ABSTRACT

Premature deaths from cardiovascular disease have become a serious threat in the last decade, owing to an unhealthy lifestyle and a lack of low-cost sensing and prediction systems. An unhealthy lifestyle, both physical and mental, facilitates cardiovascular disease, while the cost of diagnostics prevents the underprivileged from receiving an early cardiovascular assessment. The only way to prevent such sudden deaths is to detect cardiovascular anomalies early. Existing systems are inaccessible to the general population because of the cost, or they rely heavily on evaluation by professionals. This work has modeled and simulated a cardiovascular disease detection algorithm capable of detecting cardiovascular disease at the early stages. The algorithm is sensitive enough to detect five types of arrhythmias with high precision. The modeled system was also validated with an average accuracy of 95% using several standard databases such as MIT-BIH arrhythmia and MIT-BIH atrial fibrillation. Later, the model was integrated into a microcontroller to design a low-cost portable CVD detection device. A dedicated algorithm was developed to improve the efficacy of the assessment process that considers some of the associated critical factors. The model has been built and implemented with a low-cost, easy-to-use ECG collection system combined with a local storage server capable of capturing and storing patient data locally. In the meantime, the routing algorithm shares the data with remote specialists for decentralized assessment considering specialists' responsiveness to critical data, time of availability, and assessment scores. These comprehensive assessment reports received from the specialists can then be printed for the patient or emailed on demand. Such a system is portable, low-cost, and easily integrated into the Android UI for improved usability over continuous internet services.