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A Compression and Encryption Based Heart Disease Diagnosis with Deep Learning through ECG Signals

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Abstract: *Electrocardiogram (ECG) monitoring models are commonly employed for diagnosing heart diseases. Since ECG signals are normally acquired for a longer time duration with high resolution, there is a need to compress the ECG signals for transmission and storage. So, a novel compression technique is essential in transmitting the signals to the telemedicine center to monitor and analyses the data. In addition, the protection of ECG signals poses a challenging issue, which encryption techniques can resolve. The existing Encryption-Then-Compression (ETC) models for multimedia data fail to properly maintain the trade- off between compression performance and signal quality. In this view, this study presents a new ETC with a diagnosis model for ECG data, called the ETC-ECG model. The proposed model involves four major processes, namely, pre-processing, encryption, compression, and classification. Once the ECG data of the patient are gathered, Discrete Wavelet Transform (DWT) with a Thresholding mechanism is used for noise removal. In addition, the chaotic map-based encryption technique is applied to encrypt the data. Moreover, the Burrows-Wheeler Transform (BWT) approach is employed for the compression of the encrypted data. Finally, a Deep Neural Network (DNN) is applied to the decrypted data to diagnose heart disease. The detailed experimental analysis takes place to ensure the effective performance of the presented model to assure data security, compression, and classification performance for ECG data.*

Keywords: Electrocardiogram; encryption-then-compression; burrows wheeler transform; encryption

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