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Deep Learning for Ventricular Beat Detection in Electrocardiogram

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Detecting ventricular beats in ECG monitoring is important to prevent the occurrence of dangerous arrhythmias such as ventricular fibrillation, ventricular flutter, and ventricular tachycardia. In particular, as these arrhythmias can lead to death within minutes, they need to be managed as real-time as possible. Therefore, finding a reliable detection method for ventricular beats may benefit cardiovascular monitoring systems. In this study, to detect ventricular beats, a semantic segmentation algorithm such as BiSeNet was used using the characteristic that ventricular beats show a morphological difference from normal beats. The algorithm has been partially redesigned for electrocardiographic one-dimensional data. The dataset for training the algorithm consists of 11280 clinical data with a 16-second strip length, of which 9024 were used as training data and 2256 were used as test data. One data is recorded at a sampling rate of 256 per second and is labeled as sample-by-sample in three classes: baseline, normal beat, and ventricular beat. The ratio of the number of beats for each class in the dataset is 21482 Normal beats (54.4%) and Ventricular beat 18007 (45.6%) out of a total of 39489 beats. The proposed method has better detection accuracy than other existing methods. The algorithm detected the normal beat with a sensitivity of 99.8%, and the ventricular beat with a sensitivity of 98.4%.

Biography

Kunwook Jo is a researcher working in the healthcare IT industry after getting a master's degree in artificial intelligence from Hanyang University in Korea. Kunwook is researching and developing real-time artificial intelligence technology that enables telemedicine services. The main research area is the processing of biosignals such as electrocardiograms, and recently he is developing deep learning models that can detect abnormal heartbeats and arrhythmias.

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