IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
Impact Factor: 7.301
Volume 3, Issue 2, August 2023

Development of a New Biometric Authentication Method Based on ECG Signals

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Abstract: *Biometric authentication has become an integral part of secure systems, as traditional password-based methods have proven to be vulnerable to various attacks. In recent years, there has been growing interest in utilizing electrocardiogram (ECG) signals as a biometric authentication method due to their unique characteristics and inherent physiological nature. This paper presents the development of a new biometric authentication method based on ECG signals.*

The method involves capturing the ECG signals from individuals using non-invasive sensors and extracting relevant features for authentication purposes. A comprehensive database of ECG signals is collected from a diverse population to ensure the robustness and effectiveness of the system.

The acquired ECG signals undergo preprocessing techniques to remove noise and artifacts, followed by feature extraction using advanced signal processing algorithms. several key features are extracted from the ECG signals, including morphological features such as QRS complex duration, R-peak amplitude, and T-wave amplitude. Additionally, statistical features such as heart rate variability and wavelet-based features are also extracted. These features are then used to create a unique template for each individual, which serves as their biometric signature. To evaluate the performance of the proposed method, extensive experiments are conducted using a benchmark dataset. The experiments involve various scenarios, such as intra-class and inter-class authentication, to assess the system's accuracy and robustness. The results demonstrate the effectiveness of the proposed method, achieving high accuracy rates and low false acceptance rates. Furthermore, the proposed method offers several advantages over existing biometric authentication methods. ECG signals are difficult to forge or steal, making them highly secure. Moreover, ECG signals are continuously generated by the human body, enabling dynamic authentication systems that can monitor user presence and detect impersonation attempts

Keywords: ECG signals

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