

# Machine Learning Ensemble Model to Support and Provide Alerts for Heart Disease Patients

Niphade Snehal Prabhakar<sup>1</sup>, Prof. N. L. Bhale<sup>2</sup>

Student, Department of Computer Engineering, Matoshree College of Engineering and Research Center, Nasik, Maharashtra, India<sup>1</sup>

Head of Department, Department of Computer Engineering, Matoshree College of Engineering and Research Center, Nasik, Maharashtra, India<sup>2</sup>

**ABSTRACT:** In this paper, an effective medical recommendation system that uses a fast Fourier transformation-coupled machine learning ensemble model is proposed for short-term disease risk prediction to provide chronic heart disease patients with appropriate recommendations about the need to take a medical test or not on the coming day based on analysing their medical data. The input sequence of sliding windows based on the patient's time series data are decomposed by using the fast Fourier transformation in order to extract the frequency information. A bagging-based ensemble model is utilized to predict the patient's condition one day in advance for producing the final recommendation. A combination of three classifiers artificial neural network, least squares-support vector machine, and naive bayes are used to construct an ensemble framework. A real-life time series telehealth data collected from chronic heart disease patients are utilized for experimental evaluation. The propose system yields very good recommendation accuracy and offers an effective way to reduce the risk of incorrect recommendations as well as reduce the workload for heart disease patients in conducting body tests every day. The proposed system is a promising tool for analysing time series medical data and providing accurate and reliable recommendations to patients suffering from chronic heart diseases.

## I. INTRODUCTION

In today's modern world cardiovascular disease is the most lethal one. This disease attacks a person so instantly that it hardly gets any time to get treated with. So diagnosing patients correctly on timely basis is the most challenging task for the medical fraternity. A wrong diagnosis by the hospital leads to earn a bad name and loosing reputation. At the same time treatment of the said disease is quite high and not affordable by most of the patients particularly in India. The motivation of this system is to develop a cost effective treatment using data mining technologies for facilitating data base decision support system.

## II. PROBLEM DEFINITION

- To solve the problem of data exchange between medical units, we propose system which helps to improve patient safety and quality care, but also reduce time and resources.
- Nowadays, Cardiovascular Disease (Heart Attack) is ubiquitous and one of the major reasons of death worldwide. Early screening of people at risk of having CVD may lead to minimize morbidity and mortality. A simple approach is proposed in this paper to predict risk of developing heart attack using Smartphone and data mining technique.

## III. LITERATURE SURVEY

**Abhishek Ta, "Heart Disease Prediction System Using Data Mining Techniques"**

In this study, the aim was to design a predictive model for heart disease detection using data mining techniques from Transthoracic Echocardiography Report dataset that is capable of enhancing the reliability of heart disease diagnosis using echocardiography. [1]

**Sellappan Palaniappan, Rafiah Awang “Intelligent Heart Disease Prediction System Using Data Mining Techniques”**

A prototype heart disease prediction system is developed using three data mining classification modelling techniques. The system extracts hidden knowledge from a historical heart disease database. DMX query language and functions are used to build and access the models. The models are trained and validated against a test dataset. Lift Chart and Classification Matrix methods are used to evaluate the effectiveness of the models. All three models are able to extract patterns in response to the predictable state. The most effective model to predict patients with heart disease appears to be Naive Bayes followed by Neural Network and Decision Trees. [2]

**Aditya Methaila, Prince Kansal, “Early Heart Disease Prediction using Data Mining Techniques”**

In this paper the focus is on using different algorithms and combinations of several target attributes for effective heart attack prediction using data mining. Decision Tree has outperformed with 99.62% accuracy by using 15 attributes. Also the accuracy of the Decision Tree and Bayesian Classification further improves after applying genetic algorithm to reduce the actual data size to get the optimal subset of attribute sufficient for heart disease prediction. Association classification technique Apriori algorithm, was along with a new algorithm MAFIA was used. Straight Apriori-based algorithms count all of the 2k subsets of each k-item set they discover, and thus do not scale for long item sets. They use look a heads to reduce the number of item sets to be counted. MAFIA is an improvement when the item sets in the database are very long. [3]

