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# Smart Healthcare Prediction System Using Machine Learning

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**Abstract** – *In this paper, we have introduced the techniques and applications of machine learning in the healthcare system. We know that day by day large amount of data is generating in healthcare industry and other industries as well. Such large amount of data cannot be processed by humans manually in a short time to make diagnosis of diseases and treatments.*

*To reduce this manual work, we have explored data management techniques and machine learning algorithms in healthcare applications to develop accurate decisions. It also gives the detailed description of medical data which improves various aspects of healthcare applications. It is the latest powerful technology that will reduce the manual work of professionals.*

*In this paper, we will be using the Naïve Bayes machine learning algorithm to train our machine to predict the different types of diseases. It uses existing medical information in various databases to rework it into new results and researches. It will extract the new patterns from large datasets to make prediction and knowledge associated with these patterns. Particularly, the important task is to get data by means of automatic or semi-automatic.*

***Key Words: Naïve Bayes, machine learning.***

## 1. INTRODUCTION

It might have happened many times that many of us need doctor's help immediately but they are not available due to some reasons. In our day-to-day life we have lot of other problems to deal with so we neglect these problems. So, to avoid such problems we have designed user-friendly website which helps users to get instant guidance on their problems. We will implement online intelligent healthcare system which will help users to get instant guidance on their various health issues. Healthcare domain is a wider domain and having different disease characteristics, different techniques have their own prediction efficiencies, which can be enhanced and changed in order to get into most optimized way.

Smart health prediction helps in the diagnosis multiple diseases by analyzing various symptoms using machine learning algorithm techniques. Machine learning technology offers a strong application forum in the medical industry for health disease prediction concerns based on user/patient experience. We use machine learning to keep track of all symptoms and diseases. Machine learning technology helps predictive models to quickly analyze the data and produce efficient results quickly.

## 2. LITERATURE SURVEY

The prediction of diseases has been challenging task for the system. The goal of this paper is to develop machine learning algorithms for prediction of diseases. We carry out a medical observation for some time for prediction purpose.

The machine learning consists of analysis of large amount of data available in healthcare field and obtains the useful information. The information can be converted to knowledge using different algorithms.

Divya Tomar and Sonali Agarwal have presented a concise presentation of machine learning techniques in healthcare area. This contains additional features, applications, difficulties and future scope of machine learning techniques. [1]

Priyanka Pawar, Megha Walunj and Pallavi chitte presented a procedure to anticipate elements in view of client input side effects. They have assembled a model to exhibit the effectiveness of these techniques which will guide clients about their problems which they are experiencing. It predicts possible illness by data collections and and gives proposed specialists and medical arrangements. [2]

Divya Jain presents a review of the implementation of machine learning algorithm on datasets. It states the details of the idea on two-step frequent data items using machine learning rules. [3]

In this paper, we set out to identify efficient algorithm for results. We can create different types of applications for healthcare industry so as to fulfill by using all these predictive analysis and machine learning algorithms.

## 3. PROPOSED SYSTEM

To beat the existing framework which was manual system of checking and treating patients we have created smart healthcare prediction system. Here we have proposed a framework that will guide users on their various medical problems. This system allows users to share their symptoms as input to the system and system will process these symptoms and will give output to the users as predicted disease. Patients will also consult to the doctor which will be suggested by the system. This system

is also utilized for improving the task of specialists. The various parameters included in the prediction process includes integration, forecasting, path analysis and prediction analysis. There are three modules in the system: Patient module, Doctor module and Admin module.

