DAYANANDA SAGAR UNIVERSITY

KUDLU GATE, BANGALORE – 560068

Bachelor of Technology
in
COMPUTER SCIENCE AND ENGINEERING

Major Project Phase-II Report

AN APP FOR AYURVEDIC ANALYSIS OF VATA, PITTA AND KAPHA

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(2021-2022)

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CERTIFICATE

This is to certify that the Phase-II project work titled **"AN APP FOR AYURVEDIC ANALYSIS OF VATA, PITTA AND KAPHA"** is carried out by **SHREESHA K M (ENG18CS0267), VARUN V RAO (ENG18CS0315), V S K SAHITHI (ENG18CS0317), VIDHYA R (ENG18CS0318), Y SAI KUMAR REDDY (ENG18CS0329),** bonafide students of Bachelor of Technology in Computer Science and Engineering at the School of Engineering, Dayananda Sagar University, Bangalore in partial fulfilment for the award of degree in Bachelor of Technology in Computer Scienceand Engineering, during the year **2021-2022**.

Prof. Anusha Ashok	**Dr Girisha G S**	**Dr. A Srinivas**
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Date:	Date:	Date:

Name of the Examiner	**Signature of Examiner**
1.	1.
2.	2.

DECLARATION

We, **SHREESHA K M (ENG18CS0267), VARUN V RAO (ENG18CS0315), V S K SAHITHI (ENG18CS0317), VIDHYA R (ENG18CS0318), Y SAI KUMAR REDDY (ENG18CS0329)** are students of the eighth semester B.Tech in **Computer Science and Engineering**, at The School of Engineering, **Dayananda Sagar University**, hereby declare that the major project titled **"An App For Ayurvedic Analysis Of Tridosha's"** has been carried out by us and submitted in partial fulfilment for the award of degree in **Bachelor of Technology in Computer Science and Engineering** during the academic year **2021-2022**.

Student	**Signature**
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We would like to thank our Project Coordinators ***Dr. Meenakshi Malhotra, Dr. Bharanidharan N,*** *and all the staff members of* ***Computer Science and Engineering*** *for theirsupport.*

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ABSTRACT

Fundamental object of Ayurveda is not limited to prevention and cure of the diseases but to provide bliss of complete happiness by maintaining total health called chathurvidha purushartha. Every person is said to have unique ratio of each dosha. This unique ratio of vata, pitta and kapha is said to define Ayurvedic bodily constitution. The concept of prakriti helps in maintaining health and understanding disease and its management. The analysis of Tridosha's is done using physical and mental characteristics. Based on the options selected by the user, the percentage of each dosha will be calculated and the body constitution will be represented in a pie chart. For the disease prediction, the clinical data will be stored in the database and the symptoms from the data base are displayed, the user have to select the symptoms from the given list and according to that the disease will be predicted. Based on the disease predicted, suggestions / assistance will be provided in order to take some necessary precautions including the food habits and lifestyle changes which may be helpful to control the disease severity.

Chapter 1

INTRODUCTION

Chapter 1

INTRODUCTION

In Indian Ayurveda, there are mainly three types of dosha's/ body types—Vata, Pitta & Kapha. The doshas are described as biological energies found throughout the human body and mind. They govern the physical and mental processes and provide every living being with an individual blueprint for health and fulfillment. The Tridosha's (tri meaning three and dosha's being the basic physical energies) are the primary and essential factors of the human body that govern our entire physical structure and function. Derived from the Panchmahabhutas, each dosha – which like the elements cannot be detected with our senses but their qualities can be – is a combination of any two of the five bhutas with the predominance of one. Called Vata, Pitta and Kapha in Sanskrit, these three are responsible for all the physiological and psychological processes within the body and mind – dynamic forces that determine growth and decay. These doshas are derived from the five elements of nature and its related properties, wherein Vata is composed of space & air, Pitta of fire and water and Kapha of earth and water.

Every person is said to have unique ratio of each dosha. This unique ratio of vata, pitta and kapha is said to define Ayurvedic bodily constitution. The concept of prakriti helps in maintaining health and understanding disease and its management. Prakriti based guidelines for diet and lifestyle result in healthy tissues and homeostasis of Doshas. Every healthy in-dividual should know about his/her Prakriti, so that one can know which are the healthy lifestyle and eating habits for him, by adopting which he can maintain his healthy state and prevent any disease which may come.

Most of the physical phenomena ascribed to the nervous system by modern physiology for example, can be identified with Vata. Just as the entire chemical process operating in the human body can be attributed to Pitta, including enzymes, hormones and the complete nutritional system. And the activities of the skeletal and the anabolic system, actually the entire physical volume of an organism, can be considered as Kapha. When the doshas are in balance i.e. in a state of equilibrium, we remain healthy. As Charaka, the great ayurvedic sage, explained:

"Vata, pitta and kapha maintain the integrity of the living human organism in their normal state and combine so as to make the man a complete being with his indriyas (sense organs) possessed of strength, good complexion and assured of longevity." It is only when that there is imbalance within the three that disease is caused. And since it is the strongest dosha in the constitution that usually has the greatest tendency to increase, one is most susceptible to illnesses associated with an increase of the same.

