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ECG Based Reliable User Identification Using Deep Learning

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Abstract : Identity theft has serious ramifications beyond data and personal information loss. This necessitates the implementation of robust and efficient user identification systems. Therefore, automatic biometric recognition systems are the need of the hour, and ECG-based systems are unquestionably the best choice due to their appealing inherent characteristics. The CNNs are the recent state-of-the-art techniques for ECG-based user identification systems. However, the results obtained are significantly below standards, and the situation worsens as the number of users and types of heartbeats in the dataset grows. As a result, this study proposes a highly accurate and resilient ECG-based person identification system using CNN's dense learning framework. The proposed research explores explicitly the calibre of dense CNNs in the field of ECG-based human recognition. The study tests four different configurations of dense CNN which are trained on a dataset of recordings collected from eight popular ECG databases. With the highest FAR of 0.04 percent and the highest FRR of 5%, the best performing network achieved an identification accuracy of 99.94 percent. The best network is also tested with various train/test split ratios. The findings show that DenseNets are not only extremely reliable but also highly efficient. Thus, they might also be implemented in real-time ECG-based human recognition systems.

Keywords : Biometrics,Dense Networks,Identification Rate,Train/Test split ratio
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