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Automated Arrhythmia Detection and Classification Using modified Link Net and Attention Mechanism

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The diagnosis and classification of arrhythmia, which is associated with abnormal electrical activity in the heart, are critical in the clinical treatment of the condition. Previous studies have been made to derive only one arrhythmia in a given window, but the length of the arrhythmia is not determined, so multiple arrhythmia may exist in the input window. In studies that classified for multiple arrhythmia types in the given input, the classification performance was not good enough for clinical use because of mixed arrhythmia types. In this paper, we propose a novel framework for automatic detection and classification, which consists of combining encoder and decoder network inspired by Linket and a channel-wise attention block to solve to problem of arrhythmia detection and classification in constrained input length. Specifically, eight arrhythmia types, including atrial fibrillation, were classified using electrocardiogram signals. In addition, we used the time-shifting oversampling technique to solve the class imbalance problem. As a result, 8-class performance using ECGs collected with SEERS Technology was calculated, all with an overall mean-average precision of over 90\%. In addition, the overall F1-score obtained 94.66\%. The proposed framework can identify the time of occurrence and end of multiple arrhythmias in a fixed input. With this, it is possible to more accurately recognize various occurrences of arrhythmias, calculate the occurrence time, and make an accurate treatment plan accordingly.

Biography

Yun Kwan Kim has completed his M.S from Sungkyunkwan University School of Cognitive Science. He has been serving as an senior researcher of SEERS Technology.

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