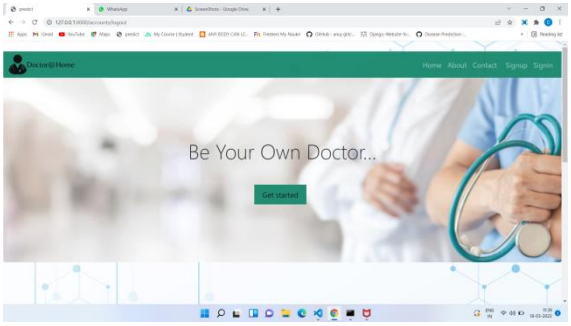


Fig.1 Home page of system

**3.1 Patient module:** In this module, we have different sub-modules.

### 3.1.1 Patient registration

### 3.1.2 Patient login

### 3.1.3 Prediction of disease

### 3.1.4 Consult a doctor

### 3.1.5 Give Feedback

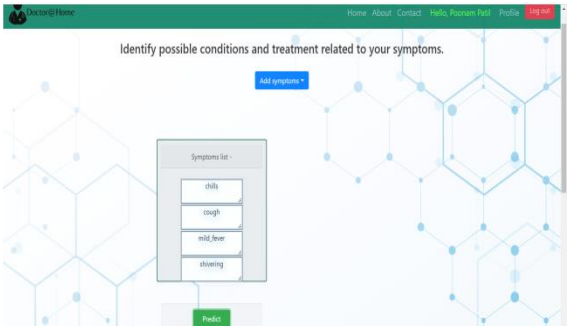


Fig.2 Input(Add symptoms) page

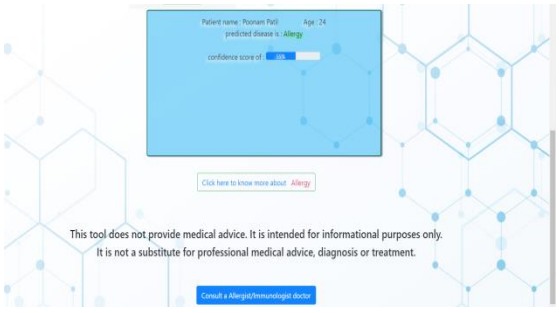


Fig.3 Disease prediction page

**3.2 Doctor module:** In this module, we have different sub-modules.

### 3.2.1 Doctor registration

### 3.2.2 Doctor login

### 3.2.3 View patient history

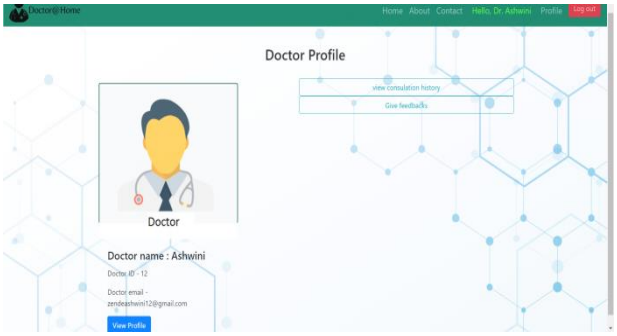


Fig.4 Doctos's Profile page

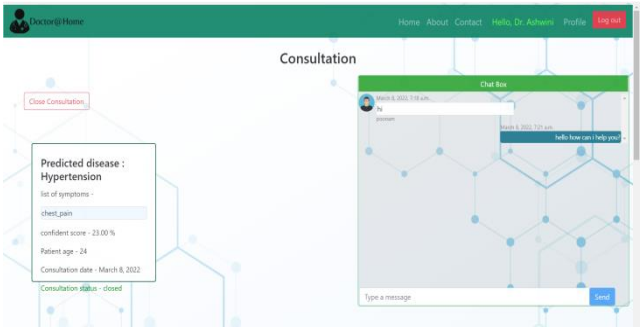


Fig.5 Patient's history and queries page

**3.3 Admin module:** Admin can add/delete patients and doctors and admin have control of website. In this module also, we have different sub-modules.

### 3.3.1 Admin login

### 3.3.2 Manage user's data

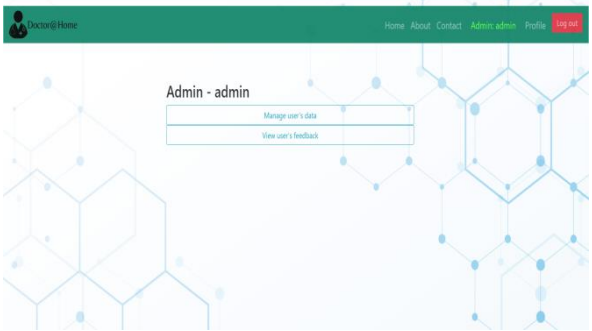


Fig. 6 Admin home page

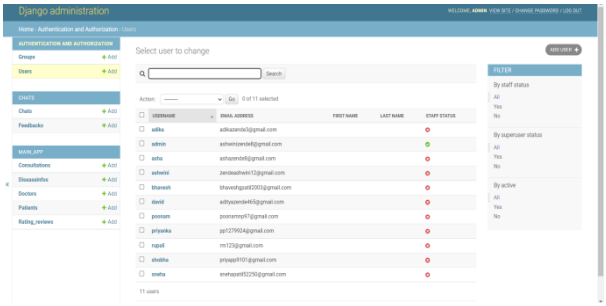


Fig.7 User details page under Admin profile

## 4. ALGORITHM USED

### 4.1 Naïve Bayes Algorithm

The proposed framework utilizes "Naïve Bayes" algorithm for the development of the framework. Naïve Bayes algorithm is a simple technique which is used for developing the models that are used to assign class labels to problem instances. The class labels are drawn from the problem set. This algorithm is a family of algorithm which is based on a general principle, not a particular algorithm.

