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Wavelet Transform and SVM Based Heart Disease Monitoring for Flexible Wearable Devices

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Abstract

INTRODUCTION: Heart disease has been a major health challenge globally; therefore the development of reliable and real-time heart disease monitoring methods is crucial for the prevention and management of heart health. The aim of this study is to explore a flexible wearable device approach based on wavelet transform and support vector machine (SVM) to improve the accuracy and portability of heart disease monitoring.
OBJECTIVES: The main objective of this study is to develop a wearable device that combines wavelet transform and SVM techniques to achieve accurate monitoring of physiological signals of heart diseases.
METHODS: An integrated method for heart disease monitoring was constructed using flexible sensor technology combined with a wavelet transform and support vector machine. The Marr wavelet transform was applied to the ECG signals, and the feature vectors were constructed by feature parameter extraction. Then, the radial basis kernel SVM was utilized to identify the three ECG signals. The performance of the algorithm was optimized by adjusting the SVM parameters to improve the accurate monitoring of heart diseases.
RESULTS: The experimental results show that the proposed wavelet transform and SVM-based approach for flexible wearable devices achieves satisfactory results in heart disease monitoring. In particular, the algorithm successfully extracted feature vectors and accurately classified different ECG signals by skilfully combining the wavelet transform and SVM techniques for the processing of premature beat signals.
CONCLUSION: The potential application value of the wavelet transform and SVM-based flexible wearable device approach in heart disease monitoring is emphasized. By efficiently processing ECG signals, the method provides an innovative and comfortable solution for real-time monitoring of cardiac diseases.

Keywords: wavelet transform, SVM, flexible wearable devices, heart disease

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1 Introduction

The rise of wearable sensors has revolutionized the medical field. While traditional medical monitoring usually requires patients to travel to hospitals or clinics, wearable sensors enable real-time monitoring of health conditions in patients' daily lives, greatly improving the convenience and efficiency of monitoring. Additionally, these sensors are capable of monitoring a wide range of physiological parameters, including blood pressure, oxygen saturation, heart rate, and more. By giving medical professionals timely and accurate data, they can better understand their patients' conditions and determine the best course of treatment. A completely new era of health management and medical monitoring has been made possible by the introduction of flexible, wearable sensors. These sensors monitor not only key biosignals such as pulse rate, respiratory rate, body temperature, movement, and blood