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Organiscribe - A Herbal Prescription Application for Healthcare and Immunity

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Abstract - *From the antecedent of human civilization, plants, seeds, flowers, trees with medicinal properties have played an integral role. The existing health care system is more kin towards western medication practices, awareness and understanding towards traditional herbal health care is limited hence, we intend to develop an android based mobile application based on machine learning that provides herbal suggestions. Decision Tree (DT) and Random Forest (RF) algorithms are used for disease prediction and herbal remedy for both disease and immunity boosting. The machine learning model is trained and tested based on symptoms for prediction of disease and herbal remedy. The introduced mobile application is helpful for the people who would like to use herbal medicine instead of chemical ones to avoid allergies and other side effects.*

Key Words: **Herbs, Immunity boosters, Random Forest, Decision Tree, Machine learning, Symptoms**

1.INTRODUCTION

The herbal remedies and herbal products have become increasingly popular in the twenty-first century in developed lands and even among those who can afford the most expensive allopathic medicines, hoping to treat cleaner, more friendly, and more secure treatments.An important area of interest in herbal products is nutritional supplements, herbal supplements provide nutrient deficiencies or malnutrition.

Maintaining good health is essential and accounts for at-most importance, good health refers to state of completely emotional and physically well-being. Structured guidance and walk through over the symptoms and effects along with formulating the recommendation and prescription with the help of phytomedicine as a single system is scarce. We try to form a bridge and bring in conventional practices to primary health care and improving immunity system that will be available on-the-go through technology as an mobile application which delegates guidance about disease and its prevention methods along with immunity boosting suggestions to optimize health conditions using machine learning techniques.

Herbal medicines are of less side effects and used widely when the conventional medicines are ineffective, and about 65 percentage of Indian population may use traditional medicine to foster their health. Partisanship in accessibility, availability and affordability of modern health care makes herbal drugs more popular in rural and remote areas. Similar demand can be seen in Germany where 40-50 percentage of people opt traditional medicine, about 42 percentage in USA, 48 percentage in Australia and 49 percentage in France.

Over last few years, swift development of medical data, artificial intelligence has led in a new vitality in healthcare field. This swift had made a significant progress in prediction of disease, identification of drugs and so on. Increase in computational power and large collection of data has made machine learning a power tool in healthcare sector.

2. LITERATURE REVIEW

Many research and survey have been carried out to amalgamate the technological advancement to healthcare to build more smart systems. To do the analysis, a data-set has been prepared using machine learning algorithms to obtain good accuracy [1]. Prediction of disease correctly has become a very challenging task, to overcome this challenge data mining plays an important role [3]. The prescription world deals with analysis of words where natural language processing comes in place to resolve machine translation problem which involves an encoder decoder system. It matches a sack of symptoms which is decoded to target herb [2]. For disease prediction, disease symptoms dataset is required [3]. An intelligent prescribing model is designed based on the Bayesian network. This model uses the medical record data of a prestigious Chinese physician as training

data, which can realize intelligent output Chinese medicine prescriptions with input symptom groups [4]. Supervised machine learning algorithms have been a dominant method in the data mining field. Identifying the key trends among different types of supervised machine learning algorithms, and their performance and usage for disease risk prediction. After comparing different supervised machine learning algorithms, it has been found that Support vector machine (SVM) has been extensively used and Random Forest (RT) algorithm has given more accurate result [9].

3. METHODOLOGY

The methodology of the system is segmented into following parts

A Programming the application

I. The application is being coded using node JS and react native programming language.

II. The application has a navigation bar for the smooth navigation between disease prediction and immunity suggestion.

III. The application embeds a self-suggesting dropdown of symptoms.

B. Data Collection

Collection of large datasets is important in order to train the model accurately. When the training data is small, it is difficult to obtain the learning effect of machine learning algorithm. Here the dataset is consisting of various herbal remedies for curing the disease and for boosting the immunity system. Before sending this data to the ML model, preprocessing procedures has to be performed in order to remove the unwanted data. The quality and representativeness of data plays a major role for getting the desired result.

C. Data Pre-processing

Here the data has to be cleaned in order to detect and remove the unwanted data from the dataset. The incomplete, incorrect data has to be condensed and replaced with the proper data. Data transformation will be performed for getting a normalized data according to the need of dataset.

