

The Health AI Frontier: New Opportunities for Innovation Across the Health Care Sector

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AI in Health Care Series: Article 1

With the health care industry under pressure to improve patient outcomes while controlling costs, artificial intelligence (AI) and machine learning (ML) are quickly becoming indispensable tools. These technologies show promise in supporting decision-making, enhancing the delivery of care, and personalizing medicine. In addition, AI and ML innovations have the potential to revolutionize medical research by giving researchers access to unprecedented amounts of data that could lead to novel treatments or cures for diseases. This blog series explores opportunities for health care organizations deploying AI-based solutions.

AI / ML in Health Care

AI and ML (which can be regarded as a branch of AI) refer to machine-driven simulations of human intelligence, with a goal of emulating the thought processes and decision-making capabilities of humans. It has potential applications in many fields, particularly health care, where it can be used to assist medical professionals with diagnostics and, more broadly, health evaluation. For example, by evaluating medical history data as well as digital imaging such as MRI scans and CT scans, machine learning algorithms are able to identify subtle anomalies that may form indicators for diseases. In addition to decision-making support, AI-powered solutions can also help health care providers deliver better care and help patients better take care of themselves. With these applications rapidly expanding in health systems worldwide, it is no surprise that these machine-simulated intelligence tools are becoming an essential resource for medical professionals. As development in these technologies continues, its use in health care will become more pervasive, allowing for a more efficient delivery of care.

Opportunities and Potential of AI in Health Care

Hospitals and medical practices are increasingly making use of AI systems to automate classification and diagnosis tasks to free up clinicians to focus on providing personalized care to their patients. AI also offers the potential to access larger data sets than ever before, helping clinicians detect patterns that would otherwise go unnoticed. This can help in uncovering novel insights into patient health, which could then be acted upon directly through targeted treatments tailored towards individual

patient circumstances. In addition, AI-based medical devices such as pacemakers and insulin pumps are currently being developed to increase independence and comfort for many patients who suffer from chronic illnesses. While these benefits sometimes involve refinement and optimization of existing models, potential new opportunities for improving patient care through AI are virtually boundless.

Personalized Medicine

AI has the potential to revolutionize personalized medicine and health care outcomes, allowing society to accelerate tailored approaches for individual patients. By parsing through massive amounts of patient data, these AI systems can provide real-time insights into personalized treatments, progress tracking, and diagnoses with more accuracy than ever before. Providers further will have improved access to patient information and can use evidence-based analytics to make informed decisions more quickly, leading to the development of personalized treatment plans as soon as a patient presents with a condition or symptom, including predictive modeling for suggested courses of action. This is an incredibly valuable tool in driving better outcomes for patients, since treatments can be personalized based on years' worth of clinical data virtually instantly. Such individualized health care can avoid adverse reactions in patients and improve outcomes in less time and at lower cost.

Better Outcomes

AI also enables more accurate diagnosis, improving patient monitoring and health outcomes, streamlining administrative processes, and creating opportunities for preventive care.

First, by applying machine learning algorithms to data from health records, health risks that might otherwise be missed can be detected, enabling life-saving interventions with early detection of diseases such as cancer. This can occur in tandem with helping physicians identify potential interactions between different drugs or treatments as well as potential medical complications.

Second, AI has the potential to drive down costs in the health care system by automating many tasks that would normally require time-intensive changes made by humans.

Third, it can reduce errors and help health care providers predict when a patient is at risk of developing certain diseases or health complications before any symptoms become apparent. All of this has the potential to help improve overall wellbeing for patients worldwide, ultimately creating better outcomes for them both physically and financially.

Drug Discovery

Drug development augmented by AI has serious potential, owing to its ability to evaluate vast amounts of data for new drug analysis and drug pathways in a short timeframe. These processes may assess visible molecular attributes representing drug combinations which were previously undiscovered, leading to highly effective treatments with fewer side effects. These treatments stemming from the use of AI can make a real difference in achieving better outcomes for patients with increased safety and accuracy.

Medical Research

On the research side, AI can be used to quickly identify patterns in large amounts of medical

information. These patterns can then indicate what treatments have been effective in the past so medical professionals can use similar treatment plans for other patients with the same medical issue. When information is available faster, medical professionals are better equipped to provide more accurate diagnoses and treatments for their patients. AI also has capabilities to anticipate potential medical issues before they worsen, allowing proactive intervention before an issue becomes severe or even life-threatening. The potential benefits of AI boosting medical research yields great promise for improving outcomes for patients.

Stakeholders and Data Considerations

The use of AI in health care is rapidly increasing, and with it comes a range of personnel who are affected by its implementation. Due to the complexity of this technology there are many stakeholders involved when considering its adoption, including patients, doctors, nurses, and other medical professionals; data scientists; software developers; regulatory bodies; insurers and other payers; IT departments; as well as government organizations responsible for setting policy guidelines for health information security.

A common thread when it comes to the impact and complexity of AI systems concerns data. Data is a lifeblood of AI and ML in health care. As AI continues to become an increasingly integral part of health care, it is essential that we understand the value of data when it comes to leveraging these technologies for improved patient care. From enabling precision medicine and clinical decision support to automating mundane tasks and freeing up physicians' time – data has the potential to revolutionize how health care is delivered. It's no surprise then that a primary concern around AI in health care is data privacy. As patient data is collected from various sources such as medical records, wearable devices, or genetic testing, there is a potential for that valuable information to be exposed to malicious actors or used for unethical purposes if not properly secured. Many health care organizations have multiple databases that need to be secure from intruders, as leaks could put patients' sensitive information at risk.

Data Protection

To promote data protection, hospitals should implement strict protocols to help ensure patients' privacy rights are respected when their medical information is collected and stored. This might include measures such as secure encryption algorithms and secure storage practices in order to prevent unauthorized access or misuse of sensitive health data. Additionally, organizations should consider governance processes that ensure potential risks associated with AI technology are identified early on so they can be addressed effectively. For example, AI solutions can be deployed with appropriate certifications in order to ensure stringent standards of data protection. An effective risk-management strategy may entail regular maintenance and updating of the system in order to identify and rectify any flaws. Additionally, processes for handling data securely should be integrated into the organization's day-to-day operations in order to ensure a secure working environment for everyone involved. These efforts will help ensure that HIPAA and other relevant laws and regulations are not violated. By taking these considerations into account when adopting AI solutions, health care institutions can secure patients' private data and uphold their trust.

Data Quality

Data quality is another major consideration when integrating AI in the health care settings. The better the data, the higher the quality of predictive models and more useful the predictions from those

models when being deployed. But obstacles persist: the data that is useful for AI integration may be siloed in different locations and departments, may employ different standards, and/or may be stored in computer systems that might not be interoperable. Certain otherwise useful data might even not be digitized. While more data generally provides additional benefit, the quality of that data matters. Helping stakeholders appreciate the need for quality will not only make AI solutions more useful, but it will also help them understand how to avoid pitfalls, troubleshoot when trying to determine why something didn't go according to plan, and develop action plans to make needed adjustments going forward.

Looking Forward

AI and ML offers a tremendous opportunity to revolutionize health care and drive better outcomes for patients, in part by freeing up health care professionals' time to focus on what matters most: caring for patients. Although implementing AI and ML in health care presents challenges, the challenges can be managed to ensure that AI's full potential can be realized without compromising patient safety or wellbeing. With careful planning and collaboration between stakeholders such as clinicians, hospital administrators, software developers, and regulatory bodies, health care organizations can create smarter technologies that make health care more efficient, effective, and affordable for all. An effective AI strategy and careful implementation will help health care organizations be innovative and thrive, now and into the future.

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