

# Hybridization of Data Mining Techniques in Heart Disease Diagnosis and Treatment

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**Abstract**—Data mining is distinct field owing to the fact that the data present are heterogeneous and that certain moral, authorized and social restrictions apply to private medical information. Health care data are sensitive, voluminous in nature and arrive from miscellaneous sources, all of them are not completely appropriate in structure and quality. Nowadays, the manipulation of knowledge and experience of numerous specialists and clinical screening data of patients gathered in a database, during the diagnosis procedure has been widely recognized. The diagnosis and accurate treatment of heart disease is a significant and tedious task. The reduction of oxygen supply and blood to the heart leads to heart disease. Heart disease diagnosis is one of the applications where data mining tools can prove successful results. Many researchers are working on different statistical tools and data mining algorithms to assist health care professionals in the diagnosis of heart disease. Utilization of single data mining technique in the diagnosis of heart disease has been comprehensively inspected, shows acceptable levels of accuracy. The proposed architecture highlights different hybrid data mining techniques showed promising results in the diagnosis of heart disease, For achieving successful result, the projected approach evaluating treatment options and formulating recommendations using data mining focus on what would be the next best treatment step within the present treatment plan. Nowadays, hybridization of data mining techniques become great virtue to analyze the heart disease cases and it is studied that it can be fruitful to patients and by this the new era of mining can be invoked.

**Keywords**—*hybridization, efficient matches, accuracy.*

## I. INTRODUCTION

The variety of lifestyle invites abundant disease in human body. In spite of all diseases, heart disease which is also called cardiovascular disease is considered as one of the leading cause of death in the world with high prevalence in the Asia subcontinent [6]. There are numerous risk factors which account for the heart disease such as sex, age, smoking, hyper tension, obesity, lack of physical activity etc. Patients with genetic risk factors (such as: diabetes, cholesterol, high blood pressure) have maximum probabilities of heart disease. There are few risk factors which are controllable. Despite the fact, having so many risk factors, it is a challenging task to analyze heart disease on the basis of patient's report. Particularly, doctors take decision on their intuition and experience rather than on the knowledge-rich data hidden in the database. In healthcare transaction procedure, data is more complex and vast to be processed and assessed by old-style methods. It

needs right skills and experiences for correct and perfect decisions for cure in prescriptions.

Data mining software is one of the key analytical tool for examining data. It can privilege users to analyze data from different dimensions to categorize and then summarize the acknowledged relationships. Data mining is the procedure of finding associations or patterns among chunks of fields in large relational databases [7]. Data mining in healthcare is an emerging field of high importance for providing prognosis and a deeper understanding of medical data. The applications belongs to data mining in healthcare include analysis of health care centres for better health policy-making and avoidance of treatment faults, on time detection, prevention of diseases, unavoidable hospital deaths and detection of fake insurance claims.

The developments in technology to be embedded in the hospitals management system to help and give advice to the healthcare professionals in diagnosing and providing suitable treatment for heart disease patients is significant. A number of data mining techniques are used in the diagnosis of heart disease such as Naive Bayes, Neural network, Decision Tree, Kernel density, Bagging algorithm, Automatically defined groups, and Support vector machine showing dissimilar levels of accuracies. The proposed model implies whether data mining techniques to heart disease treatment data can provide reliable and consistent performance as that achieved in diagnosing heart disease patients. So, the hybridization of data mining for heart disease diagnosis and treatment can be a new and improved paradigm that can be addressed by research community.

## II. RELATED WORK

Today, world-wide increasing death rate of heart disease patients each year and the availability of enormous amount of patients data from which to abstract useful information, researchers are using data mining techniques to help health care specialists in the diagnosis and treatment of heart disease.

Razali and Ali et al. [2] examined the making of treatment plans for critical upper respiratory infection disease patients using a decision tree. The proposed treatment model gave 94.73% accuracy through giving drugs to patients. The association rules and decision tree to treatment plans are showing satisfactory performance. They also found that the comparison of decision tree technique with other data mining techniques such as naive bayes, genetic algorithms and neural network still needs further investigation.

Saad Ali et al. [3] presented the improved treatment plan to support treatment decision making for health care practitioners. The respective treatment plan was generated on six common diseases using the decision trees technique showing an accuracy level that ranged from 77.97% to 91.67%.

Kim et al. [8] evaluated the current treatments for chronic heart failure using a decision tree and compared the results with those of large-scale clinical trials. They investigated the procedures which recommended prescriptions of drugs to increase or decrease plasma level, fractional shortening, spontaneous hypertension and left ventricular end-diastolic diameter in the cardiovascular disease. However, they were unsuccessful to investigate exact data mining techniques to identify the suitable treatment for heart disease patients.

### III. SCOPE OF WORK

Traditionally, healthcare providers deliver services based on their knowledge and experiences whether individually or collectively depending on cases. According to the research done in services provided by healthcare industry, it is observed that there is dissimilarity in quality of services provided by hospitals, even though they provide the same type of service [4].

