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Complete Health Care Assistance using Machine Learning

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Abstract -- The information age requires the world to provide excellent healthcare to ensure the survival and health of individuals and communities. Now, India's healthcare sector is under pressure to reduce manual labour. Hospital patients face problems such as lack of medical services, inadequate medical staff, poor communication between doctors and patients, and poor medical information. Finally, these problems prevent hospitals from having the opportunity to maintain their management and their responsibilities to protect the health of all citizens and communities. Patients need appropriate treatment, diagnosis and rehabilitation, and medical personnel need to have good medical knowledge and communication skills to accurately assess pain.Make sure you are healthy. In this study, we tried to combine the results with information from doctors to predict diseases, so that users do not have to rush to many hospitals, thus saving time and providing direct access to users and doctors.

INDEX TERMS -- Healthcare, Machine Learning, Disease Prediction, Decision Tree, Flask

I. INTRODUCTION

The right treatment is the number one need for all of us to make money. Chronic diseases such as heart disease and diabetes are prevalent in many developing countries, including India, and can have a significant impact on global health, safety and trade. Machine learning techniques help predictive models quickly analyse data and generate results quickly. Perhaps there have been many times when most of us urgently needed to seek help from a doctor, but for some reason did not get it. To avoid such problems, we have created a great customer service website that helps users get instant help to solve their problems.

We have implemented a smart online treatment system to help users get instant guidance on their health problems. Healthcare is a broad field that can be properly improved and changed by the characteristics of different diseases and the performance of different processes themselves. Disease prediction and clinical information in general terms has been well received by the information science community in recent years. We use machine learning to monitor all symptoms and diseases. Therefore, the current study recommends using machine learning for health information.

ll. LITERATURE REVIEW

Due to the increase in the number of diseases, the use of technology in the field of medicine is increasing. This is understandable. This article discusses the machine learning model developed by Anuj Kumar, Mr. Analp Pathak, "Machine Learning Model for Life-Saving Early Prediction of Multiple Diseases" [1]. Using four different algorithms, the model achieves an average accuracy of over 95%, the best possible accuracy. It focuses specifically on the use of decision trees and Naive Bayesian algorithms and comparing their accuracy in predicting liver disease. This study focuses on a limited number of symptoms and diseases associated with the liver. Healthcare in India is important to develop this system to understand the current health situation in India "Healthcare in India: care"[2] provides insight into the critical issues we face today and what our priorities should be. to create a safe and stable environment. Learn how various algorithms complement each other to select the best machine learning model for prediction "Comparison of Multiple Decision Making Using Different Machine Learning Techniques"[3] Use five algorithms: Naive Bayes, SVM, KNN, Decision Making, and Random Forest Algorithms. From the article "Disease Research Using Machine Learning" [4], we learned that SVM, RF and LR algorithms are most widely used in prediction and the truth is that they are most widely used. For breast cancer prediction, RF is the result of accurate disease classification, the LR algorithm has proven to be the most reliable for heart disease prediction, and the SVM model, when active, is good for kidney disease and PH in general. -dimensional, quasi- Has both modelled and unmodeled reliability data.It is believed that medical and research data differ from disease studies and comparisons are only possible when the basis of data and methods is established.

lll. PROPOSED SYSTEM

A. PROBLEM STATEMENT

To create a health care website which will predict the disease with the help of symptoms given by the user by Machine Learning. In this proposed system we are going to take down five symptoms from the users and evaluate them by applying algorithms such as Decision Tree, Random Forest and Naïve Bayes which will help in getting accurate predictions.

B. OBJECTIVES OF THE PROJECT

The objective of this research project is to create a user-friendly health website that serves as a one-stop shop for users to access various health services. The site includes a symptom prediction model where users can enter details about their symptoms and get predictive information about a diagnosis or further advice.

The site also has a free donation model that allows users to enter details about blood when they want to donate blood or search for available blood lists if they need it. The site also offers a variety of health-related services, including regular free medical checkups and information on other activities of partner NGOs. The website is designed to improve access to accurate medical information and healthcare, making treatment easier and more convenient for users.

