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Disease Prediction Application based on Symptoms

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ABSTRACT

The usage of mobile phones in today's world is more than ever. Mobile phones are everywhere and the mobile technology is growing at an exponential rate. The capabilities of a mobile phone have made it provide us services that make human life better. One such service that mobile phones can offer us is digital healthcare. Also, it is recognized that mobile phone applications that provide healthcare solutions are trending. Such applications provide a convenient and portable healthcare solutions to all the individuals. Such applications provide a rich experience to a user and in this way, the users will come to know more about their health and body. Digital healthcare mobile applications are capable of diagnosing a disease that a patient is suffering from using his/her symptoms. This information can be used further by a medical practitioner for later on consultation.

Keywords : Data Mining, Naïve Bayes Classifier

I. INTRODUCTION

There are several disease predication systems available in market which are available to medical practitioners only. Such systems have decent accuracy but an end user cannot use it on his/her mobile device. Other web-based systems are available to end users but these systems are not portable (Cannot use them as a mobile application) and they do not provide a personalized treatment and remedies. To increase the prediction accuracy, the application must also take care of the patient's BMI (Body Mass Index) into account while prediction. There is a lot of medical data available which can be used to predict the disease of a patient based on the symptoms that he/she enters in the application. Several other parameters like age, gender, weight and height play a crucial role in disease prediction. The mobile application should also recommend the near-by hospitals where the diagnosed disease can be predicted.

II. LITEARTURE WORK

Darcy A. Davis Used ICD9-CM to predict future disease risks. They used clustering to predict the disease based on similar patient's medical history [1]. T.F. Michael Raj and S. Prasanna proposed the model that trains the machine and it proves the probabilistic models are stable and reliable to identify the disease [2]. K.Rajalakshmi, Dr.S.S.Dhenakaran, N.Roobini pre-processed data collected from different sources was given as input to the different clustering methods. When K-Means algorithm was applied to preprocessed data, it showed low accuracy [3]. But when it was used along with different classifiers, it showed decent accuracy [4].Shalet K.S, V.Sabarinathan, V.Sugumaran, V.J. Sarath Kumar proposed a model where REPTree was used for the process of feature selection. This selection helped us get structural information which can be analyzed easily. Feature classification is done using SVM (support vector machine) [5]. Some authors have conducted the

research for the best medical diagnosis mining algorithm. These authors compared Naïve Bayes with five other classifiers i.e. Logistic Regression, K-Star, Decision Tree, Neural Network and a simple rule-based algorithm [6]. For evaluating the performance of all algorithms, 15 real-world medical problems from the UCI machine learning repository were selected. In the experiment, it was found that Naïve Bayes defeats the other algorithms in 8 out of 15 data sets [7]. So, it was concluded that the predictive accuracy results in Naïve Bayes is better than other techniques [8].

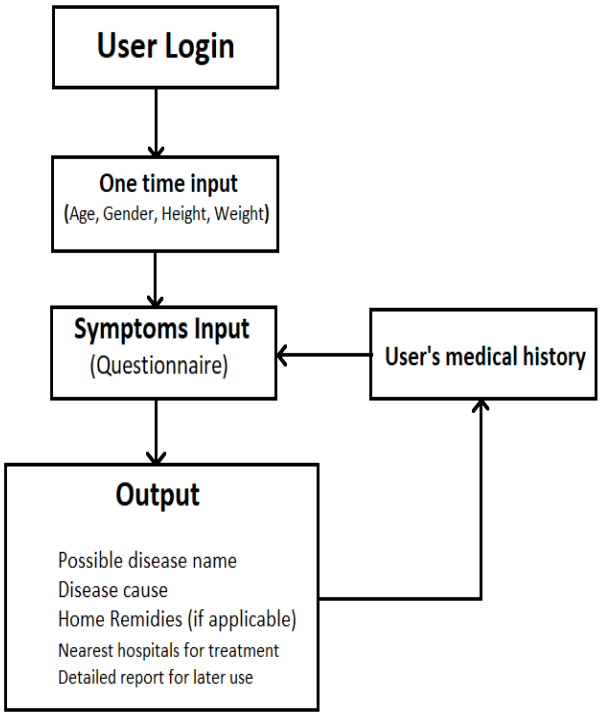

Figure 2.1. Flowchart of proposed system

III. IMPLEMENTATION

Based on our study, Naïve Bayes algorithm has proven to be the best for disease prediction systems.
Bayes theorem provides a way of calculating posterior probability P(c|x) from P(c), P(x) and P(x|c):