D. Machine learning algorithm

Machine learning algorithms learn from data. These algorithms find relationships, develop understanding, make decision, and evaluate their result from the training data. Better the training data is, the better the model performs. So, division of training and testing data for evaluation of the model is done, and consequently updating the weights, add or drop labels to give better results.

Decision Tree

Decision tree are a simple way to guide one's path to a decision. They can be a simple binary tree or a complex multi-valued decision. Decision tree are hierarchically branched structures that help one come to a decision based on asking certain questions in a particular sequence. Decision tree can generate knowledge from a few test instances that can then be applied to a broad population.

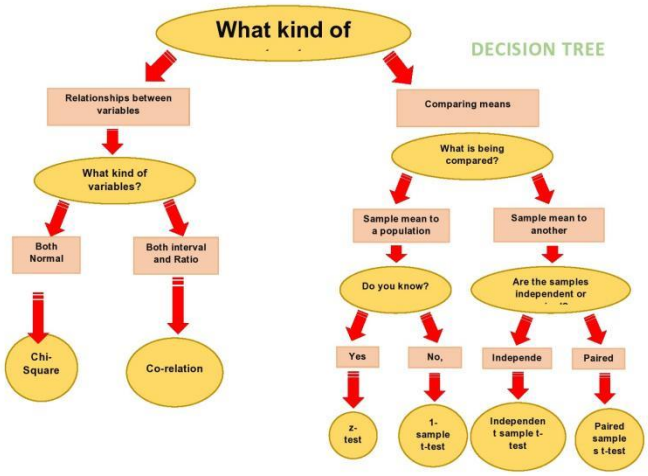

Fig 1: Decision Tree template

Random Forest

Random forest is a supervised machine learning algorithm, it is a group of decision tree which are trained with bagging method. The bagging method is nothing but combination of different learning model which provides overall increase in result. In simple words random forest builds multiple decision tree and merges them to get more accurate and stable prediction.

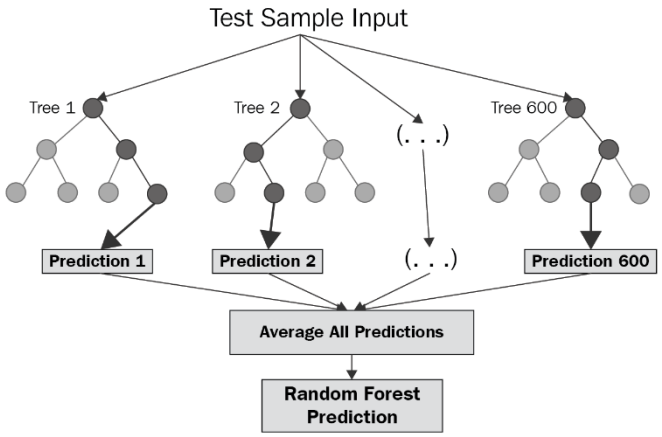

Fig 2: Random Forest template

E. Deployment to cloud

Heroku is a cloud platform that enables user to build, run, manage and operate application. Heroku is a Platform-As-A-Service type of cloud. It gives an intuitive web-based dashboard to manage our app and gain visibility in performance. It led developers extend their app functionality with add-ons, customize their application stack with build packs and jump start project with button. This helps in the easy deployment of code or algorithm which intern helps to use that code further in future.

In our application we deployed machine learning model in Heroku platform which helped us to integrate the machine learning model with the front-end UI. We used this service because the developer can access the resource from anywhere and provides tools and techniques for adding additional features.

The diagram below explains the flow of the app deployment and management on Heroku

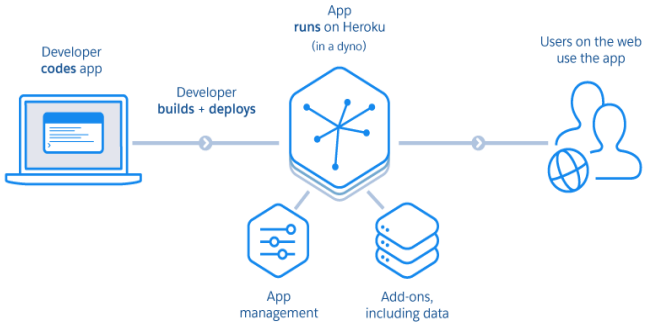

Fig 3: Deployment and management flow.

F. Multilingualism

The application will be used by discrete people, option for preferred choice in language bring in more comfortable and handy usage of the application. This feature can be implemented by creating multiple JSON objects that will store alternate statements for the content in different languages, using i18n multi-language library provided in react native for converting the content to different language using the created JSON object file.