C. FLOW OF PROPOSED SYSTEM

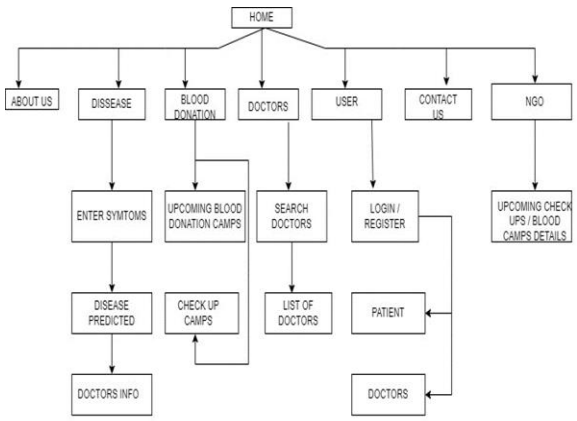

Fig 1: HealthCare System

Flow of the proposed system is user first need to register and once the registration is done he/she can visit different pages such as prediction where model can predict disease based on the input given by the user the predicted disease is 95.12% accurate, user can also fill details for blood donation and check for upcoming NGO checkup camps, and also can contact contact doctors.

D. DRAWBACKS OF EXISTING SYSTEM

1. Inadequate Disease Assessment: Current systems are limited to the diseases they can predict accurately. Currently, the system can only predict a limited number of diseases based on available data and training models. However, as machine learning and data collection continues, the system may be modified to include more diseases in the future, providing more accurate symptom predictions and medical advice.

2. Complex user interface: The user interface (UI) of today's systems can be difficult for first-time users and requires a learning curve to navigate and use all features. In future updates, efforts can be made to improve the user interface by combining beautiful design patterns, easy-to-understand, and clear instructions to improve the overall user experience. This will include iterating user testing and feedback to identify areas for improvement and make necessary adjustments to simplify the UI.

3. Increased healthcare capacity: The current system may be limited in the range of healthcare it offers. In future updates, more health-related features may be used to improve website performance. This may include features such as telemedicine counselling, personalised health advice, drug discovery, and health monitoring tools. By continuing to expand the functions and services provided, the website can become a medical platform that caters to the needs of different users.

IV. IMPLEMENTATION DETAILS

A. DISEASE PREDICTION BASED ON USER's SYMPTOMS

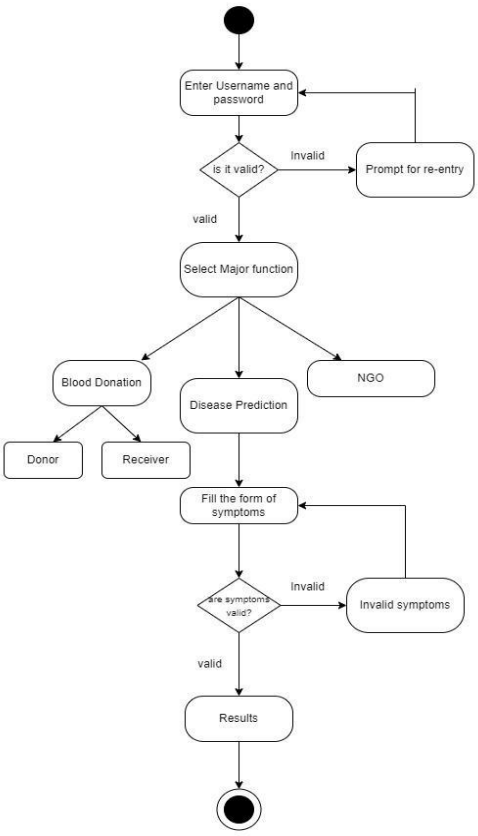

Fig. 2 Overall flow of the project

The algorithm used to identify the predicted disease based on the symptoms input.The main functionality of the webpage where the user has to enter the details for the symptoms which they are experiencing and based on those symptoms they will get the accurate disease based on the symptoms.

B. ALGORITHMS

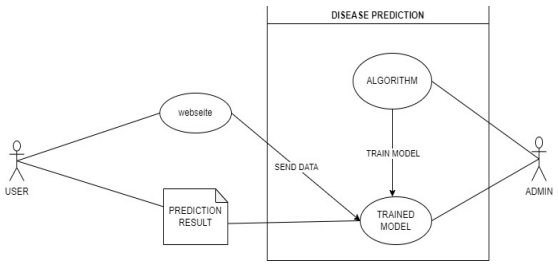

Fig. 3: Working of Algorithm

*1. Decision Tree Algorithm***:**

Decision Tree is a tool for solving classification or regression problems in machine learning, which works by creating a tree-like structure where each internal node represents a feature of the dataset being analysed. The tree is constructed by recursively splitting the data into smaller subsets based on the values of these features until the data can be classified into discrete classes or predicted with a continuous value.Decision Trees are commonly used in classification problems, but they can also be used in regression problems.

2. Random Forest Algorithm:

Random Forest is a powerful machine learning algorithm that combines the outputs of multiple decision trees to produce a more accurate and stable prediction. It is an ensemble learning method that works by building a large number of decision trees on randomly selected subsets of the data, and then aggregating their predictions. Each individual decision tree in the random forest operates independently, and the final prediction is made by taking a majority vote or averaging the outputs of the individual trees.

