

ECG signals based mental stress assessment using wavelet transform

Abstract

This paper describes the mental stress assessment using Electrocardiography (ECG) signal. Stress reflects the changes in heart rates under stressful situation. In this work, Heart Rate Variability (HRV) from ECG signal is used to study the activity of Autonomic Nervous System (ANS) under stress states. The Stroop colour word test is used to induce stress and ECG signal was simultaneously acquired from the 10 female subjects in the age range of (20 - 25) years in non invasive manner. An acquired ECG signals are preprocessed using 4 th order elliptic band pass filter. The High Frequency (HF) and Low Frequency (LF) bands of ECG signals were considered to extract the stress related features through Discrete Wavelet Transform (DWT) using db4 wavelet function. The extracted features are mapped into two states such as stress and relax using a K Nearest Neighbour (KNN). The experimental results show the maximum average classification accuracy of 96.41% on classifying the stress and relax states from the ECG signals.

Keywords — Discrete wavelet transform, K Nearest Neighbor, stress, stroop colour word test