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A novel approach for the prediction of treadmill test in cardiology using data mining algorithms implemented as a mobile application

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Statement of the Problem: Cardiovascular diseases account for a considerable percentage of untimely deaths. A statistical study conducted by WHO revealed that, around 17.7 million people had died due to Coronary Artery Heart Disease (CAHD) every year. Timely diagnosis and the correct decision on treatment can save precious lives. In the process of diagnosis of the disease, Treadmill Test (TMT) is considered as one of the important screening tests that is used to determine the condition of the heart when external stress is applied. When the patient is subjected to stress there is also a small element of risk in case of serious silent Coronary Artery Heart Disease (CAHD). To simplify and safely perform a screening procedure a Data Mining approach has been proposed in this research to predict the results of TMT.

Methodology: Using a 1000 patient dataset the clinical attributes such as Age, Gender, Body Mass Index (BMI), Diabetes, Dyslipidemia and Systemic Hypertension are found to be the contributing factors for heart disease and are chosen for analysis. The combination of Data Mining techniques - Decision Tree algorithm, K-Sorting & Searching (KSS) which is a modified version of K-Nearest Neighbors (KNN) algorithm and Curve Fitting Mathematical Technique have been applied on these attributes to predict the results of TMT. This method was then tested on 300 prospective patients.

Conclusion: From the analysis, the combination proves to have an improved accuracy over the individual algorithms specified in the methodology. The above mentioned technique utilizes data mining algorithms with a minimum number of six/seven clinical attributes. It is observed that this method has a high negative predictive value for TMT indicating that it is a useful tool to rule out CAHD. The result analysis has also given interesting outputs like reduced Accuracy if the age is more than 60 years, indicating that there are other factors that will have to be analyzed in the future. The proposed methodology implemented as a mobile application "TMT Predict" could be a future digital replacement for the manual TMT as an initial screening tool to rule out CAHD.

Biography

A Jerline Amutha MCA, M.Phil, is working as an Assistant Professor in the Department of Computer Science, M.Sc (CST), Women's Christian College, Chennai and a part time research scholar in Bharathiar University, Coimbatore. Her area of interest includes interdisciplinary research. She has specialization in Data Mining in Healthcare. She has published papers titled "Study and Evaluation of Data mining And Statistics Based Temperature Control"- International Journal of Applied Engineering Research and Development (IJAERD) ISSN 2250-1584 Vol. 3, Issue 3, Aug 2013, 7-14 and "A Novel Approach for the Prediction of Treadmill Test in Cardiology using Data Mining Algorithms implemented as a Mobile Application" in Indian Heart Journal (2018).

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