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Heart Disease Prediction and Suggestion in Efficient Way through Machine Learning Method

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ABSTRACT: The Healthcare industry generally clinical diagnosis is done mostly by doctor's expertise and experience. Computer Aided Decision Support System plays a major role in medical field. Data mining techniques and machine learning algorithms play a very important role in this area. The researchers accelerating their research works to develop a software with the help machine learning algorithm which can help doctors to take decision regarding both prediction and diagnosing of heart disease. The main objective of this research paper is predicting the heart disease of a patient using machine learning algorithms. Initially the dataset is preprocessed and feature selection has been implemented for efficient data selection. Once data selection is done SVM classifier is implemented to detect whether the particular patient is affected by heart disease or not in accurate way.In addition to this the parameters used for heart disease prediction is also analyzed to extract the information if any parameter has high value than threshold level will be notified. Therefore in our proposed system for the heart disease predicted persons a general suggestion will be generated based on their information. Hence our system predicts heart disease in accurate way and providing suggestion to particular patient in efficient way.

I.INTRODUCTION

The highest mortality of both India and abroad is due to heart disease. So it is vital time to check this death toll by correctly identifying the disease in initial stage[1]. The matter becomes a headache for all doctors both in India and abroad. Now a day's doctors are adopting many scientific technologies and methodology for both identification and diagnosing not only common.C.Nagarajan et al [3,8]studies disease, but also many fatal diseases[3]. The successful treatment is always attributed by right and accurate diagnosis. Doctors may sometimes fail to take accurate decisions while diagnosing the heart disease of a patient, therefore heart disease prediction systems which use machine learning algorithms assist in such cases to get accurate results.

The healthcare industry collects huge amounts of healthcare data which, unfortunately, are not "mined" to discover hidden information for effective decision making. Clinical decisions are often made based on doctors' intuition and experience rather than on the knowledge rich data hidden in the database. This practice leads to unwanted biases, errors and excessive medical costs which affects the quality of service provided to patients[2]. For instance it might now be possible for the physicians to compare diagnostic information of various patients with identical conditions. Likewise, physicians can also confirm their findings with the conformity of other physicians dealing with an identical case from all over the world. Medical diagnosis is considered as a significant yet intricate task that needs to be carried out precisely and efficiently. The automation of the same would be highly beneficial[5]. The heart attack occurs when the arteries which supply oxygenated blood to heart does not function due to completely blocked or narrowed.

Various types of heart diseases are
1) Coronary heart disease
2) Cardiomyopathy

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3) Cardiovascular disease
4) Ischaemic heart disease
5) Heart failure
6) Hypertensive heart disease
7) Inflammatory heart disease
8) Valvular heart disease

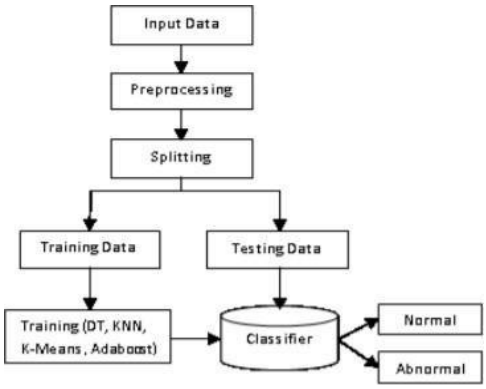
Common risk factors of heart disease include
1) High blood pressure
2) Abnormal blood lipids
3) Use of tobacco
4) Obesity
5) Physical inactivity
6) Diabetes
7) Age
8) Gender
9) Family generation

Data mining is the process of automatically extracting knowledgeable information from huge amounts of data. It has become increasingly important as real life data enormously increasing. Heart disease prediction system can assist medical professionals in predicting state of heart, based on the clinical data of patients fed into the system. There are many tools available which use prediction algorithms but they have some flaws. Most of the tools cannot handle big data. There are many hospitals and healthcare industries which collect huge amounts of patient data which becomes difficult to handle with currently existing systems. Machine learning algorithm plays a vital role in analyzing and deriving hidden knowledge and information from these data sets. It improves accuracy and speed[4].
Machine Learning is extensively used in diagnosing several diseases like heart and other crucial diseases. Among various algorithms in data modeling, decision tree is known as the most popular due to its simplicity and interpretability. Now a day's more efficient algorithms such as SVM and artificial neural networks have also become popular[6].

II. SYSTEM DESIGN

A. Preprocessing

The database contains values. The NaN values cannot process by the programming hence these values need to convert into numerical values. In this approach mean of the column is calculated and NaN values are replaced by the mean.



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BLOCK DIAGRAM

B. Splitting
The whole database is split into training and testing database. The 80% data is taken for training while remaining 20% data is used for testing.

C. Classification
The training data is trained by using four different machine learning algorithms i.e. Decision Tree, Naïve Bayes Algorithm. Each algorithm is explained in detail.

III. MODULES

Preprocessing Module:
In this module, the datasets are taken from the database as an input. In this the whole data will be consider as an input data. From this data required part is taken as an information for further process. Selection process is done in this module which is the initial step in the Knowledge discovery in database. Preprocessing are used to remove unwanted and irrelevant content in datasets.

