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ijirset@gmail.com



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HEART DISEASE PREDICTION SYSTEM

Noopura Vaidya¹, Hitesh Sancheti²

U.G. Student, Department of Computer Engineering, Sinhgad College of Engineering, Wadgaon, Pune, India¹

U.G. Student, Department of Computer Engineering, PVG's College of Engineering and Technology, Sahakarnagar, Pune, India²

ABSTRACT: The main objective of this project is to develop an Intelligent Heart Disease Prediction System using the data mining modelling technique. It is implemented as a web based questionnaire application. Based on the user answers, it can discover and extract hidden knowledge (patterns and relationships) associated with heart disease from a historical heart disease database. It can answer complex queries for diagnosing heart disease and thus assist healthcare practitioners to make intelligent clinical decisions which traditional decision support systems cannot.

KEYWORDS: Heart Disease Prediction System, Random Forest Algorithm, Hyperparameter Tuning Gradient Boosting Classifier

I. INTRODUCTION

Heart disease is the leading cause of death in the world over the past 10 years (World Health Organization 2007). The European Public Health Alliance reported that heart attacks, strokes and other circulatory diseases account for 41% of all deaths (European Public Health Alliance 2010). Several different symptoms are associated with heart disease, which makes it difficult to diagnose it quicker and better. Working on heart disease patients databases can be compared to real-life application. Doctors know to assign the weight to each attribute. More weight is assigned to the attribute having a high impact on disease prediction. Therefore it appears reasonable to try utilizing the knowledge and experience of several specialists collected in databases towards assisting the Diagnosis process. It also provides healthcare professionals an extra source of knowledge for making decisions.

The healthcare industry collects large amounts of health-care data and that need to be mined to discover hidden information for effective decision making. Motivated by the world-wide increasing mortality of heart disease patients each year and the availability of huge amounts of patients' data from which to extract useful knowledge, researchers have been using data mining techniques to help health care professionals in the diagnosis of heart disease (Helma, Gottmann et al. 2000).

Data mining is the exploration of large datasets to extract hidden and previously unknown patterns, relationships and knowledge that are difficult to detect with traditional statistical methods (Lee, Liao et al. 2000). Thus data mining refers to mining or extracting knowledge from large amounts of data. Data mining applications will be used for better health policy-making and prevention of hospital errors, early detection, prevention of diseases and preventable hospital deaths (Ruben 2009).

Heart disease prediction systems can assist medical professionals in predicting heart disease based on the clinical data of patients. Hence by implementing a heart disease prediction system using Data Mining techniques and doing some sort of data mining on various heart disease attributes, it is able to predict more probabilistically that the patients will be diagnosed with heart disease. This paper presents a new model that enhances the Decision Tree accuracy in identifying heart disease patients. It uses the different algorithms of Decision Trees.

II. RELATED WORK

According to Fahd Saleh Alotaibi, "Implementation of Machine Learning Model to Predict Heart Failure Disease" the ratio of heart failure patients has been increasing every day. To overcome this dangerous situation and deteriorate the chances of heart failure disease, there is a need of a system that can generate rules or classify the data using machine learning approaches. Therefore, this research discussed, proposed and implemented a machine learning model by combining five different algorithms. Rapid miner is the tool used in this research, which computed the high accuracy than Matlab and Weka tool. In comparison with the previous researches, this study has shown significant improvement

and high accuracy than previous work. As far as UCI dataset concerns, the dataset needs to be amplified. As the main limitation in this work is the small size of the dataset. The dataset has limited number of patient's records; therefore, the dataset was augmented using appropriate techniques. In future, the results indicated that the system can be useful and helpful for the doctors and heart surgeons for timely diagnoses the chances of heart attack in a patient.

III. METHODOLOGY

In this project, two ML algorithms for Heart Disease Prediction and Heart Disease Risk Prediction (in future) has been developed. Both ML algorithms require different datasets. The dataset used in Heart Disease Prediction is the Cleveland Heart Disease dataset taken from the UCI repository. The dataset consists of 303 individual's data. There are 14 columns in the dataset. In the actual dataset, we had 76 features but for our study, we chose only 14 from them.

