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Portable Heart Attack and Heart Wall Blockage Detection System with Mobile Application Integration: A Systematic Review

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Abstract

The leading causes of the sudden cardiac events which often occur suddenly and require immediate treatment include heart attacks and chronic obstructions to the heart walls. They are not easy to spot at an early stage because conventional diagnostic tools are only available for clinical use in developed countries, or in rural areas that have poor resources. The actual purpose of this study is to create a mobile application connected portable heart attack and heart wall blockage detection system. The system utilizes Electrocardiogram (ECG) and Photoplethysmography (PPG) sensors to constantly monitor cardiac activity in real-time. Support Vector Machine (SVM) is a supervised machine learning approach and Cross Wavelet Transform (XWT) that applies in data analysis for effective anomaly detection. The smartphone application also provides features such as real-time visualization of anomalous cardiac states, alerts, and the possibility to alert medical professionals. The system exhibited a high level, up to 70% endorsing the use of the combination of ECG and PPG and 85% saying that it is pertinent in the reduction of heart attack deaths, the study provides remarkable endorsement of using real-time cardiac monitoring. Based on the survey, 78% of the respondents supported SVM and XWT supervised machine learning methods, 72% preferred that the data be stored in the cloud, and 61% wanted an easy interface. To be able to perform effective cardiac care, more improvement on the sensor cost, privacy, and reliability is needed. More development will focus on the longevity of operating time, incorporating more sensors for enhanced prognosis performance, and extending the learning algorithm on larger databases. This system can reduce the number of hospital visits, enhance cardiac care for high-risk individuals living in rural communities, and facilitate earlier detection of cardiac events in areas where health services are lacking, catering to an urgent need in health care.

Keywords: *Portable heart monitoring, machine learning, real-time cardiac detection, heart attack, mobile health integration.*