4. EXPERIMENTAL RESULTS

Steps involved for disease prediction module

The user initiates the application and lands on home screen from there the user clicks on get started button which will redirect to predict disease screen where the user will be given privilege to select the symptoms from the list the selected symptoms in turn will be passed to Heroku app deployed that will be running the trained machine learning model, the model will then predict the disease and return the herbal remedy that will be displayed in the screen for the user.

The diagram below explains the flow for disease prediction module.

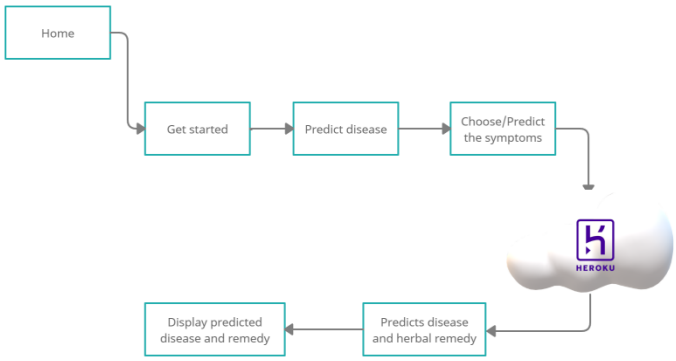

Fig 4: Disease prediction module flow

Steps involved for immunity suggestion module

The user initiates the application and lands on home screen from there the user clicks on top nav bar which will provide two option to select immunity suggestion upon clicking it will redirect to predict immunity suggestion screen where the user will be given privilege to select the symptoms from the list the selected symptoms in turn will be passed to Heroku

app deployed that will be running the trained machine learning model, the model will then predict the herbal remedy that will be displayed in the screen for the user.

The diagram below explains the flow of immunity suggestion module.

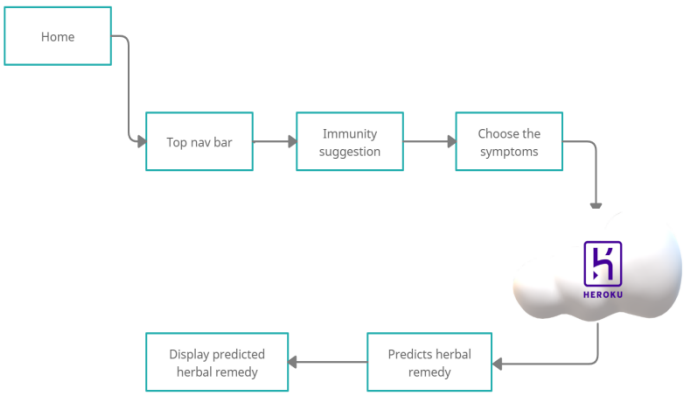

Fig 5: Immunity boosting suggestion module flow

The proposed system consists of following modules:

I. User Interface module with disease prediction and immunity suggestion.

II. Backend module running machine learning algorithm

User Interface module with disease prediction and immunity suggestion.

User interface module encapsulates all the actions the user might need to interact with the application. It enables user to access the functionalities in easy way. UI consists the concepts such as interaction design, visual design and information architecture.

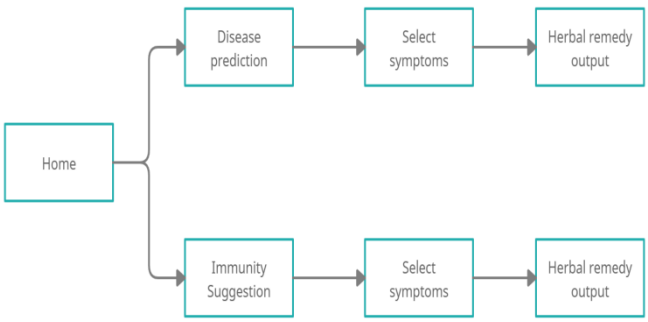

Fig 6: Workflow of UI

The workflow of our system is straightforward; here the actor is anybody who wants herbal prescription for their health condition. The actor is greeted by a home screen from where the actor can navigate to either disease prediction or immunity suggestion and enter symptoms and get herbal remedy prescription.

Back-end module running machine learning algorithm

The machine learning model coded in python is deployed as a flask app pushed through git the resulting URL on push is used to communicate with the model in Heroku.

