

Emotion Recognition using ECG Raw Data with Deep Learning

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Abstract

ABSTRACT

Long-term negative emotions have severe implications on wellbeing, which call for real-time emotion recognition system. In recent studies, researchers are focusing on using various modalities to recognize emotions for different applications. Identifying emotions correctly only with electrocardiogram (ECG) as the modality is major challenge. The purpose of using only single modality is to reduce the cost. WESAD dataset is used which consists of ECG data of 15 subjects with two targets (*stressed vs non-stressed*). The deep learning model is designed with 33 layers. As a real-time emotion recognition, a window with length of 17,920 of raw ECG data was used without any feature extraction process to perform each decision. In the hidden layers, relu activation function and sigmoid function were used in hidden layers and output layer respectively. Deep transfer learning is used using Icentia11k dataset for primary training and WESAD dataset for retraining. The accuracy is 91.3% after retraining. Tested the model with a new set of dataset A2ES using a self defined normalisation equation and the accuracy is 75%. The complexity here was the dissimilar value range of other ECG data. After including the normalisation equation the accuracy was improved.

Keywords: ECG, Deep Learning, Emotion, Stress
