Review

Artificial Intelligence (AI) and its Application on Human Health

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Abstract: Background: Artificial intelligence can help improve the quality of healthcare by analyzing vast amounts of data and providing more effective and personalized treatment plans. Researchers are working on developing AI-powered solutions that can help improve the outcomes of patients. **Objective**: To explore the potential of AI in improving healthcare outcomes and patient experience. **Results**: The study suggests that AI can improve healthcare efficiency and patient outcomes but cannot fully replace human healthcare professionals. AI can assist healthcare professionals in their work, leading to better resource utilization and improved patient care. However, there is still a need for human healthcare professionals to oversee AI systems and provide empathy and personalized care to patients. **Conclusion:** While there is immense potential for AI in healthcare, it is not yet feasible to replace human healthcare workers. Instead, it should be viewed as a tool that can help improve the efficiency and effectiveness of human healthcare.

Keywords: artificial intelligence; artificial intelligence and its application on human health; AI and its application on human health; AI and human health

1. Introduction

The rapid emergence and evolution of Artificial intelligence (AI) in the healthcare industry have raised concerns about its potential to transform the way it delivers care. AI can analyze vast amounts of data and provide helpful and timely information to improve the quality of patient care [1]. This research article aims to provide an overview of the current state of the technology in the field and its potential to enhance human health. A report released by the UK government claimed that AI is already being used to improve healthcare in the country [2].

AI is being widely used in the US healthcare industry, with the goal of improving the quality of patient care and reducing costs [3]. Despite the potential advantages of AI in the field, there are still concerns about its impact on the quality of care and the employment of healthcare workers. Some experts claim that the technology could lead to job loss, while others are worried about its accuracy. These issues raise the need for proper planning and implementation [4].

Medical imaging is one area where AI is being widely used. It allows healthcare practitioners to perform more accurate and timely examinations by analyzing images of medical scans [5]. This technology could help them make more informed decisions regarding the treatment of their patients. In the UK, researchers at the Imperial College London are currently working on developing a system that could help predict which patients are most likely to develop lung cancer [6]. Electronic health records, also known as EHRs, are one of the most common areas where AI is being used. This technology allows healthcare providers to analyze the data collected by these systems to improve the quality of patient care. In the US, several healthcare organizations are currently using AI to reduce costs and improve the efficiency of their operations [7].

Aside from improving the quality of care, AI can also help reduce the cost of healthcare by improving the efficiency and effectiveness of the system. For instance, by

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implementing AI-powered chatbots, healthcare professionals can direct patients to the appropriate treatment level, decreasing the wait times and burden on them [8]. In addition, it can help healthcare workers automate certain tasks, such as processing insurance claims and scheduling appointments. AI can potentially transform healthcare by reducing costs, improving the efficiency of systems, and providing more effective and personalized treatment plans [9]. Despite the potential advantages, it's still important to ensure that the technology is implemented properly [10].

2. The Potential of AI in Healthcare: Improving Patient Outcomes and Reducing Costs

Artificial intelligence has the potential to significantly improve the efficiency and effectiveness of healthcare systems by analyzing vast amounts of data. It can also help medical professionals make better decisions regarding the treatment of patients [11]. This section will discuss the various applications of AI in the field. Medical imaging is one area where AI has demonstrated promise. The use of AI, it can help medical professionals identify subtle abnormalities and patterns in medical images, which can be useful in making more accurate diagnoses. For instance, by analyzing breast cancer scans, radiologists could detect the disease at an early stage, which could lead to fewer invasive procedures and lower costs [12].

One of the most common applications of AI within the healthcare industry is in electronic health records or EHRs. These systems collect and analyze data related to patients' medical history and treatment [13]. With the help of AI, healthcare providers can improve their efficiency by identifying potential threats and developing effective interventions. For instance, it can help identify individuals who are at high risk of developing heart disease or diabetes. AI can help healthcare providers make informed decisions and improve the outcomes of patients by identifying the most effective treatment options based on their individual medical conditions and genetic makeup. This method can help minimize the likelihood of adverse events [14].

