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Deep Learning with Long Short-Term Memory for Enhancement Myocardial Infarction Classification

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Abstract: Myocardial infarction (MI) may be a minor event in a type of chronic disease, even undetectable. However, it can also be a major disaster that causes sudden death. The multivariance in ECG signals for different patients causes the interpretation of existence MI is a difficult task. The various conventional method is proposed to diagnose MI of ECG signals. The conventional classifier algorithm uses a shallow feature learning architecture based on the hand-crafted feature. This paper is only a preliminary study so that this paper contains only brief analysis and plan. However, it can present other point-of-view to process cardiac rhythm that associated in timesteps based on deep learning approach. Basically, a shallow feature learns as well as deep learning. However, the advantage and characteristics of deep learning will make classifier learn automatically without having to involve human intervention. Long

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(MCC) metrics are used to analyze imbalance sequential data of 4.57 Imbalance Ratio (IR). The overall, 3 hidden LSTM layers as classifier show good performance in imbalanced data to classify MI with precision, sensitivity, F1 score, BAcc, and MCC is 0.91, 0.91, 0.90, 0.83 and 0.75 respectively.

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Contents

I. Introduction

Cardiovascular disease (CVD) is the leading global cause of death in low- and middle- income countries [1]. It estimated to be the first-leading killer in 2020 [2]. The result of Basic Health Research at the Indonesian Ministry of Health in 2013 explained that the most common CVD in adults is coronary heart disease. The estimated prevalence of coronary heart disease in Indonesia is around 883.447 or 0.5 percent [3]. Among several types of coronary heart disease, Myocardial Infarction (MI) is the most dangerous form of coronary heart disease with the highest mortality rate [4]. MI occurs due to a lack of oxygen demand in the cardiac muscle tissue which requires the high supply of oxygen, which reduces the supply of oxygen to the area. To pump blood throughout the body, oxygen is needed by the cardiac muscles. If cardiac muscle activity increases, oxygen demand also increases [5].

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