This module trains the Random Forest Classifier model according to provided UCI heart disease dataset. There are only two possible outputs for this model which are 0 (absent) and 1 (present). If it predicts present then this module calculates the chances in percentage.

This module works after the Heart Disease Prediction module. If previous module predicts absent output, then this module runs. This module trains the Hyperparameter Tuning Gradient Boosting Classifier model on provided Framingham Heart dataset. There are only two possible outputs for this model which are 0 (absent) and 1 (present). If it predicts present, then this module calculates the future chances in percentage. Therefore the person's both the results are inserted into the database based on unique identity.

IV. EXPERIMENTAL RESULTS

The screenshots show the heart disease prediction module.

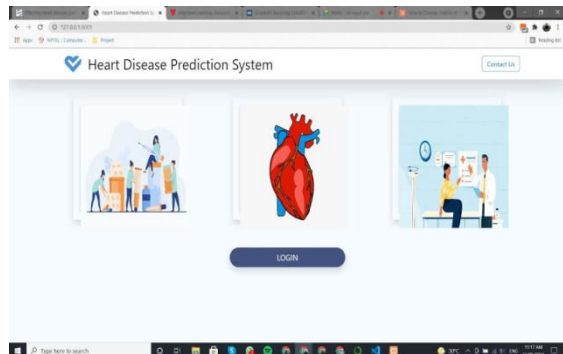