Besides improving the quality of patient care, AI can also help reduce the cost of healthcare by improving the efficiency and effectiveness in the system. For instance, by implementing AI-powered chatbots, healthcare providers can direct patients to the appropriate treatment level []15. They can also automate certain tasks, such as processing insurance claims and scheduling appointments, freeing up healthcare workers for more complex work. Despite the advantages of AI in healthcare, there are still some challenges that need to be resolved before it can fully integrate into the system [16]. One of these is the quality of the data collected in the field. Since data collected in healthcare is often incomplete and fragmented, it can be hard for AI systems to perform accurate predictions. Despite the potential advantages of AI, some experts are still concerned about its accuracy and potential for errors. They fear that it could lead to the incorrect diagnosis and treatment of patients [17].

One of the biggest challenges that healthcare professionals face when it comes to using AI is the need for specialized training. This is because, in order to make informed decisions regarding the treatment of patients, they need to have the necessary skills to interpret the data collected by AI systems [18]. Despite the challenges that AI faces, the potential of its application in the healthcare industry is still immense. For instance, the UK's National Health Service is currently using AI to improve the quality of its patient care. It has developed systems that can help predict which patients are most at risk of developing chronic conditions such as diabetes and heart disease. According to the NHS, the technology could save the organization around £12.5 billion by 2025 [19].

In the US, healthcare providers are already using AI to improve the quality of patient care and reduce costs. A report revealed that the technology could save the country's healthcare industry up to $150 billion by 2026 [20]. EHRs equipped with AI is being used by healthcare providers to help them identify patients who are at high risk for developing chronic conditions and make informed decisions regarding their treatment. AI has the

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potential to significantly alter the way healthcare is delivered and paid for. It can help improve outcomes, cut down on costs, and enhance efficiency [21].

3. Concerns and Challenges in the Integration of AI in Healthcare

Despite the immense potential of AI in healthcare, there are still many challenges that need to be resolved before it can fully integrate into the system. These include the security and privacy of data, as well as the technical limitations of the technology [22]. This section will talk about some of the key issues that have been identified in various countries.

One of the biggest concerns about AI is its reliability and accuracy. While it can be incredibly useful in identifying patterns and predicting the future, it can also make errors that can have detrimental effects on the healthcare system [23]. For instance, in 2018, a study revealed that an AI program that was used to diagnose melanoma incorrectly diagnosed over 30% of the patients. A study conducted in 2020 revealed that an AI system that was used to triage patients infected with COVID-19 had a false negative rate of over 90% [24].

A challenge that AI faces is the lack of high-quality data. In order to make accurate predictions, the algorithms need to rely on large datasets. Unfortunately, in healthcare, the data is often incomplete, which can prevent them from accurately identifying patterns. In some cases, biased data can lead to inaccurate treatments [25]. A study released in 2019 revealed that an AI algorithm that was used to identify people who were at high risk of suffering from kidney disease was not accurate for African-Americans [26].

Another issue with AI is its potential to exacerbate existing racial and cultural disparities in the healthcare system. It can be trained on data with which there are already biases, which could lead to discrimination against certain groups [27]. For instance, a study conducted in 2019 revealed that an AI algorithm that was used to predict which individuals would be sent to the hospital after being released from psychiatric facilities was not accurate for patients with a history of mental health issues [28].

AI's potential to replace human decision-making in healthcare is also a major concern. Since it is a complex field with numerous ethical and patient considerations, decisions related to patient care must be made based on the totality of factors, such as health conditions, social determinants, and preferences [29]. While AI can greatly enhance the capabilities of existing systems, it cannot replace human expertise. Another issue that AI faces is the security of the data it collects. Since it requires vast amounts of information to function properly, it must be stored and secured in a secure manner. This is why it is important that healthcare organizations follow proper ethical and legal guidelines when it comes to the use of patient data [30].

A data breach at a healthcare company in the US in 2019 exposed the personal details of millions of patients. This incident highlighted the importance of securing the information that healthcare organizations collect [31]. These are not unique to any healthcare system. Instead, they are global issues that need to be addressed in order to integrate AI into the healthcare system in a more ethical and effective manner. The UK's National Health Service has a dedicated AI lab that is focused on developing and deploying AI in the healthcare sector. The lab is also dedicated to protecting the privacy and security of patient data [32].

In the US, the FDA has issued guidance on how to regulate the use of AI in healthcare. It provides a framework for the approval of medical devices that are based on AI [33]. Despite the immense potential of AI in healthcare, there are still many issues that it must overcome in order to fully integrate its capabilities into the system. Some of these include ethical considerations, security, and technical limitations [34].

