Emotion detection from QRS complex of ECG signals using hurst exponent for different age groups

Abstract

Emotion recognition using physiological signals is one of the key research areas in Human Computer Interaction (HCI). In this work, we identify the six basic emotional states (Happiness, sadness, fear, surprise, disgust and neutral) from the QRS complex of electrocardiogram (ECG) signals. We focus specifically on the nonlinear feature 'Hurst exponent' computed using two methods namely rescaled range statistics (RRS) and finite variance scaling (FVS). The study is done on emotional ECG data obtained using audio visual stimuli from sixty subjects belonging to three different age groups - children (9 to 16 years), young adults (18 to 25 years) and adults (39 to 68 years). The performance of the Hurst exponent computed using RRS and FVS for individual age groups resulted in a maximum average accuracy of 78.21%. The combined analysis of the all the age groups had a maximum average accuracy of 70.23%. In general, the results of all the six emotional states indicate better performance compared to previous research works. However, the performance needs to be further improved in order to develop a reliable and robust emotion recognition system.

Keywords — Emotion, inducement stimuli, physiological signals, signal processing techniques