International Journal of Scientific Research in Science, Engineering and Technology
Print ISSN: 2395-1990 | Online ISSN : 2394-4099 (www.ijsrset.com)
doi : https://doi.org/10.32628/IJSRSET229219

# Smart Health Consulting System Using Machine Learning

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**Article Info**
Volume 9, Issue 2
Page Number : 114-119

**Publication Issue :**
March-April-2022

**Article History**
Accepted : 20 March 2022
Published: 28 March 2022

**ABSTRACT**

For the treatment and prevention of sickness, accurate and timely investigation of any health-related problem is critical. In the case of a critical illness, the standard method of diagnosing may not be sufficient. People nowadays suffer from a variety of ailments as a result of the environment and their lifestyle choices. As a result, predicting sickness at an early stage becomes a critical responsibility. However, doctors find it challenging to make precise predictions based on symptoms. The most difficult challenge is correctly predicting sickness. The development of a diagnosable disorder method machine learning - based (ML) algorithms for illness prediction can aid in a much more official diagnosis than the current technique. Using numerous machine learning techniques, we created a disease prediction system.

**Keywords :** Machine Learning , Disease Prediction , Healthcare , KNN, Naive Bayes, Decision Tree , Random Forest, Symptoms.

## I. INTRODUCTION

Everyone in today's society understands the value of good health. As we all know, there are several occurrences in our lives that need adequate counsel, and there are many individuals out there who are not receiving necessary medicine or medical services at the appropriate moment. Many areas in India lack good facilities, therefore this suggested approach would give an accurate and effective method of illness prediction. One of humanity's main concerns is healthcare. When used to health care, machine learning is capable of detecting disease early and accurately. Every year, as the number of patients and diseases increases, the medical system becomes overburdened and, in many nations, expensive. The majority of the condition necessitates a visit with a doctor in order to be treated. With enough data, illness prediction using a program can be simple and inexpensive. Predicting illness based on symptoms is an important element of treatment. In our study, we attempted to properly forecast an illness based on the patient's symptoms. For this, we utilised four different algorithms and achieved an accuracy of 92-95 percent. A system like this has a lot of potential in future medical therapy. We've also developed an interactive interface that enables working with the system easier. We've also tried to illustrate and depict the findings of our research and this project.

## II. LITERATURE SURVEY

PAPER 1: Using a machine learning technique to design a disease prediction model.

Dhiraj Dahiwade, Prof. Gajanan Patle, and Prof. Ektaa Meshram are the authors.

As a result of the climate and their lifestyle choices, people currently suffer from a range of diseases. To solve this challenge, big data plays a critical role in illness prediction. Each year, medical research creates a massive amount of data. Due to the rising volume of data development in the healthcare and medical areas, accurate analysis of medical information has been aided by early patient treatment. Prediction of illness based on the patient's symptoms. For effective illness prediction, we employ the Convolutional Neural Network (CNN) machine learning and K-Nearest Neighbor (KNN) algorithms.

For disease prediction, a collection of sickness symptoms is required. The person's lifestyle habits and checkup data are taken into consideration in this general sickness prediction for an accurate prognosis. In general sickness prediction, the CNN algorithm does have an efficiency of 84.5 percent, which is greater than the KNN technique.

PAPER 2: K. Shailaja, B. Seetharamulu, and M. A. Jabbar are the authors of Machine Learning in Healthcare. Machine Learning has become a significant trend in the market since it is a new and highly complex technical application. Machine Learning (ML) is everywhere, and it's employed in a variety of applications. It is crucial in a variety of sectors, including banking, medical science, and security. ML is being used to find patterns in medical data and has strong illness prediction skills. We examine a variety of machine learning techniques for generating effective decision assistance for healthcare applications in this research. This work contributes to closing the research gap in the development of effective decision support systems for medical applications.

PAPER 3: Machine Learning as a Tool for Disease Prediction Pahulpreet Singh Kohli and Shriya Arora are the authors.

In the field of medical diagnostics, machine learning is becoming increasingly popular. This is mostly due to advances in disease classification and detection techniques, which can provide data that aids medical professionals in the early detection of lethal illnesses, resulting in a significant increase in patient overall survival. In this work, we employ three separate classification algorithms, each with its own set of benefits, to predict illness in 3 distinct disease databases accessible in the UCI repository (Heart, Breast cancer, and Diabetes). The p-value test has been used to choose characteristics for each dataset using backward modelling. The outcomes of the study back up the idea of utilising ML to detect diseases early.

PAPER 4: Data mining is used to create a smart health prediction system.

AUTHOR: Nikita Kamble,

The study discusses data mining methods and their applications, as well as the health and healthcare components of Clinical Predictions. As a consequence of law and computer access, a large amount of data is now becoming accessible in the quality medical professions. Humans are incapable of comprehending such a large amount of data in such a short amount of time in order to produce assessment and treatment plans. One of the key objectives is to evaluate data mining technologies in healthcare and health-care applications in order to make the best decisions possible. It also contains a comprehensive discussion of health data mining techniques that can aid Medical Predicting in a number of different ways.