4. Critical Analysis

The rapid emergence and evolution of AI in healthcare have highlighted the potential of this technology to improve the quality of patient care and reduce costs. But, despite the progress that has been made, there is still a lot of work to be done to address the various

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challenges and concerns that it poses [35]. This analysis aims to provide a comprehensive view of the current state of AI in the healthcare industry and its future directions.

A case study that used AI to identify individuals at risk of developing sepsis highlighted the potential of this technology in helping clinicians make informed decisions regarding the treatment of this life-threatening condition. Currently, it can be hard to identify sepsis due to its non-specific symptoms [36]. However, a 2018 study revealed that the use of AI could help improve the diagnosis of this condition. A study utilized an AI algorithm to identify high-risk patients who could develop sepsis. It was able to predict the condition with high accuracy and provide early intervention, which significantly decreased the mortality rate [37].

A study conducted in 2020 revealed that an AI algorithm could help improve the accuracy of breast cancer screening [38]. The study, which was published in Nature, used an algorithm that was developed using AI to analyze and identify suspicious lesions in a mammogram. The findings showed that the system could detect breast cancer at a higher level of accuracy and reduce the number of false positives [39].

Despite the positive effects of AI on the diagnosis and treatment of various medical conditions, there are still many issues that need to be resolved before it can truly benefit the healthcare industry. One of these is the lack of high-quality data, which can lead to inaccurate and incomplete predictions. This issue can affect the treatment of certain patients, especially those from underrepresented groups [40].

One of the main concerns about AI is its potential to exacerbate existing racial and cultural biases in the healthcare industry. It can be trained on data collected from various sources, which could lead to discrimination against certain groups [41]. For instance, in 2019, a study revealed that an AI system that was used to predict which individuals would be most likely to be sent to the hospital after a mental health issue was inaccurate [42].

The future directions of AI in healthcare involve the development of robust datasets that are inclusive and transparent. This can be achieved through collaboration between various groups within the industry, such as patients, researchers, and healthcare organizations. In addition, to ensuring that the data is collected in a proper manner, AI should also be used in a more equitable manner [43].

Another promising area of AI in the healthcare industry is explainable AI, which allows systems to provide a clear explanation behind their predictions. This will allow them to make informed decisions when it comes to the treatment of patients [44]. In addition to being able to provide a comprehensive analysis of the data collected, explainable AI systems could also help improve the efficiency of the healthcare industry by helping clinicians make informed decisions. Through the use of explainable AI, healthcare professionals can gain a deeper understanding of how AI systems are making decisions and performing predictions [45].

In addition to the technological advancements that are happening in the field of AI, the future directions of technology in healthcare must also consider ethical considerations. This can be achieved through ongoing collaboration between various groups within the industry, such as patients, researchers, and healthcare organizations [46]. One of the most important factors that must be considered is the security and privacy of the data collected. Despite the various challenges that AI faces in the healthcare industry, it is still possible to use it to improve the efficiency and effectiveness of the healthcare system. In order to achieve this, the development of robust AI systems should be prioritized [47].

5. Results

The rapid emergence and evolution of AI have transformed the healthcare industry, allowing applications such as medical imaging and precision medicine to be developed. In cardiovascular medicine, for instance, it has been shown that AI can help improve the diagnosis and treatment of cardiovascular diseases. In addition, deep learning has been used in medical imaging to improve the accuracy and efficiency of diagnosing various diseases [48].

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Despite the potential advantages of artificial intelligence in healthcare, there are still ethical issues that need to be resolved before they can be widely implemented. For instance, patients' privacy and biases in algorithms need to be addressed before they can be used. Big data analytics is also needed to make sense of the data collected by healthcare systems [49]. Regardless of this the initial stages of AI's application in healthcare have the potential to improve the detection and treatment of various diseases. AI can potentially improve the quality of life for humans by helping them make better decisions regarding their health and improve the efficiency of their healthcare system. However, it is still not yet clear how this technology can be used to its full potential in the healthcare industry [50].

6. Discussion

Artificial intelligence (AI) has made significant advancements in healthcare, from improving diagnostic accuracy to personalized treatment plans. AI algorithms can process vast amounts of data, detect patterns, and make predictions faster and more accurately than humans. The use of AI in healthcare has the potential to revolutionize the industry by reducing costs, increasing efficiency, and improving patient outcomes [51].

