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Ethical, Philosophical, and Practical Applications of AI in Healthcare: A Case Study on IBM Watson for Oncology

Introduction

The application of artificial intelligence (AI) has led to dramatic industrial changes which particularly affect healthcare the most. Currently AI technologies transform the medical field by altering diagnostic methods and treatment approach development as well as patient care quality improvement. Medical data coupled with machine learning allows AI systems to produce valuable knowledge that enhances healthcare provider decision-making capabilities.

IBM Watson for Oncology operates as an AI tool developed to support cancer specialists in their creation of customized patient treatment recommendations from medical literature syntheses and clinical information analysis. IBM Watson for Oncology receives research that outlines design principles alongside its application methods for healthcare as well as its measurable advantages for healthcare professionals during cancer therapy planning. The research

investigates both the benefits produced by AI tools in healthcare together with the difficulties medical professionals encounter when using AI technology. An evaluation of ethical matters along with societal results as well as future directions in Artificial Intelligence-driven health care systems will assimilate to deliver complete knowledge about current medical practices affected by AI.

Description of AI Technology

IBM Watson for Oncology represents an advanced artificial intelligence application through which artificial intelligence analyzes medical data by utilizing both NLP and machine learning technology. IBM Watson for Oncology incorporates both structured patient medical records together with unstructured data from diverse resources like research papers and clinical trials and medical journals and relevant documents. The combination of NLP capabilities lets the system understand human language within various sources so it can obtain significant findings from textual and analytical data sets.

IBM Watson for Oncology is efficient at processing vast amounts of healthcare information beyond human potential because of its exceptional synthesis capabilities. The system maintains its currency with medical research through this method which enables it to identify key findings in oncology that will guide clinical decisions. Healthcare providers obtain evidence-based recommendations through this system because it delivers up-to-date information about cancer treatment advances.

Watson for Oncology generates customized clinical guidance which specifically addresses the healthcare requirements of each person it serves. Through the combination of patient-specific medical records with genetic data and additional relevant factors Watson for Oncology develops custom treatment plans based on validated medical research. The system offers guidance which supports oncologists' expertise to help them develop better informed choices in their work with cancer patients within this dynamic medical field.

IBM Watson for Oncology assists health professionals by finding suitable clinical trials for patients through an analysis of their medical records and present health status. It enhances patient opportunities to join cutting-edge research projects thus obtaining access to experimental treatments unavailable through conventional medical pathways.

Implementation in Healthcare

Watson for Oncology started operating at worldwide research institutions and hospitals. An AI system based at Memorial Sloan Kettering Cancer Center together with other healthcare institutions trained with structured and unstructured medical data to provide oncologists with ranked treatment options as well as corresponding evidence.

Benefits of IBM Watson for Oncology

The fast capability of AI to process wide medical data enables precise diagnosis and tailored treatment recommendations than what human doctors can achieve.

This technology develops patient-specific treatment approaches by using historical data combined with genetic information of individual patients.

The efficiency of oncologists improves because AI technology allows faster review of medical literature and clinical guidelines as well as increased time for patient care.

Full accessibility across the world allows medical facilities with limited resources to consult world-leading oncology experts and receive their treatment recommendations.

Challenges and Limitations

The effectiveness of AI medical recommendations requires high-quality training data but such data might not fully reflect all patient population demographics.

Integration challenges exist for several hospitals because they need to merge Watson solutions with their active electronic health record systems.

AI training algorithms use data which leads to detection of biases that results in inadequate treatment advice for minority patient groups.

Doctors tend to reject AI diagnostic recommendations by preferring their established diagnostic procedures.

Ethical Considerations

AI-derived healthcare suggestions must act as tools which augment human clinical choices instead of functioning independently from human physicians when treating patients.

Medical organizations must protect patient information used for AI training systems from breaches because such actions violate privacy laws like HIPAA.

The training of AI models requires diverse datasets since without these datasets bias and unfairness will impact treatment recommendations.

Medical organizations need established protocols to identify who will be accountable if AI-based suggestions result in healthcare errors.

Societal Impact

AI healthcare development creates better access to quality medical suggestions which will benefit communities without enough medical services. Artificial intelligence systems assist medical detection and therapy selection while offering urgent medical information which helps these systems lower healthcare disparities to improve worldwide health results.

