

## **Support Vector Machines and Feature Selection for the Detection of Potentially Fatal Arrhythmias**

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### **Abstract**

It is very important to find ventricular fibrillation (VF) and rapid ventricular tachycardia (VT) as soon as possible so that defibrillation therapy works. Numerous detection techniques have been developed that rely on extracting temporal, spectral, or complexity factors from the electrocardiogram (ECG). Nevertheless, the construction of these algorithms primarily involves the consideration of each parameter in isolation. This paper introduces a unique algorithm for detecting life-threatening arrhythmias. The algorithm incorporates many ECG characteristics that have been previously proposed, including support vector machine classifiers. A comprehensive set of 13 metrics was calculated, encompassing temporal (morphological), spectral, and complexity characteristics of the electrocardiogram (ECG) signal. A strategy for filter-type feature selection (FS) was proposed in order to assess the relevance of computed parameters and their impact on detection performance. The evaluation of the proposed methodology encompassed two distinct binary detection scenarios: the differentiation between shockable (VF plus VT) and nonshockable arrhythmias, as well as the distinction between VF and nonVF

rhythms. This evaluation was conducted by utilizing data from various sources, including the medical imaging technology database, the Creighton University ventricular tachycardia database, and the ventricular arrhythmia database. The sensitivity (SE) and specificity (SP) analyses conducted on the out-of-sample test data revealed that the values for sensitivity were 95% and 92% for shockable and VF scenarios, respectively. Similarly, the specificity values were found to be 99% and 97% for the shockable and VF scenarios, respectively. The performance of our system was evaluated by comparing it to existing individual detection schemes, resulting in considerable improvements. The findings of our study indicate that the utilization of statistical learning algorithms to combine ECG parameters enhances the efficacy of identifying life-threatening arrhythmias.

(Keywords:)

Feature selection (FS), support vector machines (SVM), ventricular fibrillation (VF) detection

## REQUEST FOR FULL TEXT

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