Medical Recommend System Using Machine Learning

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***Abstract*—Advancements in healthcare have facilitated the use of artificial intelligence (AI) for medical decision-making. A key focus area is medical prescriptions, where machine learning (ML) can assist in suggesting appropriate treatments based on patient symptoms and their medical background. This paper introduces a real-time Medical Recommendation System that employs machine learning algorithms to forecast medications for conditions such as kidney disease, liver disease, pneumonia, malaria, lung cancer, diabetes, and heart disease. The machine learning models were developed using disease-specific datasets, achieving a high level of accuracy in determining the right disease. The system features an easy-to-use web interface, enabling healthcare providers and patients to receive tailored medication recommendations on the spot. Our findings suggest that machine learning can greatly improve the precision and effectiveness of medical recommendations, reducing human errors in prescribing practices.**

***Keywords*—Recommendation system, Machine learning, Medical, Healthcare**

I. INTRODUCTION

Chronic and infectious illnesses rank among the top causes of global health issues and deaths. Quick and precise disease prediction is essential for helping patients recover. Traditionally, medical predictions depend on the knowledge of doctors and established clinical protocols. However, human decision-making can be affected by limitations such as biases, exhaustion, and possible errors in judgment. With the advent of machine learning in the healthcare sector, it is now possible to create intelligent systems that aid in decision-making. Our project seeks to develop an automated medical recommendation system that can anticipate the correct disease based on the symptoms and medical history of patients.

In recent years, progress in artificial intelligence (AI) and machine learning (ML) has enabled the creation of systems capable of swiftly and accurately analyzing large amounts of medical data. These advanced systems can handle patient details such as symptoms, medical history, and test results, which may be too much for a single doctor to evaluate effectively. By leveraging machine learning algorithms, these systems can detect patterns and relationships within the data, yielding more accurate forecasts and assisting physicians in making more informed choices. The incorporation of AI-driven systems into healthcare presents numerous benefits.

They can help physicians by offering insights and proposals for possible diagnoses, thereby lowering the chances of mistakes due to human limitations. Additionally, they can facilitate faster reactions to patient requirements, particularly in urgent scenarios where swift actions can greatly influence results. Furthermore, these systems can deliver a more customized approach to healthcare, modifying their forecasts according to the distinct traits of each patient, including age, gender, lifestyle, and past medical history.

Overall, our automated medical recommendation system aims to complement doctors rather than replace them, enhancing their ability to provide precise and prompt care. By merging the capabilities of human knowledge with machine learning, we can develop a more efficient, trustworthy, and patient-focused healthcare system that ultimately leads to better outcomes and saves lives.

II. LITERATURE SURVEY

A literature survey serves as a summary of prior research that relates to our project. It allows us to grasp current solutions, recognize existing gaps, and illustrate how our work adds value to the field.

A. Existing Work on Medical Recommendation Systems

Numerous researchers have created AI-driven medical recommendation systems designed to assist

both doctors and patients in selecting appropriate medications. Some of these systems utilize collaborative filtering, suggesting medications based on treatment histories of other patients. Others leverage advanced deep learning frameworks such as CNNs and RNNs to interpret patient data and forecast diseases. Many current systems prioritize disease prediction over medication recommendations. Moreover, several models do not support real-time functionality, which limits their ability to deliver immediate responses to users.

B. Machine Learning in Healthcare

Machine learning has significantly contributed to advancements in the healthcare sector. Common algorithms such as Decision Trees, Random Forest, and Neural Networks are utilized to assess patient symptoms and suggest appropriate treatments. Research indicates that Random Forest often achieves higher accuracy in medical predictions compared to individual Decision Trees. Additionally, researchers have investigated the use of electronic health records (EHRs) to tailor medicine recommendations to individual patients. This allows AI systems to propose treatments based on a patient's entire medical history, enhancing the effectiveness of care.

C. Gaps in Existing Research

1.Certain models are not refined for real-time suggestions.

2. There is a scarcity of studies that integrate various diseases within a single framework, limiting their application.

3.Some techniques demand substantial computational resources, making them impractical for routine use by everyday users.

D. Our Contribution

Our Medicine Recommendation System fills these gaps by:

1. Employing machine learning models (such as Decision Trees and Random Forest) to suggest medications for various conditions (including kidney disease, liver disease, pneumonia, malaria, lung cancer, diabetes, and heart disease).

2. Offering a real-time web application that allows users to input symptoms and receive immediate suggestions.

3. Enhancing prediction accuracy through the use of multiple algorithms and performance assessments. This survey emphasizes the significance of machine learning in medical recommendations and illustrates how our project advances previous studies.

III. METHODOLOGY

We leveraged five datasets corresponding to different ailments, each containing patient symptoms, medical test outcomes, and suggested treatments. These datasets were sourced from openly accessible medical databases and research publications.

A. Pre-processing Steps:-

Data Cleaning: Eliminating duplicate and irrelevant information.

Managing Missing Values: Applying imputation techniques to address absent records.

Feature Selection: Identifying critical factors that influence medical predictions.

Data Normalization: Standardizing data to a consistent scale for machine learning models.

Splitting Dataset: Dividing the data into training (80%) and testing (20%) subsets.

