Transform Based Approach for ECG Period Normalization

Hamza Baali*, Rini Akmeliawati, Momoh J E Salami, Musa Aibinu and Asan Gani

Kuala Lumpur /MALAYSIA, Malaysia

The irregularity in the ECG heartbeats durations and application of two dimensional ECG compression algorithms has undoubtedly been a challenge in this field. In this paper, an efficient alternative solution for ECG period normalization is proposed. Each ECG heartbeat is transformed into the SVD domain formed from the LPC filter impulse response matrix, where only a few components contain most of the energy of the signal. The transformed signal is zero padded or truncated to match the desired length then, multiplied by a basis of higher or lower dimension, respectively, to form a normalized ECG heartbeat. Reverse steps are applied to recover the heartbeat with original length. It is proven that a perfect recovering of the original signal is achieved when it is stretched. On the other hand, the limit in shrinking the signal without producing significant distortion is also analysed using objective measure of distortion. In addition, it is shown that the singular vectors are orthogonal sinusoids which lead to a reduction of the computational complexity of the algorithm.