Analysis of 12-Lead Electrocardiogram Signal Based on Deep Learning

Yangxin Chen
Jiangting Mai
Wen Hao Liu
Yuyang Chen
Yong Xie
Jingfeng Wang

Introduction: In this work, a deep learning method is proposed to identify the types of arrhythmia.

Methods: The 12-lead electrocardiogram signal is first denoised by filters to eliminate the baseline drift and the myoelectric interference. Then, the filtered signal is sliced into beats and sent to a deep neural network, which contains four convolutional layers, two gated recurrent unit layers, and one full-connected layer. Features in both the spatial domain and the time-frequency domain can be extracted implicitly by the deep neural network, instead of being extracted manually.

Result: On the test split of the dataset, our neural network model achieves an accuracy of 98.15%. Among the accuracies for the four types of arrhythmia, respectively, the lowest one is 96% and the highest is 99%. Our model is must better than a baseline support vector machines classifier, with a test accuracy of 73.54%.

Conclusion: The results give a supportive evidence to make our model clinically applicable to assist physicians in diagnosing certain arrhythmias.