Hindawi
Computational Intelligence and Neuroscience
Volume 2022, Article ID 9580896, 12 pages
https://doi.org/10.1155/2022/9580896

Research Article

Significance of Visible Non-Invasive Risk Attributes for the Initial Prediction of Heart Disease Using Different Machine Learning Techniques

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Received 29 October 2021; Revised 11 January 2022; Accepted 19 January 2022; Published 21 February 2022

Academic Editor: Gaurav Singal

Introduction. Heart disease is emerging as the single most critical cause of death worldwide and is one of the costliest chronic conditions. *Purpose*. Stimulated by the increasing heart disease mortality rate incidents, an effective, low-cost, and reliable heart disease risk evaluation model is developed using significant non-invasive risk attributes. The significant non-invasive risk attributes like (age, systolic BP, diastolic BP, BMI, hereditary factor, smoking, alcohol, and physical inactivity) are identified by the help of medical domain experts, and their reliability in heart disease prediction is investigated through different feature selection techniques. *Methodology*. The enhancements of applying specific investigated techniques like random forest, Naïve Bayes, decision tree, support vector machine, and K nearest neighbor to the risk factors are tested. The heart disease risk assessment model is developed using the Jupyter Notebook web application, and its performance is tested not only through medical domain measures but also through the model performance measures. *Findings*. To evaluate heart disease risk evaluation model, we calculated measures of discrimination like error rate, AUROC, sensitivity, specificity, accuracy, precision, and so on. Experimental results show that the random forest heart disease risk evaluation model outperforms other existing risk models with admirable predictive accuracy and minimum misclassification rate. *Originality*. The heart disease risk evaluation model is developed based on novel non-invasive heart disease dataset, which consists of 5776 records. This dataset is collected from different heterogeneous data sources of Kashmir (India) through quantitative data collection methods. *Research Implications*. The risk model is applicable where people lack the facilities of integrated primary medical care technologies for untimely heart disease risk prediction. *Future Work*. To investigate deep learning and study the significance of other controlled attributes on different age and sex groups in the risk estimation of heart disease.

1. Introduction

Heart disease is the most influential socioeconomic and public health problem, which has potentially affected both genders with a significant number of causalities and other disabilities [1, 2]. Regardless of being among the most widespread chronic condition leading to a large percentage of disability and mortality across the globe, heart disease is recognized to be among the most avoidable and controllable diseases [3]. Initial identification of cardiac disorder victims can benefit from recuperating patients' health and diminishing the death ratio [4]. If we are to reduce the alarming circumstances emerging out from heart disease, it is implicit to recognize its causal factors that have pushed the world to an unfavorable situation [5]. It is widely accepted that risk factors like age, harmful intake of alcohol, unhealthy diet,