3.Naïve Bayes Classifier Algorithm:

Naive Bayes is a popular supervised learning algorithm used for solving classification problems in machine learning. It is based on Bayes theorem and assumes that the features of the dataset are independent of each other. Naive Bayes calculates the probability of each class based on the values of the input features and then predicts the class with the highest probability. During the prediction phase, the algorithm applies Bayes theorem to calculate the probability of each class given the input features and selects the class with the highest probability as the prediction.

Table 1: Description of Algorithms Used

Parameter	**Decision Tree**	**Random Forest**	**Naive Bayes**
Input data	Performs well with small data	Performs well with large data	Performs well with small data
Pre-processing	Required minimal pre-processing	Requires minimal pre-processing	Requires lots of pre-processing

Table 2: Algorithms Used

Algorithms Used		
Decision Tree Supervised Learning	Random Forest Supervised Learning	Naives Bayes Supervised Learning
Algorithm Chosen: Decision Tree Algorithm		

According to the description and analysis performed above, we come to the following conclusion:
Decision Tree has given the highest accuracy , as compared to other two algorithms and are most accessible for our system.
Hence we decided to go for Decision Tree Algorithm.

C. USER INTERFACE

The user interface of the health forecast has access pages for various roles, including users, doctors, patients, and administrators. After successfully logging in, the user will be redirected to the home page with various functions such as disease prediction, blood donation, NGO information and contact us for users.
The home page is the main interface after the user logs in to the account. It is designed to be user-friendly with intuitive navigation and easy-to-use features. The backend processes user requests and fetches relevant information from a MySQL database that stores information such as patient history, doctor calls, and NGO information.
The homepage provides users with various functions such as disease prediction, blood donation, NGO information and doctor contact us page. This virus prediction is based on machine learning algorithms trained on the data used in the system.
Blood Donation allows users to register as blood donors and provide their contact information. The NGO information page provides details about the different NGOs involved in health activities such as blood collection, health awareness and medical aid projects.
Overall, the user interface of the health forecast is designed to be user-friendly, intuitive and functional, providing a good experience and usability.

V. EXPERIMENTAL SETUP

The proposed architecture of the health prediction system was implemented using HTML, CSS, and JavaScript for the frontend, Flask as the backend framework, and SQL for database management.
Jupyter Notebook was used as a compiler for coding the machine learning prediction models, including Decision Tree, Random Forest, and Naive Bayes.The results of these models were compared, and the Decision Tree model was selected for disease prediction.
The implementation of the frontend involved designing the user interface using HTML for the structure, CSS for the presentation, and JavaScript for the interactivity. The Flask backend framework was employed to handle the communication between the frontend and the machine learning models.The backend was responsible for processing user input, fetching data from the SQL database, and passing it to the machine learning models for prediction.
For database management, SQL was used to store and manage patient history, doctor information, and other relevant data. The database was designed to efficiently store and retrieve data, enabling seamless integration with the frontend and backend components of the system.
Jupyter Notebook was used as the compiler for coding the machine learning models. The dataset used for training and testing the machine learning models was obtained from kaggle.com, containing approximately 4920 rows and 133 columns. Seaborn, a Python data visualisation library, was used to visualise the dataset.This dataset was preprocessed and split into training and testing sets. The machine learning models were trained using the training data and evaluated using various performance metrics.
The Seaborn library was utilised for visualising the dataset, providing insights into the distribution and relationships between different features. Data visualisation aided in identifying patterns and trends within the dataset, assisting in feature selection and model evaluation.
This laid the foundation for building a robust health prediction system that can assist clinical doctors in making informed decisions and enhancing patient care.

VI. RESULTS

Applying health prediction using machine learning algorithms yielded good results. The system provides a better understanding of the disease by analysing the patient's medical history, age, gender, and other factors. The accuracy for disease prediction is determined based on the accuracy of the machine learning algorithm, which uses a decision tree to correlate the patient's medical

information with the medical records stored in the data with 95.12% accuracy. The System has successfully reduced the time and effort required to make medical decisions by providing physicians' advice and recommendations.It improves patient care by recommending qualified doctors based on their specific skills and promoting communication between doctors and patients.

