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ECG Biometric Verification Incorporating Different Physiological Conditions

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Abstract
The liveness detection criteria of biological signals have become one of the reasons it has been introduced as an ideal biometric recognition system. Electrocardiogram (ECG) is one of the biological signals that records the rhythms of human's heart in the form of PQRST waves proves the uniqueness of the ECG itself making it suitable to be applied as biometric mechanisms. Previous research had shown the success of proving ECG as a biometric modality however most experimentations were done in normal conditions. Thus, to improve the current research, this work proposed a robust biometric identification by introducing ECG signals incorporating various physiological conditions. After the data collection of cycling, walking, climbing stairs, and jogging, the signals are pre-processed by using MODWT to remove unwanted noises produced during data collection process. Then, Pan Tompkins algorithm is used to segment the QRS complexes. The segmented signals are overlapped and align with each other to observe its pattern. Next, the QRS waveform is classified by using various class of SVM by considering two factors which are same physiological conditions and different physiological conditions. The subjects are compared between same and different physiological condition to validate the proposed method. The results show that the precision achieved up to 100%. In average, Gaussian SVM gives highest precision when compared to other type of SVM classifiers suggesting that Gaussian SVM is the most appropriate to be applied for person identification. Thus, the proposed method proves that biometric recognition can be performed regardless of different physiological conditions and can be applied in real life scenarios.

Author Keywords
Biometric; ECG; MODWT

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