus, researchers must gather data from the desired patient population. Data is developing fast, offering perfect information at decision time. The System's accountability is especially difficult since if the AI gives bad advice, the patient dies. Who will kill him? AI or doctors? This is difficult to say since medical professionals used the system to better serve patients.

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Trust underpins doctor-patient relationships. When a patient trusts a doctor and expects a cure, medical issues occur. How will an AI-unfamiliar person trust it? Doctor-patient trust promotes treatment [6].

Machine learning

Machine learning algorithms analyse and extract data. The machine learning algorithm receives patient "characteristics" and, sometimes, medical outcomes. Unsupervised and supervised machine learning algorithms exist. Unsupervised learning is good for feature extraction, while supervised learning is better for predictive modelling since it links patient data to the intended result. Partially supervised learning, a blend of unsupervised and supervised learning, has been offered as a solution to unclear subject outcomes. Supervised learning is employed increasingly in healthcare AI because unsupervised learning yields better clinical results. The popularity of SVM and neural networks in medical applications [7].

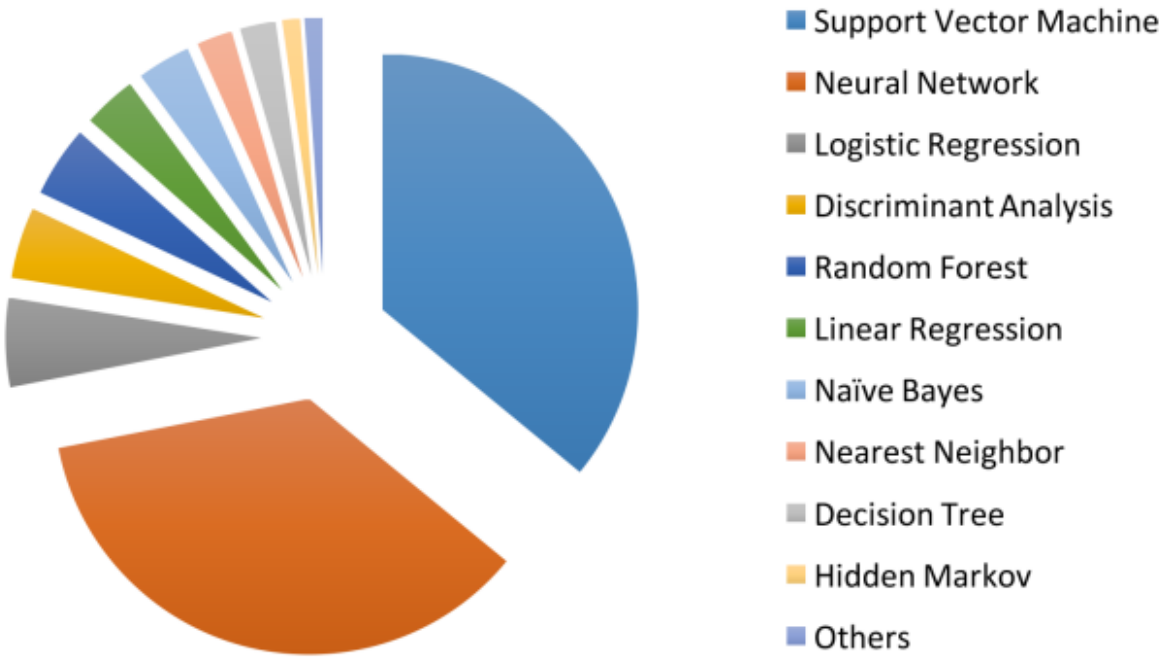

Fig: 2 Healthcare Artificial Intelligence

Neural networks

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Neural networks underpin AI (AI). Anns can solve mathematical and human-impossible tasks. Anns process data like humans. ANNs learn without a curriculum. Artificial neural networks include input, hidden, and output layers. First-layer input neurons provide data to the second layer for processing. After passing through the second layer's hidden layer, activated neurons output the result via activation. Complex problems may have many hidden layers [8].