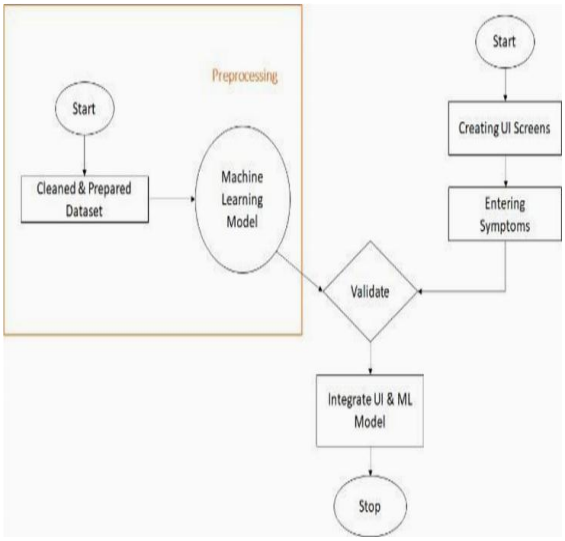

Fig1: Flowchart of Medical Recommendation System

B. DECISION TREE CLASSIFIER:-

The classification model is a decision tree, in which every node represents a test on an attribute, and all possible values of that attribute flow out from the node as branch. The model learns a set of simple "if-then" rules based on the values of various attributes, further splitting the data set into smaller subsets to help in the ultimate prediction of the desired variable. The structure of a decision tree classifier is mainly bifurcated into two major parts: decision nodes and leaf nodes.

Decision node: A node, from which one or more sub-nodes emanate is known as a decision node. In this case, all symptoms would serve as decision nodes.
Leaf node: Nodes from which no sub-node emanates (not further divided) are synonyms of leaf nodes. They simply do not split it anymore. This is where we reach the classification outcome. Leaf nodes denote classifications that express a decision about the class. In this analysis, the diseases correspond with leaf nodes.

C. RANDOM FOREST CLASSIFIER: -
Random forest is a widely accepted machine learning algorithm that often provides excellent results. It is fairly easy to use in a classification setting. One of the weaknesses of the decision tree method is its potential for overfitting. The Random Forest classifier, in simple terms, builds a number of decision trees from randomly chosen subsets of the training data. The final decision is then based upon the combination of the predictions made by these different decision trees. This is an example of ensemble learning, that is, combining several decision tree classifiers working on different subsamples of data.

IV. RESULT

The model was trained on seven diseases and their associated ones. From the below table, we infer that all three algorithms have performed excellently. The following table describes the training accuracy. We can see that efficiency in training is much higher in decision trees and Random Forest. It is because they overcome the problem of over fitting, which is common in the case of Decision Tree and Random Forest classifiers. We have seen that there are numerous diseases that share common medicines for treatment if symptoms are common between the diseases. Thus, the algorithm finds the most common disease and suggests the medicine to the user. After training all these classifiers, they are now ready to test for results on any symptoms. In the course of implementing the system, a Web-Site was also developed so that this work may be utilized as a software product version. Users can select their symptoms (which have been trained in the model). Now based on these specified symptoms, our system predicts the disease. Once all these classifiers are trained, it is now ready to test the results over any symptoms. While implementing the system, a Web-Site was also developed so that this work can be used as a software product version. Users can select symptoms (which are trained in the model); now based on the specified symptoms our system can predict the disease.

Fig2: Kidney Disease Predictor

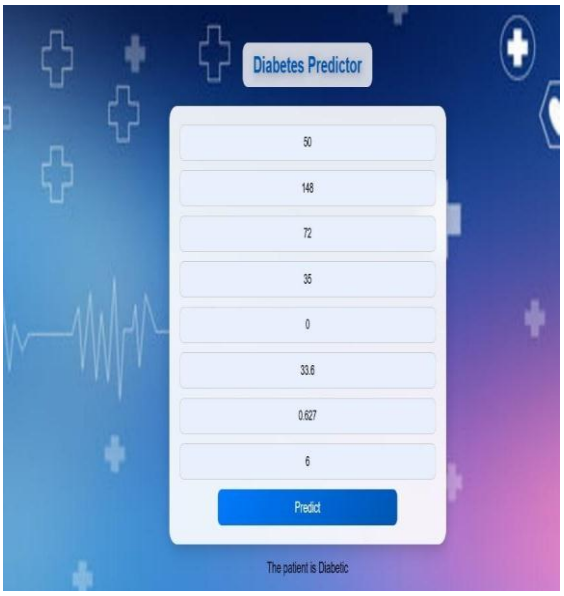

Fig3: Diabetes Predictor

Algorithm Used	Accuracy
Decision Tree	98.2
Random Forest	97.25

Table1: Model Accuracy

V. CONCLUSION

A system has now come into being with the disease prediction and medicine recommendation as advanced with various machine learning techniques such as Decision Tree and Random Forest. The trained system in the diseases mapped the various symptoms in the dataset. It was also analyzed the prediction level of the disease (High, Average, and

Low) based on the classifiers. In addition, our system also contains a feature that recommends appropriate medicines, based on the predicted diseases. Now, we will develop the system that predicts the illness, and its corresponding medicine based on symptoms given to it. It reached an accuracy of 98% on average. The system is user-friendly; therefore anybody can use it without great difficulty. It will ease doctors' burden. This system will act only as a temporary operation but can be used in case of emergencies where no one is there for a consultation. Generally, the people would not like to visit a doctor for minor symptoms and waste much time.

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