

Conference abstract

Hybrid Deep Learning Model for Automated and Accurate Coronary Artery Disease Detection from Cardiac Magnetic Resonance Images

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INTRODUCTION

Coronary artery disease (CAD) is the leading cause of cardiovascular morbidity and mortality worldwide. Cardiac magnetic resonance (CMR) imaging provides high-resolution structural and functional assessment, yet manual interpretation remains time-consuming and prone to inter-observer variability. Deep learning offers opportunities to automate CAD detection with improved diagnostic accuracy.

METHODS

A public dataset from Kaggle containing 63,151 CMR images (Normal and CAD) was preprocessed with contrast-limited adaptive histogram equalization (CLAHE), resized to 100 100 pixels, and z-score normalized. Segmentation used an Attention U-Net. Feature extraction employed a pretrained EfficientNet-B0 backbone, followed by dense layers for classification. To address class imbalance, class weighting, oversampling, and focal loss were applied. The

dataset was split into stratified 80% training and 20% validation subsets. Model performance was optimized using Test-Time Augmentation and threshold tuning to enhance sensitivity while maintaining acceptable specificity. Final evaluation on the validation set was based on sensitivity, specificity, accuracy, and area under the ROC curve (AUC).

RESULTS

The model achieved an AUC of 0.975, sensitivity of 94.19%, specificity of 95.47%, and overall accuracy of 96.03% on the validation set, demonstrating strong performance in discriminating CAD from Normal cases.

CONCLUSIONS

The model achieved an AUC of 0.975, sensitivity of 94.19%, specificity of 95.47%, and overall accuracy of 96.03% on the validation set, demonstrating strong performance in discriminating CAD from Normal cases.



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