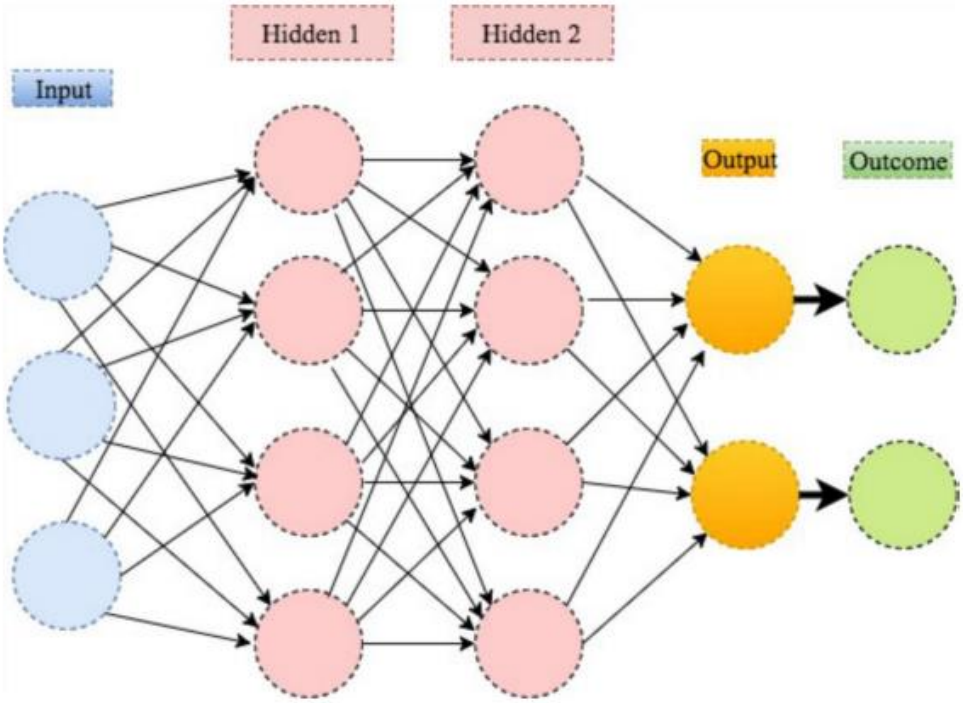

Fig:3 Artificial Neural Network Architecture

Natural language processing

Physical exams, clinical laboratory results, operation papers, and discharge summaries are unstructured and indecipherable to computer programmers. For therapeutic decision-making, NLP extracts useful information from written texts. Text processing and classification comprise an NLP pipeline. The NLP pipeline helps doctors make treatment choices and monitor side effects [9].

AI in healthcare
Medical data management

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AI is particularly visible in healthcare data management. storing, standardising, and tracking its origins. It starts the healthcare revolution [10]. Recently, Google's AI research group launched its Google Deep Mind Health project to mine medical facts to provide excellent and fast health services [11]. Data management is the most common use of artificial intelligence and digital automation in health care since it's vital. Robots store, re-layout, and track data for quicker, more consistent access [12].

Repeating tasks

Robots can quickly and correctly analyse tests, X-Rays, CT scans, data input, and other tasks[13]. Radiology and cardiology need a lot of time and data [14]. Future cardiologists and radiologists should only examine complex situations that need human supervision. IBM started Medical Sieve [15]. A long-term research effort aims to create a "cognitive assistant" with analytical, reasoning, and clinical understanding. Medical Sieve may assist radiology and cardiology clinicians. The "cognitive health assistant" can quickly and accurately note and detect issues in radiography pictures.

Methodology

AI is improving healthcare treatment organisation, data analysis, and monitoring [16]. AI can quickly and effectively identify illness symptoms in medical pictures like MRI, CT scans, ultrasound, and x-rays, lowering the time patients wait for a diagnosis from weeks to hours and speeding up treatment [17].

E-consultation

Healthcare bots engage patients first. Babylon and motif are mobile messaging app healthcare bots that help patients instantly by sending a message [18]. Health conversation bots may answer health concerns and help people manage prescriptions by delivering medication information and dosages [19].

