16.INTERPRETABLE AND EFFICIENT HEARTBEAT DYNAMICS FOR ARRHYTHMIA CLASSIFICATION

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Accurate classification of arrhythmias is crucial for early diagnosis and effective treatment of cardiovascular diseases. This study introduces Heartbeat Dynamics, a novel and efficient interpretable feature for arrhythmia classification. Unlike traditional feature extraction methods that rely on handcrafted statistical or frequency-based attributes, Heartbeat Dynamics captures the intrinsic temporal variations and rhythmic patterns of heartbeats, enhancing classification performance. The proposed approach leverages advanced machine learning techniques to analyze electrocardiogram (ECG) signals, ensuring robust detection of abnormal heart rhythms. Extensive experiments on benchmark ECG datasets demonstrate that Heartbeat Dynamics significantly improves classification accuracy while maintaining model interpretability. The results highlight its potential for real-world applications in automated arrhythmia detection, contributing to more precise and reliable cardiac healthcare solutions.

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