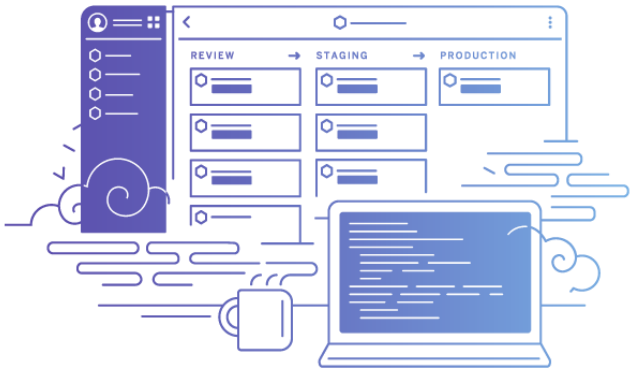

Fig 7: Heroku cloud deployment dashboard

5. RESULTS

The main purpose of our approach is to provide herbal remedies and immunity suggestions after realizing user's undergoing health condition. For implementing this system, we have implemented a mobile application that had two tasks. The first was to predict the disease based on the user entered symptoms and second was to provide the herbal medicament for both disease and immunity.

The below screen shows the result of predicted disease and herbal remedy based on symptoms entered by user. When user enters the symptoms that symptoms will be given as input to the trained and tested machine learning model which is designed using Decision Tree (DT) and Random Forest (RF) algorithm. Then the model will predict the disease based on the input (symptoms) given along with the herbal remedy for the predicted disease

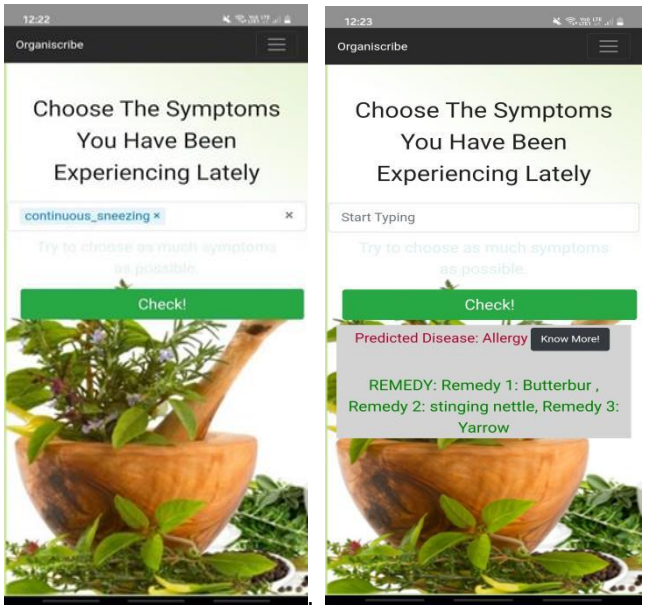

Fig 8a: Selection of symptoms Fig 8b: Predicted disease and herbal remedy

The below screen shows the result of predicted herbal remedy based on symptoms entered by user. When user enters the symptoms that symptoms will be given as input to the trained and tested machine learning model which is designed using Decision Tree (DT) and Random Forest (RF) algorithm. Then the model will predict the herbal remedy based on the input (symptoms) given.

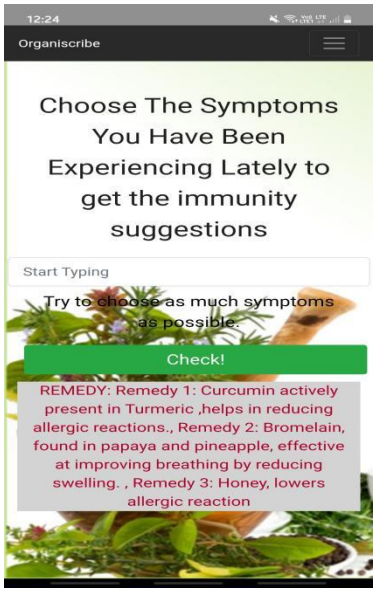

Fig 9: Predicted herbal remedy for immunity boosting

6. CONCLUSIONS

The paper presents the idea of predicting the disease based on selected symptoms and also suggest various phytomedicines using machine learning models. Many numbers of people are opting back to herbal medicines to improve their health naturally and also to get rid of side effects from modern medicine. One of the best alternatives for conventional medicine are medicinal plants and herbs. Hence this healthcare application provides data on disease and prescribes the herbal remedy, also enhancing the body's immune system by prescribing herbal remedy.

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