PAPER 5: A Smart Health Prediction Using Data Mining AUTHORS: Prof. Krishna Kumar Tripathi

This project might be used in a number of disciplines, including medical, research, and education, to use data mining techniques. As a consequence of law and computer access, a large amount of data has become accessible in the care and nursing professions. As a consequence of recent improvements in computer

technology, there really is no longer a need to manage such a large number of information at the identical time. The major purpose of this work is to evaluate data mining technique in medical and health-care applications so that acceptable conclusions may be drawn. This is a well and strong technology that has piqued the computing world's curiosity. It extracts new patterns and gathers adequate information with all these patterns from massive data sets using AI, ML, and record keeping approaches.

PAPER 6: Smart E-Health Prediction System Using Data Mining

AUTHOR: G Pooja reddy, M.Trinath basu, K.Vasanthi, K.Bala Sita Ramireddy

We propose data mining approaches and applications in the medicinal and instructional aspects of Clinical Predictions in this studyA tremendous quantity of information in the quality medical areas is becoming accessible because to the increasing use of computers. Such a large volume of data cannot be analysed in order to produce early health projections and treatment regimens for diagnosis. Our purpose is to assess data analytics techniques in quality medical settings so that informed judgments may be made. It also enables for close collaboration on medical data processing techniques, which might improve several areas of Clinical Predictions. It's a cutting-edge, high-powered technology that's generating a lot of buzz in the computer industry. It reworks previously collected data from different databases into fresh studies and findings. ML and databases are used in data mining to derive new patterns and information linked to these patterns from large data sets. The objective is to obtain data using automated or semi-automated methods like Data processing includes factors such as clustering, forecast, routing analysis, and predictive analysis.

## III. MACHINE LEARNING ALGORITHMS

Decision Tree

The decision tree is a ML technique that may be used for classification or regression analysis, and is analogous to a tree in real life. It's a tree-like network that begins with a node and branches out to other possible outcomes. Unlike linear models, a decision tree is trained to learn that maps non-linear relationships as well. A decision tree is a categorization approach that is both successful and adaptable. Because of its versatility, it is utilised for categorization in exceedingly complicated issues. It's also capable of dealing with higher-dimensional challenges. It is made up of three parts: root, nodes, and leaves. The root of the tree contains the attribute that has the most impact on the result, the leaf verifies the value of a certain attribute, and the leaf delivers the tree's output. The first prediction approach we employed in our study was the decision tree. It provides us with a 95% accuracy rate.

Random Forest

A random forests is a collection of different decision trees that have been trained using the bagging approach. By approaching the averaging model technique, bagging is employed to make the models more stable and precise. The random forest algorithm is essentially a collection of decisions tree, each of which is built using a set of random vectors and can vote for the most preferred prediction class. The addition of randomization to the algorithm prevents it from overfitting, resulting in improved classification results.

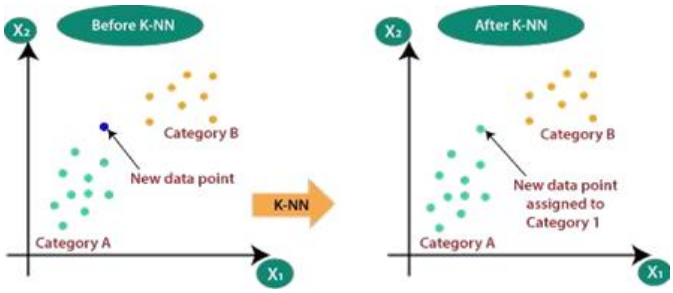
It's a supervised learning method that may be used for classification as well as regression. This algorithm is made up of four essential steps:

1. It selects data samples at random from a data collection.

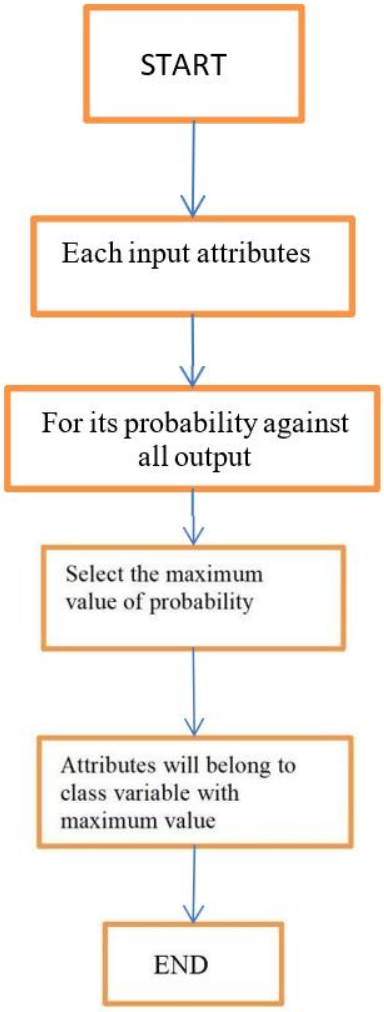
2. It creates decision trees for each sample data set that is selected.
3. At this point, all of the anticipated outcomes will be collated and voted on.
4. At the end, the most popular forecast will be chosen and presented as the categorization result.
We utilised a decision tree classifier with 100 different selection in this research, and the outcome was 95% accurate.

K Nearest Neighbour

K Nearest Neighbour is a learning algorithm that is supervised. It's a simple yet crucial algorithm.
The KNN approach considers that the entering case/data and preexisting cases are comparable, and the tiny device is assigned to the group that is closest to the original categories. The Learning algorithm saves all available data and categorises sets of data based on their similarity to previously stored data. This means that utilising the K-NN approach, new data may be swiftly classified into a well-defined category. Although the KNN technique can be used both for regression and classification, it is more often utilised for classification problems. KNN is a non method, meaning it doesn't make any assumptions it utilises. It's also called as a knn classifier since it doesn't use the training sample straight away; instead, it keeps the dataset and uses it as expected when classifying it. It's commonly utilised in data mining and pattern recognition. It works by discovering data patterns that link data to outcomes, and with each repeat, it improves at recognising patterns. Using K Nearest Neighbour, we were able to classify our data with 92 percent accuracy.




Naïve Bayes




The naive bayes algorithm is a collection of algorithms based on the naive bayes theorem. They all follow the same principle: each pair of predictions is independent of the others. It also assumes that each characteristic contributes equally and independently to the prediction. We employed the nave bayes algorithm in our project to get a 95% accurate forecast.
Bayesian classifiers are modelled after statistical classifiers. Based on a given class label, Naive Bayes identifies the class membership probability. It does a single data scan, making categorization simple.
Bayesian classifier using naive Bayes The Naive Bayes algorithm represents the unsupervised machine learning approach of classification. It employs a probabilistic model in which the outcomes/outputs are assigned probability. It's utilised to solve challenges

that are both analytical and predictive. The Naive Bayes algorithm is resistant to noise in the input dataset. For forecasting a category of datasets, Nave Bayes is a quick and straightforward machine learning algorithm. It may be used to classify both binary and multi-class data.

## IV. Proposed Method

This research attempts to develop a strong ML model that can accurately forecast a human's illness based on his or her symptoms.

As input, a CSV file is provided. The outcome is anticipated and presented once the surgery is completed successfully. Depending on the user's preferences, several methods such as Decision tree, Random forest, Naive Bayes, and K-Nearest Neighbor can be used to forecast illness.

Our model is trained using these four techniques, all of which have an accuracy of above 90%.

The following are some possible results of the development site:

Fill in the "Surname of the Patient" field next to the label with the patient's name. It is a required field that the user must fill out in order to receive a result.

Choose five symptoms from the drop-down menu that are labelled as follows:

1st symptom, 2nd symptom, 3rd symptom, 4th symptom, and 5th symptom

Symptoms 5 and 6 are the same.

If the user is unaware of all five symptoms, he must input at least two beginning systems; otherwise, the outcome will not be displayed and a notice box will appear.

Depending on the user's preferences, several methods such as Decision tree, Random forest, Naive Bayes, and K-Nearest Neighbor can be used to forecast illness. Click on the following buttons according to the algorithm: Prediction 1 is for the Decision Tree method, Prediction 2 is for the Random Forest algorithm, Prediction 3 is for the Naive Bayes algorithm, and Prediction 4 is for the K-Nearest Neighbor algorithm.

Disease Recommendation will appear in front of the algorithm labels of the user's choosing.

To forecast the illness for any other patient, click the "Reset" button. To exit the GUI, press the "Exit System" button.

## V. CONCLUSION

This system is capable of predicting illness based on symptoms provided to it. A system like this could reduce the amount of time people spend in hospital emergency rooms and reduce the amount of work medical staff has to do. We are successful in developing such a system, and we did it using four separate algorithms. On average, we got a 94 percent accuracy rate. A such system can be generally dependable in its performance. We also included a means to save the data submitted by the client in the database, which may be utilised in the future to aid in the development of a better version of the system. In addition, our system offers a user-friendly interface. It also includes a variety of visual representations of the data gathered and the outcomes obtained.

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**Cite this article as :**

Rezni S, Syed Umar, Umme Hajira, Umair Amin, Syed Nabeel Sultan, "Smart Health Consulting System Using Machine Learning", International Journal of Scientific Research in Science, Engineering and Technology (IJSRSET), Online ISSN : 2394-4099, Print ISSN : 2395-1990, Volume 9 Issue 2, pp. 114-119, March-April 2022. Available at doi :
https://doi.org/10.32628/IJSRSET229219
Journal URL : https://ijsrset.com/IJSRSET229219