Cardiokey: A Binary and Multi-Class Machine Learning Approach to Identify Individuals Using Electrocardiographic Signals on Wearable Devices

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Abstract— Biometrics tools such as fingerprint and iris are widely used in industry to protect critical assets. However, their vulnerability and lack of robustness raise several worries about the protection of highly critical assets. Biometrics based on Electrocardiographic (ECG) signals are a robust identification tool. In addition, most of the state-of-the-art techniques have worked on clinical signals that are of high quality and less noisy. In more practical contexts, the extracted signals from wearable devices like smart watch are noisier and contains more inconsistencies. In this paper, we are presenting a complete machine learning pipeline that identify people using ECG extracted from an off-person device. An off-person device is wearable device that is not used in medical context such Apple watch. In addition, one of the main challenges of this project is the variability of the ECG of different persons and in different situations. To solve this issue, we proposed two different approaches: per person classifier, and one-for-all classifier. The first approach suggests making binary classifier to distinguish one person from others. The second approach suggests multi-classifier to distinguish the selected set of individuals from non-selected individuals (others). The preliminary results, the binary classifier obtained a performance 90% in terms of accuracy within a balanced data. The second approach has reported a multi-class accuracy of 80%.

***Keywords*—** Biometrics, ECG, Machine Learning, signals processing.

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