$$P(c|x) = \frac{P(x|c)P(c)}{P(x)}$$

- P(c | X) =P(x_1|c) * ……* P(x_n | c)*P(c)
- P(c | x) is the probability of occurence (c, target) given (x, attributes) has occured.
- P(c) is the probability of occurrence of class c.
- P(x | c) is the probability for x given that c has already occured.
- P(x) is the probability of event x.

The patient is allowed to create an account and he/she can login using his/her credentials. The login page is designed as shown below:

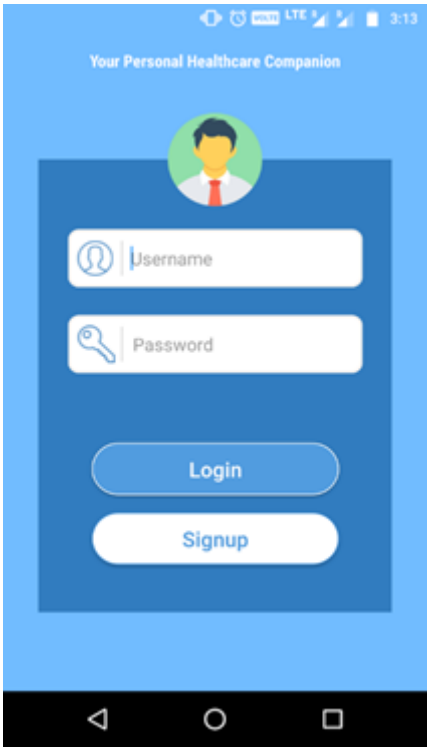

Figure 3.1 Login Screen

To signup, the patient has to choose a username, password and enter his age, weight, gender and height.

The sign-up page is shown as below:

Figure 3.2 Signup Screen

A general health background of patient is also necessary for predicting the right disease. So, during the signup process, the patient has to answer some questions related to his health background:

Figure 3.3 Health Background Screen

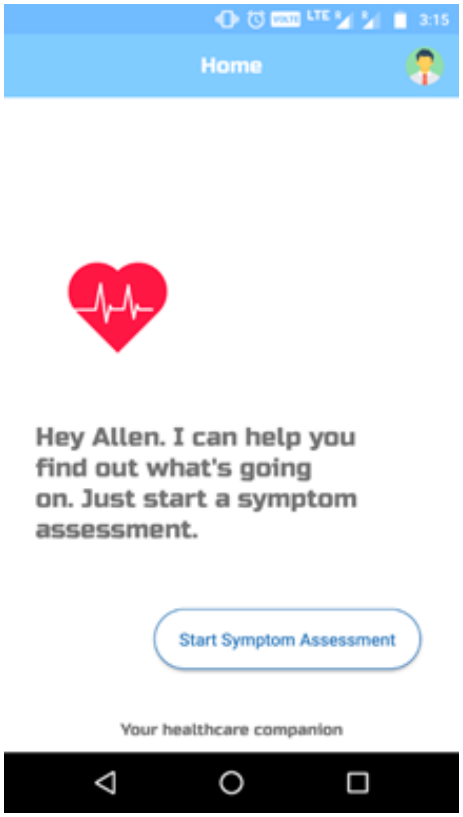

Figure 3.4 Home screen

Figure 3.5 Profile screen

Figure 3.6 Questionnaire start screen

Figure 3.7 Questionnaire screen

Figure 3.8 Result screen

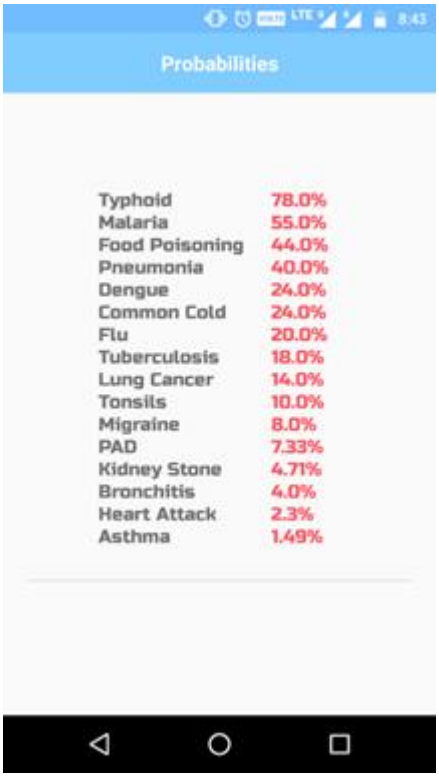

Figure 3.9 Report screen

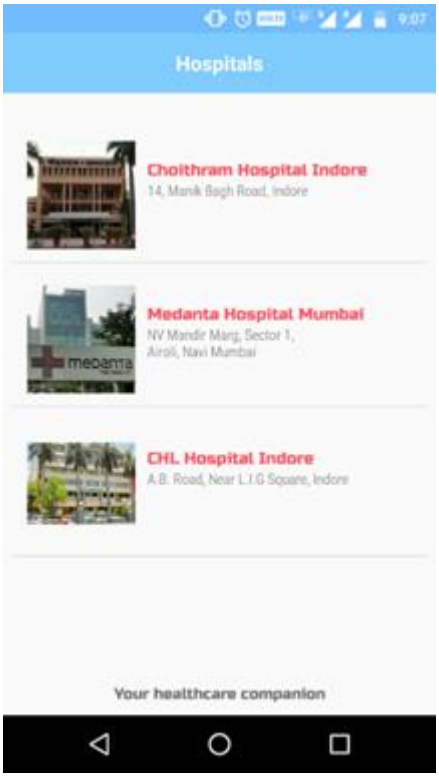

Figure 3.10 Nearby hospitals screen

IV. RESULT ANALYSIS

The app was tested with 200 patients. Patients had to start symptom assessment, record the results of app and visit a medical practitioner to know the actual disease. These details were submitted by them in a survey (Google Form). The accuracy of present healthcare system (ADA) is 34% when top 5 diseases predicted are taken into consideration. Our system is accurate 42% of the times that is, the correct disease (top 3 predictions) was predicted in 84 patients out of 200.

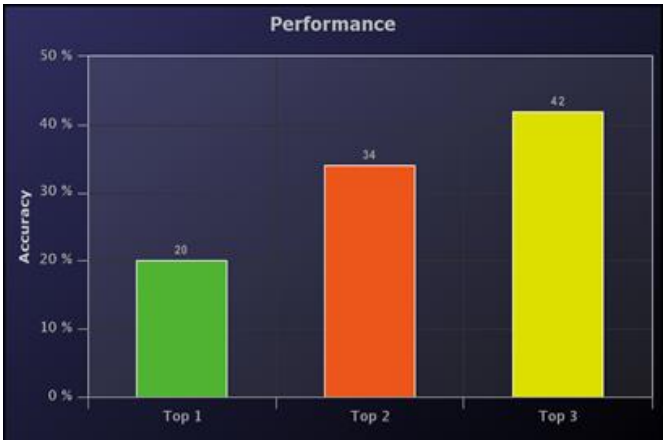

Figure 4.1 Result analysis

V. CONCLUSION

Here we have implemented an improved approach for generalized disease prediction system based on symptoms by using Naïve Bayes algorithm. Our system takes one-time input such as Age, Height, Weight, Gender, etc. from the user and this data is used further in disease prediction. Our system asks user some simple & relevant questions and based on the answer given by the user, it generates a report which contains list of diseases with their probability and list of nearby hospitals. The report contains the causes & remedies of the disease with maximum probability. User can also update his personal information (Age, Weight, Height, and Password). It is our opinion that research in healthcare is an exciting area for many years to come and will keep many scientists and engineers busy.

VI. FUTURE WORK

In the future, our system can be extended by deploying an additional feature of early prediction, where the system will notify the user about a possible disease before the user even starts a questionnaire. Also, our mobile application can be integrated with healthcare bands and rings available in the market for better predictions. This will also provide a great healthcare experience to the user.

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