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Enhancing Healthcare Services through Machine Learning and Artificial Intelligence Applications

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Abstract

The rapid growth of digital technologies has positioned Machine Learning (ML) and Artificial Intelligence (AI) as key drivers in modernizing healthcare. This study explores recent advancements in applying ML and AI to improve disease diagnosis, predictive analytics, treatment personalization, and patient monitoring. Using a systematic literature review of peer-reviewed studies from IEEE Xplore, PubMed, and Scopus, the research prioritizes clinical relevance, methodological rigor, and innovation. Findings show that deep learning models, notably convolutional and recurrent neural networks, enhance diagnostic accuracy and chronic disease prediction. AI tools also support real-time decision-making, remote monitoring, and early detection of complications, especially in resource-limited settings. Despite their potential, challenges remain in data privacy, model

transparency, and interdisciplinary collaboration. This study highlights the transformative role of AI/ML in patient-centered care and efficiency, stressing the need for ethical standards and strong data governance to guide implementation across diverse health systems. © 2025 IEEE.

Author keywords

Analytics; Artificial Intelligence; Diagnosis; Machine Learning; Personalization

Indexed keywords

Engineering controlled terms

Clinical research; Data privacy; Decision making; Deep learning; Diseases; Learning systems; Patient monitoring; Patient treatment; Predictive analytics

Engineering uncontrolled terms

Analytic; Digital technologies; Disease diagnosis; Healthcare services; Learning models; Machine-learning; Neural-networks; Personalizations; Rapid growth; Systematic literature review

Engineering main heading

Diagnosis

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