How Does AI Improve Coronary Artery Disease Detection?

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Abstract

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Coronary Artery Disease (CAD) remains a leading cause of morbidity and mortality worldwide, presenting a significant challenge to healthcare professionals. The timely and accurate detection of CAD is crucial for effective treatment and improved patient outcomes. In recent years, Artificial Intelligence (AI) has emerged as a transformative force in cardiology, offering innovative solutions to enhance the detection and management of CAD. This article explores the multifaceted role of AI in improving the accuracy and efficiency of CAD detection, supported by recent academic research.

Enhancing Diagnostic Accuracy with AI-Powered Imaging Analysis

One of the most significant contributions of AI in cardiology is its ability to analyze complex medical images with a high degree of accuracy. AI algorithms, particularly deep learning models, can examine imaging data from various modalities, such as Computed Tomography (CT) and Magnetic Resonance Imaging (MRI), to identify the presence and extent of plaque buildup in the coronary arteries. A study published in the *Balkan Medical Journal* highlights that a deep learning system can precisely identify and evaluate coronary artery stenosis on CT images, a task that is often time-consuming and prone to variability when performed manually [1]. By automating the analysis of these images, AI not only accelerates the diagnostic process but also enhances its consistency and reliability.

Furthermore, AI-powered platforms are being developed to assist in the real-time interpretation of other diagnostic tools. For instance, a recent study

tested an AI-based electrocardiogram (ECG) model, the Queen of Hearts platform, for its ability to detect severe heart attacks, known as ST-elevation myocardial infarction (STEMI). The results demonstrated that the AI model outperformed standard emergency room triage in identifying STEMI, with a significant reduction in false positives [2]. This capability is critical in emergency settings where rapid and accurate diagnosis is paramount to saving lives.

Improving Risk Stratification and Prediction

Beyond image analysis, AI algorithms excel at processing vast amounts of patient data to identify individuals at high risk of developing CAD. By analyzing electronic health records (EHRs), which include a wealth of information such as medical history, laboratory results, and genetic data, AI models can identify subtle patterns and risk factors that may not be immediately apparent to clinicians. This allows for more personalized risk stratification and the implementation of preventive measures for high-risk patients.

Moreover, AI can predict the outcomes of interventions and the likelihood of complications. For example, machine learning systems can predict the probability of in-stent restenosis, a common complication of angioplasty, by analyzing a combination of patient and clinical data [1]. This predictive capability enables clinicians to make more informed decisions regarding treatment strategies and to tailor post-procedural care to individual patient needs.

The Future of AI in CAD Detection

The integration of AI into clinical practice is still evolving, but the potential for further advancements is immense. The development of sophisticated models like the Adaptive Gated Spatial Convolutional Neural Network (AG-SCNN) for ultrasound imaging demonstrates the ongoing innovation in this field. The AG-SCNN model has shown impressive accuracy, sensitivity, and specificity in detecting CAD from ultrasound images, paving the way for more accessible and non-invasive diagnostic methods [3].

In conclusion, AI is revolutionizing the detection of coronary artery disease by enhancing diagnostic accuracy, improving risk stratification, and providing valuable predictive insights. As these technologies continue to mature and become more widely adopted, they will undoubtedly play an increasingly vital role in the fight against cardiovascular disease, ultimately leading to better patient outcomes and a more efficient healthcare system.

References

[1] Hayıroğlu, M. İ., & Altay, S. (2023). The Role of Artificial Intelligence in Coronary Artery Disease and Atrial Fibrillation. *Balkan Medical Journal*, 40(3), 151–152. [https://pmc.ncbi.nlm.nih.gov/articles/PMC10175890/] (https://pmc.ncbi.nlm.nih.gov/articles/PMC10175890/)

[2] UC Davis Health. (2025, November 19). *New study finds AI model improves heart attack detection*.

[https://health.ucdavis.edu/news/headlines/new-study-finds-ai-model-improves-heart-attack-detection/2025/11]
(https://health.ucdavis.edu/news/headlines/new-study-finds-ai-model-improves-heart-attack-detection/2025/11)

[3] Singh, A., Nagabhooshanam, N., Kumar, R., Verma, R., Mohanasundaram, S., Manjith, R., shuaib, M., & Rajaram, A. (2025). Deep learning based coronary artery disease detection and segmentation using ultrasound imaging with adaptive gated SCNN models. *Biomedical Signal Processing and Control*, 105, 107637.
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(https://www.sciencedirect.com/science/article/pii/S174680942500148X)