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Artificial Intelligence in Healthcare: Opportunities and Challenges

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Abstract:

Artificial intelligence (AI) rapidly dominates the health service system. It removes the manual health system into automatic, in which humans conduct the routine works/tasks in medical practice to the management of patients and medical resources. The technical challenges of digitizing health services pose new problems when developers create artificial intelligence systems to carry out tasks.AI offers the potential for a huge improvement in patient care and a reduction in health care costs. The increasing population is expected to be able to encourage the demand for health services. The health service sector needs innovative solutions to find out how to be more effective and efficient without excessive expenditure. Rapid developments in technology, especially in the fields of AI and robotics, can assist the complement of the healthcare industry.AI and robotics in health care using artificial intelligence develops quickly, especially for early detection and diagnostic application. AI is becoming more powerful at the same time. It enables them to do what humans perform — often more efficiently, easily, and at reduced cost. Some risks and challenges appear, including the risk of injury to patients from system errors, the risk of patient privacy in obtaining data and drawing conclusions from artificial intelligence, and more. The important thing for public health is that AI preventative care can assist people to stay healthy.AI is highly needed for early detection and diagnostic. It is used in various ways to detect diseases such as cancer more accurately, reliably, and quickly. Simply put, it works by comparing data from some patients, including pictures of vast quantities of other patients' data. The independent learning system detects association and suggests a diagnosis. The future of AI in health care is not fully optimistic because there are advantages in the process. Numerous questions arise whether AI can exercise doctors' rights and obligations, protect privacy issues, and the applicable law is not fully prepared with this progress. The use of AI for the healthcare system in the world indicates that current regulations support it. It is proven that the rules in the development of technology and health technology products can be developed and applied for medical care. This study aimed to find out the opportunity of AI and the risk in health service.

INTRODUCTION

Artificial intelligence in healthcare is an overarching term used to describe the use of machine-learning algorithms and software, or artificial intelligence (AI), to mimic human cognition in the analysis, presentation, and comprehension of complex medical and health care data. Specifically, AI is the ability of computer algorithms to approximate conclusions based solely on input data. What distinguishes AI technology from traditional technologies in healthcare is the ability to gather data, process it, and give a well-defined output to the end-user. These algorithms can recognize patterns in behavior and create their own logic. To gain useful insights and predictions, machine learning models must be trained using extensive amounts of input data. AI algorithms behave differently from humans in two ways: (1) algorithms are literal: once a goal is set, the algorithm learns exclusively from the input data and can only understand what it has been programmed to do, (2) and some deep learning algorithms are black boxes; algorithms can predict with extreme precision, but offer little to no comprehensible explanation to the logic behind its decisions aside from the data and type of algorithm used.The primary aim of health-related AI applications is to analyze relationships between prevention or treatment techniques and patient outcomes. AI algorithms can also be used to analyze large amounts of data through electronic health records for disease prevention and diagnosis. Medical institutions such as The Mayo Clinic, Memorial Sloan Kettering Cancer Center, and the British National Health

Service, have developed AI algorithms for their departments. Large technology companies such as IBM and Google, have also developed AI algorithms for healthcare. Additionally, hospitals are looking to AI software to support operational initiatives that increase cost saving, improve patient satisfaction, and satisfy their staffing and workforce needs. Currently, the United States government is investing billions of dollars to progress the development of AI in healthcare. Companies are developing technologies that help healthcare managers improve business operations through increasing utilization, decreasing patient boarding, reducing length of stay and optimizing staffing levels.

Role of AI in Healthcare

Artificial intelligence (AI) generally applies to computational technologies that emulate mechanisms assisted by human intelligence, such as thought, deep learning, adaptation, engagement, and sensory understanding. Some devices can execute a role that typically involves human interpretation and decision-making . These techniques have an interdisciplinary approach and can be applied to different fields, such as medicine and health. AI has been involved in medicine since as early as the 1950s, when physicians made the first attempts to improve their diagnoses using computer-aided programs . Interest and advances in medical AI applications have surged in recent years due to the substantially enhanced computing power of modern computers and the vast amount of digital data available for collection and utilisation . AI is gradually changing medical practice. There are several AI applications in medicine that can be used in a variety of medical fields, such as clinical, diagnostic, rehabilitative, surgical, and predictive practices. Another critical area of medicine where AI is making an impact is clinical decision-making and disease diagnosis. AI technologies can ingest, analyse, and report large volumes of data across different modalities to detect disease and guide clinical decisions . AI applications can deal with the vast amount of data produced in medicine and find new information that would otherwise remain hidden in the mass of medical big data . These technologies can also identify new drugs for health services management and patient care treatments.

The application of artificial intelligence in health service

In this era, the role of technology is very important. Technology plays a role and aims to ease human work and to make it more efficient. Besides, in the health sector, technology plays an important role in minimizing errors caused by human negligence. For instance, if there is no role of technology in surgical operations performed by doctors, the operation can be dangerous and lead to failure. In other words, AI is a simulation of human-made intelligence in machines programmed to think like humans. AI will improve patient diagnostics, prevention, and therapy and to improve clinical decision-making.