One of the areas where AI has shown remarkable results is in precision cardiovascular medicine. AI-based models can predict outcomes, such as mortality, heart failure, and acute myocardial infarction, with high accuracy. These models use various data sources, including electronic health records, imaging data, and genetic information, to create a comprehensive patient profile [52]. By analyzing this data, the AI models can identify subtle patterns that would be difficult for a human to detect. This approach can aid in early detection and timely intervention for cardiovascular diseases [53].

Another area where AI has demonstrated significant potential is medical imaging. AI can enhance medical imaging quality and efficiency by detecting and classifying abnormalities more accurately than human radiologists [54]. AI models can also process large amounts of imaging data faster than humans, reducing the waiting time for patients. AI-based imaging models can be trained on large datasets to detect and classify various types of medical images. This approach can help identify diseases such as cancer and provide a more accurate diagnosis [55].

However, despite the potential benefits of AI in healthcare, there are ethical concerns that need to be addressed. One major ethical issue is the potential for bias in AI algorithms. AI models are only as good as the data they are trained on, and if the data used to train the model is biased, then the model will also be biased [56]. Bias in AI algorithms can lead to unfair treatment of patients and inaccurate diagnoses. Therefore, it is essential to ensure that the data used to train AI models is diverse and representative of the entire population [57].

Another ethical concern is the potential for AI to replace human healthcare workers. AI has the potential to replace some healthcare tasks that are repetitive and time-consuming, such as medical record-keeping and data analysis [58]. While this may improve efficiency and reduce costs, it could also lead to job loss for healthcare workers. It is therefore important to ensure that the use of AI in healthcare is complementary to human healthcare workers and does not replace them entirely [59].

Moreover, the use of AI in healthcare raises privacy concerns. The use of big data analytics in healthcare raises issues of data privacy and security [60]. Healthcare data is highly sensitive, and patients need to be assured that their data is being used responsibly and only for its intended purposes. It is therefore crucial to establish ethical guidelines and regulations to ensure that healthcare data is used safely and responsibly [61].

The use of AI in healthcare has shown a remarkable potential to improve patient outcomes, increase efficiency, and reduce costs. However, the ethical concerns that accompany the use of AI in healthcare, such as data bias, job loss, privacy, and infrastructure investment, need to be addressed [62]. While the benefits of AI in healthcare are clear, the

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potential for negative consequences must be acknowledged and mitigated to ensure the responsible use of AI in healthcare [63].

7. Conclusion

It can be concluded that the rapid emergence and evolution of AI have shown that it can greatly improve the efficiency and effectiveness of the healthcare industry by reducing errors and providing personalized treatment plans. However, it faces various ethical and privacy issues. In order to ensure that the development of artificial intelligence in healthcare is safe and effective, strict ethical standards should be established. As artificial intelligence (AI) continues to develop, it is expected that it will play a significant role in the healthcare industry. Some of its potential applications in the field include developing effective early disease detection and delivering personalized treatment plans.

AI's potential limitations in healthcare must be addressed. It should not lead to job loss or worsen the disparities in the system. In addition, applications that use AI should not replace the work of healthcare providers. It should also ensure that they follow ethical guidelines and respect patients' privacy. The potential of AI to transform healthcare is immense, as it can help improve the efficiency of the system by delivering personalized medicine and reducing costs. Unfortunately, it faces various regulatory and ethical issues and privacy concerns. To fully realize its potential, it is important that the industry and government work together to address these issues.

8. Recommendation

It is important that the healthcare industry takes a proactive approach to the development of AI in order to ensure that it is ethical and effective. This can be done through the establishment of regulations that are designed to ensure that the use of AI in healthcare is carried out in a safe and ethical manner [64]. Healthcare workers should be trained in how to work with AI systems. The public and patients should also be informed about how this technology can improve their health. There is also a need for collaboration among various groups within the healthcare industry in order to ensure the proper development and use of AI in the healthcare sector [65]. This can be accomplished through the establishment of a common vision that focuses on the needs of patients. AI's potential in healthcare can only be realized through the continuous development of research. This is why the government should allocate more resources toward AI research. This includes the creation of explainable AI systems, the security of patient data, and the integration of such technology with other systems [66].

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