

Research Title	The Feature extraction of Electrocardiogram for Analysis of Heart Rate Variability and Heart Abnormality Classification for Prediction of Cardiovascular Disease	
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The objectives of the research present a novel time-frequency electrocardiogram and heart sound processing for an automatic heart rate characteristics monitors and analysis for an estimate of cardiovascular disease risk factors. An algorithm to classify normal and abnormal heart sound signals using phonocardiogram (PCG) dataset from the secondary database. Heart sound analysis process consists of segmentation, feature extraction and classification. Segmentation is the most important process due to heart sounds are non-stationary signal and interference from extra cardiac sounds. The proposed analysis is based on an experiment composed of several statistical signals analysis techniques such as wavelet based de-noising, energy-based segmentation, Hilbert-Huang transforms based feature extraction and Support Vector Machine (SVM) based classification.

From the results, Hilbert boundary spectrum shows the energy distribution of normal heart sound changing with frequency. It has two main frequency peaks. The first peak locates around 40Hz, which is in the frequency range of S1. The second peak lies around 70Hz corresponding to the frequency range of S2, respectively. The classification algorithm test results using testing dataset validate the model used in the proposed system with very high classification accuracy averaged at 90.48% composed of 100% sensitivity and 81.8% specificity.