Challenges and benefits of artificial intelligence

The application of AI in health service can cause challenges or benefits. The application of technology in healthcare has clear benefits, such as improving patient management choices and outcomes, as well as potential secondary benefits such as fewer referrals, reducing costs, and saving time. It can also assist health facilities in rural areas and promote recruitment and retention in rural areas. Ultimately, this can contribute to a more equitable system of global health care,[1] the challenges are facilitating early adoption, and sustainable implementation in the health system, lack of consideration for the user's perspective, and technology cannot be used optimally but the need for adoption of AI in the public health sector. In the public health system, the adoption of AI offers a blueprint for the flow

of research that focuses on different aspects of the adoption of AI in the public system.

The applications of artificial intelligence in health service

The application of AI is the right way for the development in the health sector, especially Health Service. However, there will be an impact on AI application, such as a system error and ethical issues and regulations.

Equity

In the sense of health, moderate images, text from patient reports on medical conditions, diagnosis and care, and cost reimbursement codes may be included, but not limited only. Inaccurate and under-representative training data sets for AI models, as discussed previously, can cause bias, misleading predictions, adverse events, and even large-scale discrimination.

Transparency

While the deep learning model's performance in the analysis of medical image and clinical risk prediction has been highly promising, this model is also difficult to interpret and explain. The difficulty raises certain problems in the world of medicine, where transparency and the ability to explain clinical decisions are very important.

Trust

Physicians need to consider the cause and effect of medical problems, and the techniques and models used to help the decision-making process of the doctor, in the case of AI. Besides the clarification issues discussed in the previous section, the potential for AI applications' Autonomous functions and the possible susceptibility to accidental or malicious tampering of these applications to produce unsafe results may present a major obstacle for doctors to recognize AI in their medical practice.

Accountability

Accountability is the fourth and the last part of our proposal for governance. This begins with the development of the AI model and extends to the extent that the model is used in clinical care and, ultimately, retirement. This scope includes many players, including developers of software, government officials, health care, medical practitioners, and advocacy for patients groups.

The use of AI in health service is not only for increasing clinical capacity but also for administrative capacity. AI can be conducted with telemedicine for distributing health-related services and information by utilizing communication technology, assuming the implementation of telemedicine will greatly affect the business model in hospitals.

Challenge and benefit of artificial intelligence

The development of the health sector currently does not grow maximally. A promising field of AI application is the public health service. Although implementation is slow, its use continues to increase because of the potential cost savings at the core of health care delivery, AI will replace face-to-face experiences. In many respects, the use of AI has been generally considered possible to redesign the health sector. The virtual branch concerns the center of AI, including the study of in-depth knowledge processing for health management systems, electronic health records, and the active supervision of doctors in their medical decisions.[16] The use of AI systems to assist doctors in patient diagnosis, in particular, has recently received research attention. In the future, this AI can detect various other diseases, when updated with more sophisticated technology and equipped with more complete data.

The technology in healthcare has clear benefits, such as improving patient management choices and outcomes and potential secondary benefits such as fewer referrals, reducing costs, and saving time. This can also help reduce professional isolation and promote recruitment and retention in rural areas. In turn, this can contribute to a more equitable system of global health care in poor-resource settings in high- and low-income countries.

Problems in the application of artificial intelligence in health service

1) Data bias

Training of the AI model needs a big scale of input regarding health data or others. Such bias may occur when the data used for training does

not reflect the target population and when insufficient or incomplete data is used to train AI models, there may be unrepresentative data due, for example, to social discrimination (lack access to services health) and relatively small samples (for example, minority groups).

2) Personal

Health service data are the most sensitive information that can be owned by an individual about another. In health care, respecting the privacy of an individual is a vital ethical principle because privacy is bound by patient autonomy or self-government, personal identity and well-being.Thus, it is ethically important to respect patient confidentiality and ensure adequate processes for obtaining correct consent.

3) The principle of ethical double effects

Considering that science is a backsword, certain findings ultimately cause damage. This is very suitable for special borders in AI. Therefore, the principle of double effect ethics must be carefully considered in applying AI, for example, stem cell research and gene editing.

4) Problem of ethic related to research and biomedical medicine

As all new scientific techniques, biomedical ethical principles must be obeyed by AI in healthcare applications. They are autonomy, benefit, non-crime, and justice. They are manifested as consent, privacy, and safety, voluntary participation, autonomous decision making, etc., which should be considered and practiced in any implementation.

Result

AI has a role in diagnostic accuracy and helps in the analysis of health data by comparing thousands of medical records, experiencing automatic learning with clinical alerts, efficient management of health services and places of care, and the possibility of reconstructing patient history using these data. AI is used as a tool for case triage. It supports a clinician reviewing images and scans. This enables radiologists or cardiologists to identify essential insights for prioritizing critical cases, to avoid potential errors in reading electronic health records (EHRs) and to establish more precise diagnoses.

Conclusions

The application of AI is needed in health services, especially in the management of health services, to make medical decisions, especially predictive analysis, in diagnosing and treating patients. The challenges are facilitating early adoption, sustainable implementation in the health system, lack of consideration for the user's perspective, Technology is not optimally used, but is necessary for the adoption of AI in the public health sector. Some of the ethical problem lists faced by AI clinical application, there are safety, efficacy, privacy, information and consent, the right to decide, “the right to try,” the costs and access.

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