**S. Kiruthika Devi, S. Krishnapriya and Dristipona Kalita“Prediction of Heart Disease using Data Mining Techniques”**

The accuracy of the algorithms used in each technique can be enhanced by hybridizing or combining algorithms to a single algorithm which may not be accurate for weakly classified sets of data, and is expected to make quicker and more precise decisions. [4]

**M. Lavanya, Mrs. P. M. Gomathi, “Prediction of Heart Disease using Classification Algorithms”**

Medical related information is huge in nature and it can be derived from different birthplaces which are not entirely applicable in feature. The research undertook an experience on application of varies data mining algorithm to predict the heart attacks and to compare the based method of prediction. The predictive accuracy determined by J48, REPTREE, nave bayes, neural networks, CART. The overall objective is to study the various data mining techniques available to predict the heart. [5]

**Hlaudi Daniel Masethe, Mosima Anna Masethe, “Prediction of Heart Disease using Classification Algorithms”**

The research undertook an experiment on application of various data mining algorithms to predict the heart attacks and to compare the best method of prediction. The research results do not presents a dramatic difference in the prediction when using different classification algorithms in data mining. The experiment can serve as an important tool for physicians to predict risky cases in the practice and advise accordingly. The model from the classification will be able to answer more complex queries in the prediction of heart attack diseases. The predictive accuracy determined by J48, REPTREE and SIMPLE CART algorithms suggests that parameters used are reliable indicators to predict the presence of heart diseases. [6]

**IV. SYSTEM DESIGN**

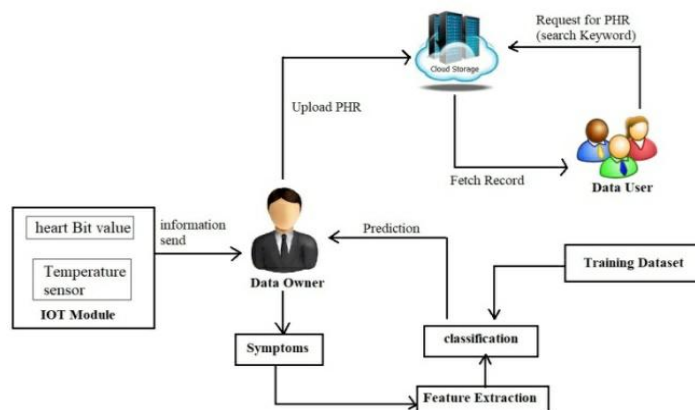


Fig 1: System Architecture

Proposed System presents a methodology called SeSPHR that permits patients to administer the sharing of their own PHRs in the cloud. The SeSPHR methodology employs the encryption and decryption to ensure the PHR confidentiality. The methodology allows the PHR owners to selectively grant access to users over the portions of PHRs based on the access level specified in the ACL for different groups of users.

To generate the re-encryption keys for different groups of users thereby eliminating the key management overhead at the PHR owners end. Formal analysis and verification of the proposed methodology is performed to validate its working according to the specifications. We have planned to develop an application that will provide interface to both physicians and patients.

The application of machine learning and data mining techniques shows it better performance results among themselves. This app will be supposed to predict the heart attack from the chest pain at an early stage and guide the person to take treatment early such as to get their ECG done as early as possible and get evaluated from a doctor to make diagnoses of heart attack.

### V. RESULT



Fig 2: Admin Registration



Fig 3: PHR Owner Registration



Fig 4: PHR Owner Login



Fig 5: User Registration



Fig 6: User Login



Fig 7: Home Page

## VI. CONCLUSIONS AND FUTUREWORK

The symptoms of heart disease are familiar for everyone. But no one can predict when it may happen and also the prediction will not give any instance status i.e. normal or abnormal. Our research intention is to notify the patients that neither normal nor abnormal at its early stage. The application of data mining algorithms shows it better performance results among themselves. This app will be supposed to predict the heart attack from the chest pain at an early stage and guide the person to take treatment early such as to get their ECG done as early as possible and get evaluated from a doctor to make diagnoses of heart attack.

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