FIG 1: COMMON LOGIN PAGE

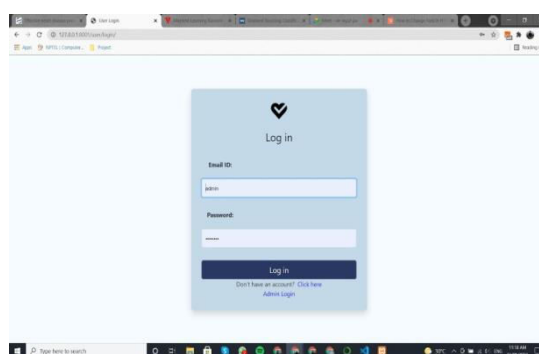


FIG 2: LOGIN PAGE

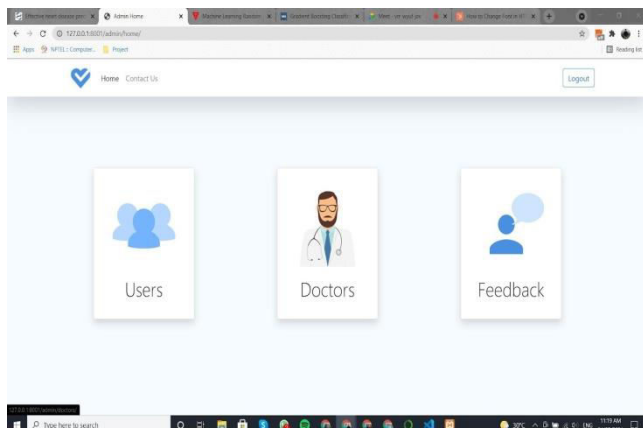


FIG 3: ADMIN HOME PAGE

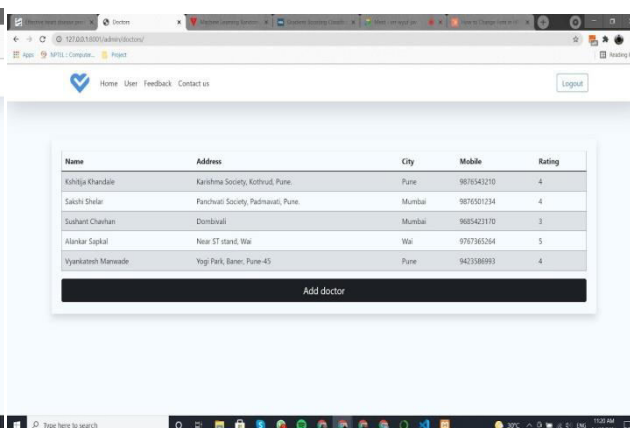


FIG 4: DOCTOR'S LIST PAGE

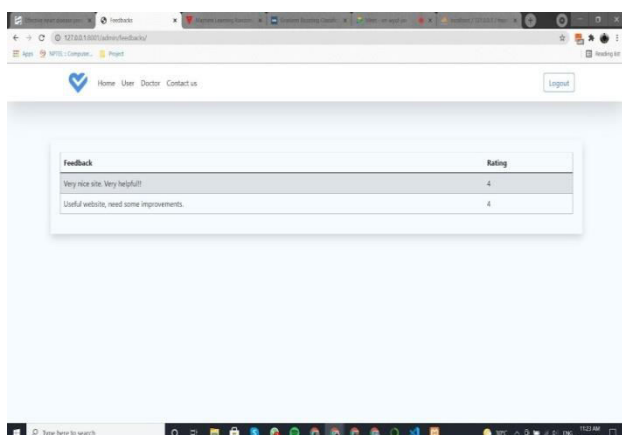


FIG 5: FEEDBACK LIST PAGE

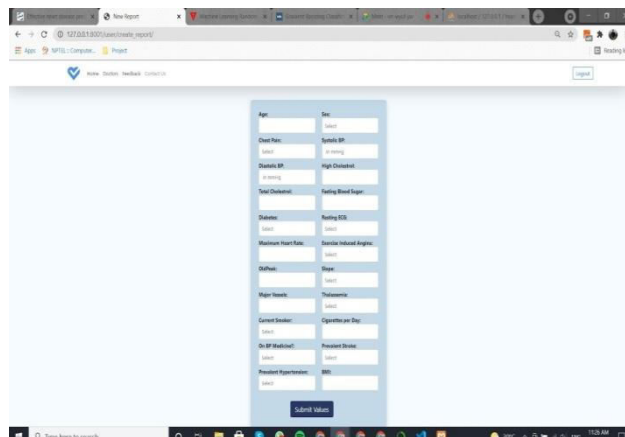


FIG 6: NEW REPORT FORM

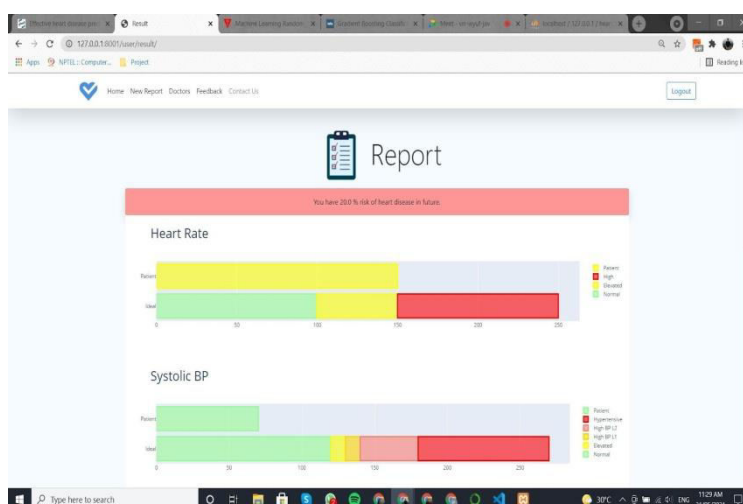


FIG 7: RESULT PAGE

V. CONCLUSION

This proposed system helps in predicting heart disease or its future risk in any user. The proposed system consisting of 4 main modules, which are data pre-processing, feature extraction, predicting the heart disease or its future risk, suggesting a diet according to the output of ML model. Main aim of machine learning module is to find out chances of heart disease in percentage or its future risk. Overall, this system is useful for everyone.

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