It is equally important to understand that the three doshas within any person keep changing constantly, due to the doshic qualities of specific lifestyle and environment, such as time and season. And that these three are not separate energies but different aspects of the same energy, present together in an infinite variety of combinations, wherein their qualities overlap and interrelate. Ayurveda is a science of self-understanding. By understanding your own unique nature or constitution, you can begin to understand how you interact with your environment and thus make choices that will lead you toward greater health.

Ayurveda defines disease as the natural end result of living out of harmony with one's constitution. Our constitution is the inherent balance of energies within our bodies and our minds. It describes who you are on the most fundamental level. This unique balance of energy determines everything from our bone structure to our predisposition toward certain health challenges. Our constitution defines what we are naturally attracted to as well as what repels us. It defines what is in harmony with our nature and what will cause us to move out of balance and experience sickness and disease. Because we all have a different balance of energy, Ayurveda shows that the path to optimal health is different for each person depending upon their constitution.

Chapter 2

PROBLEM DEFINITION

Chapter 2

PROBLEM DEFINITION

The main objective of this project is to consolidate a personality theory taking support of Ayurvedic literature from the psychological perspective and to make a case that personality testing taking Tridoshaand Triguna could be a comprehensive perspective. Ayurveda, with its defined constructs which are elemental and form the cornerstone of physiology as well as psychological delineations, their assessment, categorization and treatment options, is indispensable for developing a theory and methodology for assessment of Prakriti more specifically, the psychological manifestation of the Tridosha's and the Triguna's combined for a scientific, elemental and globally valid testing procedure and its obvious categorization. This would lead to globalizing the understanding of human behaviour irrespective of caste, creed and religion, leading to a universal typology of people, helping in the ultimate need for psychology, that of understanding and predicting of human behavior and emotions. This has large implications in areas ranging from harnessing of human resources to early identification of diseases and their better management.

2.1 Scope:

This project is prepared for the people to give an opportunity to get to know their body. By knowing one's body constitution i.e., the percentage of vata, pitta and kapha the body is made up of, people can choose to make changes in their lifestyle in order to balance their body constitution.

This project is intended to healthify the society, by providing the overview of their body constitution and also can go through the disease prediction which predicts the disease based on the symptoms selected by the user and also provides some suggestions/assistance to control the severity of the disease or some precautionary measures to follow in order to avoid the effects during episodes.

Chapter 3

LITERATURE SURVEY

Chapter 3

LITERATURE SURVEY

[Verma, V., Agrawal, S., & Gehlot, S. (2018) Possible measures to assess functional states of tridosha: A critical review. International Journal of Health Sciences and Research, 8(1), 219-234]. In this paper, Healthy and unhealthy state of a human being depends on normal and abnormal functional state of Tridosha, considering the physiological importance of Dosha in maintenance of homeostasis of the body. Tridosha have been called as root (Dosha Dhatu Mala Moolam hi Shariram) of the body. All the functions of the body could be explained in terms of Dosha, Dhatu and Mala. Ayurveda has considered that the balanced state of Dosha, Dhatu and Mala leads to state of health and their imbalanced state produces disease. This state of equilibrium is maintained through not only the definite quantity but also quality (functional state) of these factors i.e. Dosha Dhatu and Mala. The state of health has been defined as the presence of equilibrium in activities of Dosha, Agni, Dhatu, Mala and calm and pleasant state of soul, sense organ and mind. [3] The state of health is maintained until and unless these factors are in equilibrium but results in diseases when there is any discordance in them (Vaishmaya). Tridosha are the biological entities derived from Panchamahabhuta, responsible for regulation of all bodily functions. Both quantitative and qualitative criteria have been mentioned for describing the functional status of Dosha, Dhatu and Mala. Quantitative assessment is done by Anjali Pramana and qualitative assessment through the observing their functions.

[Joshi, K., Thapliyal, A., & Singh, V. (2021)] The Tridosha Theory According to Ayurveda. In this paper, Ayurveda is believed to be the oldest medical science. It is more clearly the science of the Human civilalization based on tridosha. Tridoshas are the three humors or forces of the body, which bring health when in balance, and produce diseases when out of balance. In this study we will describe the basic Ayuvedic theory of Tridosha and how to balance it in our body Ayurveda is the traditional, ancient Indian system of health science. Its name literally means, "life knowledge." The Ayurvedic method of holistic healthcare emphasizes balancing the body, mind, and spirit to treat and prevent disease. This 5,000-year-old practice focuses on harmonizing the body with nature through diet, herbal remedies, yoga and meditation, exercise, lifestyle, and body

cleansing. The basic edifice of the Ayurvedic mode of treatment is founded on the fundamental theory commonly called the ‘tridosha tatwa’. Etymologically, the word ‘tridosh’ is derived from the Sanskrit words, ‘tri’ and ‘dosh’ meaning three and pollutant or vitiated factor respectively, and in combination they mean the ‘three pollutants’ or ‘tri-pollutant’; and the Sanskrit word ‘tatwa’ stands for its English equivalent ‘theory’. Essentially, the pollutants or vitiating factors play a significant role in maintenance of health or well-being and disease or illness. In a nutshell, health or well-being is maintained if trido shorthe three pollutants operate in harmony with one another. The Doshas ensures that all mahabhutas are held together and exert their functions in synergism for the optimum function of the human body. