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Sparse Coding Based Classification of Electrocardiography Signals Using Data-Driven Complete Dictionary Learning

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Abstract : In this paper, a data-driven dictionary approach is proposed for the automatic detection and classification of cardiovascular abnormalities. Electrocardiography (ECG) signal is represented by the trained complete dictionaries that contain prototypes or atoms to avoid the limitations of pre-defined dictionaries. The data-driven trained dictionaries simply take the ECG signal as input rather than extracting features to study the set of parameters that yield the most descriptive dictionary. The approach inherently learns the complicated morphological changes in ECG waveform, which is then used to improve the classification. The classification performance was evaluated with ECG data under two different preprocessing environments. In the first category, QT-database is baseline drift corrected with notch filter and it filters the 60 Hz power line noise. In the second category, the data are further filtered using fast moving average smoother. The experimental results on QT database confirm that our proposed algorithm shows a classification accuracy of 92%.

Keywords : electrocardiogram, dictionary learning, sparse coding, classification
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