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DEVELOPMENT OF A SMART CARDIOVASCULAR HEALTH MONITORING SYSTEM USING WEARABLE DEVICES

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Background: Cardiovascular disease (CVD) remains a leading cause of morbidity and mortality worldwide, imposing significant economic and social burdens. With advancing technology, personal health management through wearable devices, such as smartwatches, has gained traction, particularly among heart patients. These devices measure key health metrics like heart rate and physical activity. However, their capacity to predict cardiovascular risks is still limited. This research aims to develop a cardiovascular risk assessment algorithm using data from smartwatches, supplemented by patient information collected during clinical visits.

Methodology: Participants were recruited from the general public and cardiology clinic patients. Each participant wore a smartwatch that tracked their 24-hour basal heart rate, heart rate variability, physical activity, and SpO2 levels. This smartwatch data was merged with modified Atherosclerotic Cardiovascular Disease (ASCVD) scores from clinical visits. Data preprocessing, cleaning, and merging were done using Python. Logistic regression was employed to train the algorithm with data from high-risk CVD patients. The training model accounted for dynamic changes in key health metrics over time to predict cardiovascular risks.

Deliverables: Preliminary analysis revealed that combining smartwatch metrics with ASCVD scores enabled the identification of high-risk CVD patients. The algorithm issued real-time alerts, advising users to seek medical attention when necessary. It effectively differentiated between low and high-risk patients by analyzing health parameter distributions.

Conclusion: The developed cardiovascular risk assessment algorithm integrates smartwatch data with clinical information to provide real-time health alerts, offering potential for early CVD management and more personalized treatment approaches. However, further research is required to address concerns about scalability, reliability, and safety before widespread clinical implementation. This study opens new avenues for the development of advanced CVD prediction tools.

Keywords: Cardiovascular disease, Remote health monitoring, Wearable devices