

Supraventricular Tachycardia Recognition Using Vectorcardiography Vector and Particle Swarm Optimization Algorithm

Javid Farhadi¹ , Nader Jafarnia Dabanloo¹ , Saman Parvaneh²

¹Department of biomedical Engineering , science and Research Branch, Islamic Azad University , Tehran , Iran

²Philips Research North America, Cambridge, MA, USA

Abstract

Vectorcardiography (sometimes called as VCG) is a way of recording the magnitude and direction of the electrical forces that are produced by the heart using a continuous series of vectors that shape curving lines around a central point. Recently, the enhancement of definite and fast approaches for automatic ECG feature extraction have been of major importance, especially for the investigation of long recordings and for extracting physiological and nonphysiological features. Supraventricular tachycardia (SVT), also named paroxysmal supraventricular tachycardia, is an abnormally fast heartbeat in which the electrical system in the heart is not working appropriately. The utilized data base for test and training processes are related to Saint Petersburg cardiology institute, which are available in Physio Net website. In this study, dower transformation has been used for extracting VCG from ECG and then Particle Swarm Optimization (PSO) algorithm is employed for the extraction of 12 features during a heartbeat. Afterward, Support Vector Machine (SVM) has been employed for the classification process and showed that the result with 5 fold cross validation method has an accuracy of 97.16%. The simulation results depicted the effectiveness of proposed method.