According to this principle, the value of each function of all Naïve Bayes classifiers is independent of the value of other features. Because of this algorithm, disease prediction could be achieved over a short period of time and at a low cost. There are n-variety of probability models, but for some of them, the Naïve Bayes algorithm performs best in supervised learning model.

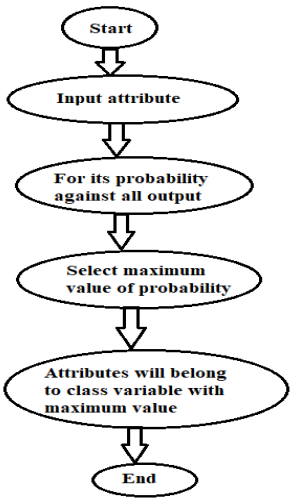


Fig .8 Naïve Bayes Algorithm steps

Following advances are actualized in Bayes calculation:

Bayes Theorem: P(c|x)=P(x|c) P(c) / P(x)

where, P(c|x)= Posterior probability

P(c) = Prior probability

P(x|c)= Probability of predictor

P(x)= Predictor's prior probability

Different kind of medical data was taken in program was prepared with the data indexes to such an extent that the probabilities of the considerable number of classes with each condition were determined. Result was gathered in the database and when the test information was given we got the probablities for the distinctive classes for the given side effect based on which we infers that the patient fell into the class with the most elevated likelihood. Thus it is in "Naïve Bayes" form.

We initially process all possible individual probabilities adapted on the objective quality of specific illness contained all probabilities of trait of that malady. Register the possible probabilities for all condition choose that the p has part up into two cases one for Y and second for N. Subsequently, on the off chance that the contention of likelihood of P1 is more prominent than P2, at that point patient isn't having the illness.

In terms of accuracy and time, the results of Naïve Bayes and other algorithms are compared, and the accuracy of the Naïve Bayes algorithm is higher than the other algorithms.

### 4.2.2 Decision Tree Algorithm

The decision tree algorithm is used to make a prepared set to demonstrate which is used for estimation of target factors by taking in decision standards got from before data.

Decision tree utilizes a choice tree to go from perceptions around things to decisions about the thing's objective esteem. It is one of the major approaches used in insights, information mining and AI.

## 5. APPLICATIONS

There are various applications of machine learning such as telecommunication industry, commercial industry, data analysis and many more. The proposed system can be used in hospitals as health monitoring system. Through this system, patient can self-assess himself/herself and monitors by self. Doctors can also assess their patients from remote location with their convenience. This is an automatic wireless health monitoring system.

In the healthcare industry, a lot of data is produced day by day. Since there is a need of analysis of data and the amount of data analyzed is in large amount, so there is a need of excessive knowledge regarding the technology of machine learning. This application will be primarily used for patient data analysis and disease diagnosis at various levels. There are some patients who require continuous checkups, so this system will be very helpful for them.

## 6. CONCLUSION AND FUTURE SCOPE

Smart healthcare system is a developing and especially critical research field with a possibly significant effect on the conventional healthcare industry. Our work represents the challenges and techniques of smart healthcare system.

We focused on the two most popular classical techniques in Machine learning: Naïve Bayes algorithm and decision tree algorithms. Required clinical symptoms related information can be obtained from historical knowledge in the suggested methodology by planning datasets using the Naïve Bayes algorithm. These datasets will be compared with the incoming queries and the final output will be generated. This new solution will be based on real historical data, it would provide accurate results that would allow patients to get an immediate prediction of diseases. Then patient can also consult with system suggested doctors remotely. The proposed system will be useful in emergency cases where patient is unable to reach doctor, for emergency cases that do not have doctors in an area, during late night emergencies and also for preliminary examination of patients.

With this automatic system there would be straightforwardness for users to perceive the medical problems. The further enhancements that can be done would be integrating this web application in an Android application. This will be available to users on their mobiles and its use can be further increased and will become more user-friendly. Also, in future we make this application available in the villages also where medical facilities are not so good. In this way, there is a research work and scope available in this application.

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