The decision of treatment plan on the other hand refers to management on any interferences consists of treatment and examination which will be originated for each problem based on patient's history, provisional diagnosis, physical examination, and differential body diagnosis [7]. Treatment plan can be generated to provide useful evidence as a basis for future medical practice by utilizing previous treatment patterns from clinical records database. So, there is need of such data mining techniques which will provide reliable diagnosis and harmless treatment to heart disease patients.

### IV. PROBLEM DEFINITION

In the past 10-15 years, heart disease is the major cause of death all over the world. Numerous data mining techniques have been used to help health care professionals in the diagnosis of heart disease. Researchers are suggesting that applying data mining techniques in identifying effective treatments for patients can improve practitioner performance and helping to detect which data mining technique can provide more reliable accuracy.

The use of linear data mining technique in the diagnosis of heart disease has been comprehensively explored showing satisfactory levels of accuracy. In the research of heart disease diagnosis and treatment plan, it is found that use of single data mining techniques is less effective and unable to derive expected result. There is no former research that classifies which data mining technique can provide more reliable accuracy in identifying suitable treatment for heart disease patients. So, the conjunction of multiple data mining techniques to form a robust platform which enables a practitioner to convey best match and perfect prescription counselling that can be vital in terms of better treatment and mitigate failure chances.

### V. PERSPECTIVE SOLUTION

Accurate diagnosis and treatment given to patients have been major issues emphasized in medical services. In recent times, research is ongoing for investigating data mining techniques to handle the error and complexity of treatment processes for healthcare service providers. There can be different data mining techniques are combined during diagnosis process and then the treatment plan for the patient is finalized. The comparison of single and hybrid data mining techniques in the diagnosis of heart disease shows diverse accuracies. As per the research in healthcare using data mining, it is proved that the hybrid techniques showing improved accuracy than single technique. Hybridized data mining techniques can enhance the accuracy and worthiness of heart disease diagnosis and can help to identify most relevant and the appropriate treatment for heart disease patients.

### VI. PROPOSED WORK

The proposed model is an efficient approach to measuring the usefulness of hybridized data mining techniques to discover the suitable treatment for heart disease patients. It highlights mixing of different data mining techniques, enhances the accuracy of treatment which is fruitful to patients. So, a new model of hybridization of data mining techniques can be addressed for getting perfect match. As appropriate match of heart disease diagnosis can affect the treatment data which can help researchers to analyze best results for heart disease diagnosis.

### VII. PROPOSED ARCHITECTURE

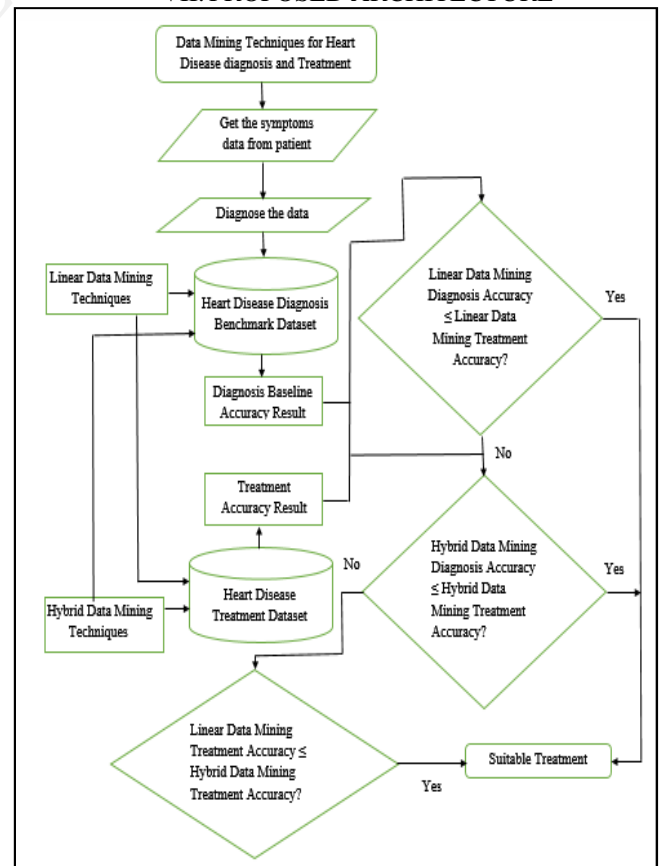


Fig. 1. Architecture for Heart Disease Diagnosis and Treatment

## VIII. CONCLUSION AND FUTURE SCOPE

The proposed approach bridging the gap between heart disease diagnosis and treatment in the healthcare world and illustrate a model to systematically discover if applying data mining techniques to heart disease treatment data can provide as trustworthy performance as that achieved in diagnosing heart disease patients. Due to computer based data analysis awareness, online educational availability and developing integrated learning approach among medical professionals will definitely helpful for accurate diagnosis and effective treatment management plan for heart disease. Innovative and truthful medical technologies are crucial for patient care. This is also factual for prevention of various diseases related to hygiene, addiction related diseases like lung cancer, oral cancer, blood cancer liver cirrhosis and communicable diseases etc. In future, the scope of technology applications like data mining techniques based systems in the healthcare world will really make dramatic changes at every level and patients with heart disease problem will get proper treatment. Additional data mining techniques can be incorporated in near future to provide better results for better life of human being.

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