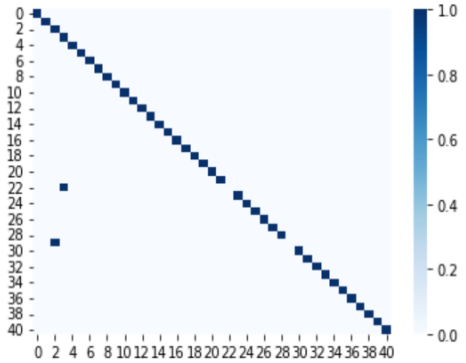

Fig 4: Heatmap for data visualisation

The proposed system needs to include the functionality:

4.1 Patient/Doctor/NGO Registration

Patients/Doctors/NGOs will have to register themselves for the first time and create their username and password to use the system.

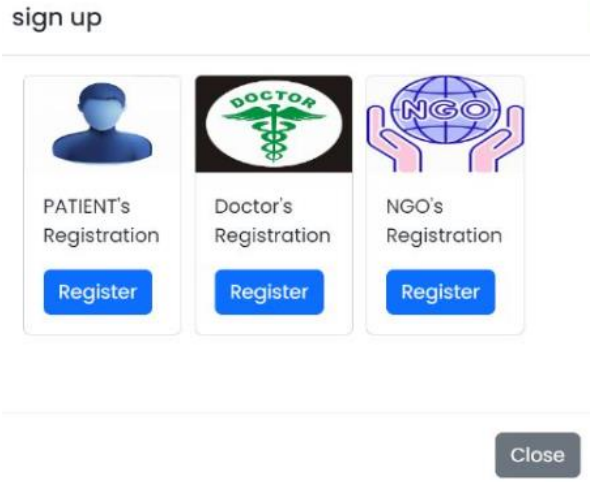

Fig 5: Patient/Doctor/NGO Registration

4.2 Patient/NGO Login

Patients/NGOs would be required to login into their system with their username and password.

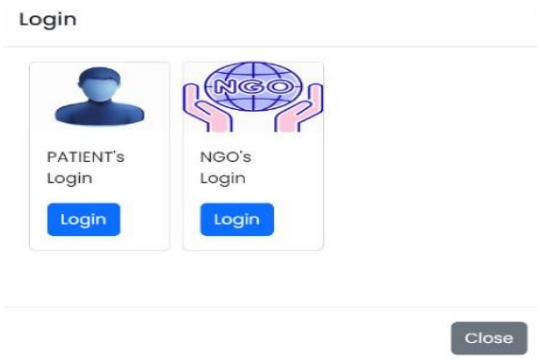

Fig 6: Patient/NGO Login

Fig 7: Patient has to enter username and password to login

4.3 Viewing Blood Donor's Details

Patients will be able to view details of blood donor's and can contact them.

Fig 8: Viewing Blood donor's details

4.4 Disease Prediction

Determine the illness/disease to the patient through his symptoms and using machine learning to point to the most accurate disease.

Fig 9 : Disease Prediction Results

4.5 Search Doctors

Patients can search for a doctor according to their specialty, diseases they have contracted and other references.

Fig 10 : Searching for Doctors

4.6 Selecting various Symptoms

Users can select various symptoms or search for any particular symptoms they want to select.

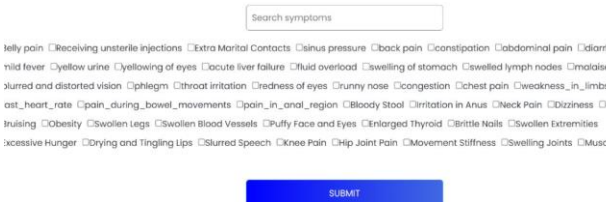

Fig 11: Selection of symptoms

4.11 NGO check up page

Users can view various camps and check ups which the NGOs are going to hold along with their schedule.

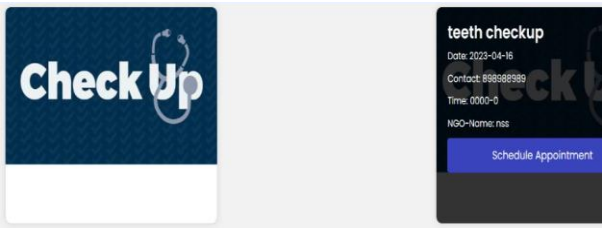

Fig 12: NGO Page

VI. CONCLUSION

Health prediction methods have been developed to demonstrate the potential to improve the accuracy and efficiency of disease diagnosis. Using machine learning algorithms and using patients' medical information and medical records, the system provides insights to help doctors make better decisions.

The System can improve healthcare by reducing the burden of manual data analysis and facilitating communication between physicians and patients. Future work may focus on expanding scope, including more sophisticated and accurate learning methods, and conducting clinical trials to validate their accuracy and perform well in a real clinical setting.

Overall, this research contributes to health awareness and the ability to improve overall health for all through timely and accurate disease prediction.

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