Modern health organizations depend more heavily on AI technologies which potentially erodes the professional decision-making autonomy of medical staff. Doctor professionals often perceive AI systems have reduced their healthcare duties because these tools perform additional medical tasks. The dependence on machine technology might grow to an unhealthy level which threatens important human supervision needed to care for patients especially when context and empathy play essential roles.

Medical staff members express concerns that AI technology might replace their current positions in the workforce. Fear exists among professionals about automation replacing human workers because AI enables improving workforce capabilities in repetitive or data-driven tasks. Workplace anxiety stems from fears about job dismissal mostly affecting radiology professionals and employees in administrative positions. Healthcare organizations must achieve the correct blend between AI systems and human medical professionals to maintain professionals' active contribution during technological progress.

Future Trends in AI for Healthcare

AI interpretability needs major improvements because this will help doctors and patients develop greater trust in the system.

The adoption of enhanced AI governance standards for healthcare purposes is expected by governmental organizations and health institutions.

Future healthcare AI systems will incorporate immediate patient data streams for creating responsive strategies that adapt to constant data changes.

AI systems will acquire the ability to assist doctors by limiting their autonomy to independent decision-making.

Recommendations for Improvement

The successful development of AI healthcare systems requires thorough training data incorporating numerous diverse cases in order to prevent unfair conclusions from biased outcomes during treatment assessment. The quality of recommendations produced by AI depends heavily on the training data it receives but unrepresentative populations resulting from age-based or gender-based or ethnic or socio-economic differences in data create serious risks of bias. Optimum healthcare delivery becomes unequal because insufficient diverse representation in training sets leads to inferior care for some patient groups. The training of AI systems requires demographics which match the patient community to prevent unfair or biased treatment of any individuals.

The integration of AI technology in healthcare requires healthcare staff to acquire complete training about decision-making strategies that involve artificial intelligence systems. The training curriculum should teach doctors the basics of AI system operation while also explaining the interpretation of AI suggestions and instruction for implementing AI technology into work routines. Healthcare workers must use training to maintain control over AI tools so they remain supporting resources instead of taking over their professional duties. Training programs will assist healthcare providers to manage dual challenges by teaching them about AI system boundaries while showing them how to compare AI advice against their medical experience and skills.

Patient information needs protection through strong protocols that healthcare AI systems should implement for data privacy purposes. Companies need to adopt superior encryption methods for securing both dormant and moving data to maintain patient information security. Enhanced access control measures must restrict both the people who can access patient data along with people authorized to make modifications to the data. Both role-based access control systems and multi-factor authentication provide healthcare providers with the means to authorize personnels accessing their critical data. These security measures effectively stop data breaches from occurring by upholding patient privacy according to HIPAA standards and the GDPR requirements.

Healthcare AI developments benefit from improved teamwork between AI technology developers and medical personnel and corresponding supervisory organizations. The process of tool creation demands developers to join forces with clinical staff for understanding healthcare problems as well as medical constraints to design AI systems for actual service delivery in medicine. Healthcare professionals deliver essential information about practice implementation

of AI systems and system adaptations which lead to improved patient care. Regulatory bodies need to participate because they must create formal ethical guidelines and safety regulations to monitor AI deployments across health care programs. Collaboration plays an essential role to develop AI while it respects medical ethics and protects patient rights and produces better outcomes for everyone involved.

Conclusion

The AI healthcare system called IBM Watson for Oncology shows potential to transform cancer diagnosis and treatment preparation through data-based recommendation services for medical practitioners. Through integration of artificial intelligence systems medical decisions become more precise and these systems make treatment advances more available and operational with heightened speed. The benefits from applying AI in healthcare face major technical hurdles along with difficulties surrounding medical data integrity and computer program discriminatory practices and clinical standards about treating patients with dignity along with protecting their personal health information. Medical AI operations need to maintain open systems and straightforward processes which respect medical ethics standards in order to develop healthcare provider and patient trust framework.

The future requires organizations to build a three-dimensional solution that enhances AI disclosure while optimizing information acquisition methods and establishes cooperative relationships between Artificial Intelligence developers and healthcare providers and policymakers. When medical professionals receive enhanced training about artificial intelligence

systems the healthcare field can adapt them into transformative tools through appropriate regulatory measures. Proper development alongside careful inclusion of AI-powered tools like IBM Watson for Oncology will help increase healthcare outcomes thus advancing worldwide patient care quality.