Feature selection Module:
From a large datasets more number of parameters is taken into consideration in order to attain detail in perfect manner. However needed parameter alone extracted from database and loaded for processing hence this process could be done through feature selection module. The parameter here selected must be in mandatory one to analyze then only efficient suggestions will be provided to patient.

Information Extraction Module:
In this module, Information extraction algorithm is used to extract the particular value points from the database and produce the output measures. Here the mean variant technique is used to evaluate the heartbeat, from the database a particular threshold value is fixed based on the time interval we are taking for consideration. The mean variant have four categories they are positive, negative, false positive and false negative.
If the output value is higher than the threshold value then is comes under the positive category. If the output is less than the threshold then it comes under the negative category. This is the critical situation where the output measure is just minute difference with the threshold it comes under false positive. By using this technique we can obtain.
Based on the output measures, semi supervised algorithm generate the current condition of the patient and also generate the suggestion in the parameters to take of one's health. In this the suggestions are generated based on the parameter that we are taken for the process. The parameters are Cholesterol, Blood pressure, Diabetics, Age, Weight and Chest pain.

Intimate Suggestion Module:
In this module, we already stored the information based on the parameters like if a person age is 30 then weight should be 48-50 kg where this is for a male, which also includes the cholesterol and smoking ratio for a particular gender and age. Similarly a table of analyzed information is stored in the database and it is used to analyze about the patient condition and it produce the result. To perform this fuzzy logic is used, from the database information if-then rule is used, where it combines all the parameter data and combines the result into one output. Which produce the risk level of the patient and provide suggestion like if the weight of the patient is 60 then the suggestion should be at 30 age the weight should be 48-50, please follow diet control eat more vegetables and reduce oil containing food. Data mining process is done where the result in the extracted from the database. Interpretation and evaluation process is performed in order to provide the result in the form of useful and meaning full way to the user.

IV. SYSTEM STUDY

FEASIBILITY STUDY
The feasibility of the project is analyzed in this phase and business proposal is put forth with a very general plan for the project and some cost estimates. During system analysis the feasibility study of the proposed system is to be carried out. This is to ensure that the proposed system is not a burden to the company. For feasibility analysis, some

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understanding of the major requirements for the system is essential. Three key considerations involved in the feasibility analysis are

- ECONOMICAL FEASIBILITY
- TECHNICAL FEASIBILITY
- SOCIAL FEASIBILITY

ECONOMICAL FEASIBILITY

This study is carried out to check the economic impact that the system will have on the organization. The amount of fund that the company can pour into the research and development of the system is limited. The expenditures must be justified. Thus the developed system as well within the budget and this was achieved because most of the technologies used are freely available. Only the customized products had to be purchased.

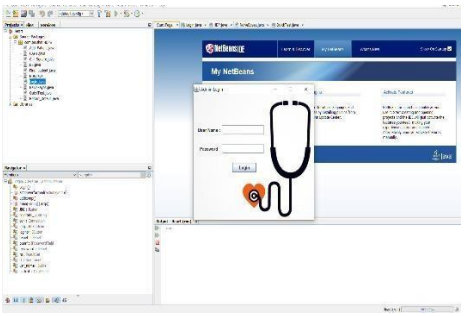
TECHNICAL FEASIBILITY

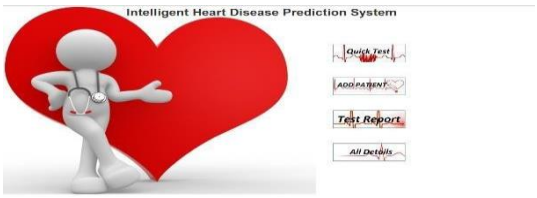
This study is carried out to check the technical feasibility, that is, the technical requirements of the system. Any system developed must not have a high demand on the available technical resources. This will lead to high demands on the available technical resources. This will lead to high demands being placed on the client. The developed system must have a modest requirement, as only minimal or null changes are required for implementing this system.

SOCIAL FEASIBILITY

The aspect of study is to check the level of acceptance of the system by the user. This includes the process of training the user to use the system efficiently. The user must not feel threatened by the system, instead must accept it as a necessity. The level of acceptance by the users solely depends on the methods that are employed to educate the user about the system and to make him familiar with it. His level of confidence must be raised so that he is also able to make some constructive criticism, which is welcomed, as he is the final user of the system.

V. OUTPUT





VI. CONCLUSION

Identifying the processing of raw healthcare data of heart information will help in the long term saving of human lives and early detection of abnormalities in heart conditions. Machine learning techniques were used in this work to process raw data and provide a new and novel discernment towards heart disease. Heart disease prediction is challenging and very important in the medical field. However, the mortality rate can be drastically controlled if the disease is detected at

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the early stages and preventative measures are adopted as soon as possible. Our proposed system attains better performance compared to existing system. Further extension of this study is highly desirable to direct the investigations to real-world datasets instead of just theoretical approaches and simulations. The future course of this research can be performed with diverse mixtures of machine learning techniques to better prediction techniques. Furthermore, new feature selection methods can be developed to get a broader perception of the significant features to increase the performance of heart disease prediction.

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