Making drugs

Machine learning algorithms are reducing drug discovery timeframes with several successes. Clinical trials to develop drugs may take over 10 years and cost billions of dollars. AI can

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restore drug discovery steps faster, cheaper, and safer. AI can help find novel therapeutic molecules, but it cannot totally automate medication synthesis. It may help identify new uses for examined compounds [20]. AI was used to scan available drugs that may be altered to treat West Africa Ebola in 2014. Two medications that lower infectivity were found in one day, saving thousands of lives [21]. AI platforms and in-memory computing will soon expedite drug research, development, and delivery and assist scientists uncover novel medicinal uses [20].

Implementation issues

The absence of prospective clinical studies confirming the effectiveness of AI-based therapies is the primary obstacle to deployment. AI's impact on patient outcomes is seldom studied. [21] Artificial environments are used for preclinical AI research in healthcare. 1 Thus, results are hard to apply. The gold standard in medicine, randomised controlled trials, cannot prove AI's effectiveness in healthcare. [22] The first comprehensive assessment of deep learning performance in medical imaging illness detection demonstrated that deep learning models perform comparable to human professionals [23]. Few researches externally evaluated their findings or compared algorithm and human performance using the same dataset. Due to the absence of empirical evidence and varied study quality, enterprises are sluggish to embrace AI-based solutions. [24]

Ethics issues

AI has always faced ethical issues and criticism. Accountability is the biggest issue after data privacy and safety. [25, 26] Poor healthcare choices have serious implications, thus someone must be held responsible. AI is frequently seen as a "black-box" that cannot explain its predictions or recommendations. The "black-box" problem may not be as significant for algorithms in applications with smaller stakes, such as those focused on efficiency or operations rather than patient care [27]. When things go wrong, accountability is increasingly important for AI applications that enhance health outcomes. Thus, the system's failure's accountability is ambiguous. The physician is not responsible for the algorithm, but holding the developer liable seems too far away from the therapeutic setting. In China, AI cannot make healthcare decisions without human involvement [28, 29].

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Healthcare AI limitations

"Artificial intelligence" may be misleading since it refers to a more advanced technology [30]. Current technology machine learning methods can produce artificial narrow intelligence (ANI) in several sectors. That's happening too fast [31]. These limited-intelligence systems outperform humans. ANI's medical limitations must be highlighted to prevent overselling the technology [32]. Streamlining and standardising medical records so algorithms can understand them is another major obstacle to adding ANI to hospital departments for administrative tasks.

AI Future

Many areas are adopting AI. Doctors and patients may benefit greatly from AI. AI can gather and evaluate a lot of data, enabling faster and more accurate diagnoses for a wider population. AI may help those without access to highly specialised healthcare [33]. Better diagnosis may lower healthcare costs. AI harms patients and doctors. Doctors must utilise their skills and experience to ensure that artificial intelligence is making accurate diagnosis and treatment recommendations until the data warehouse is large and well-qualified [34]. AI technology will shift physicians' perspectives, improve illness prediction and treatment, reduce healthcare costs, and improve medical care in underserved areas. Finally, data-driven medicine offers optimism but requires ongoing study to realize its full potential. [35]

Conclusion

Healthcare has untapped AI potential. AI might reduce effort for healthcare personnel and improve job quality by lowering mistake and enhancing accuracy. It might empower people and prevent hospitalizations. It might improve clinical suggestions by expanding medical understanding. The difficulties are substantial. To train accurate algorithms, data must be shared to encourage technical growth. Safely implementing and assessing AI technology requires standards and study on its capabilities and limits. Robust research is required to demonstrate AI's real-world advantages. AI in healthcare may develop even when the ideal circumstances for adoption have not yet been realised. There are various important concerns. Due to the absence of AI governance agreement, it may be impossible to create AI-based healthcare systems with generalizable algorithms. Thus, it may be wise to prioritise solutions

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that can be deployed and utilised at their intended institutions. 36 Patient care must take precedence over cutting-edge technologies. The artificial system's safety and efficacy must be considered before usage. Artificial intelligence has uses in many industries, including healthcare. Studies show that healthcare AI is rapidly growing. It is used in data management, medication research, diabetes treatment, digital consulting, and more. Medical AI has been shown to aid physicians and patients provide better healthcare in the 21st century.

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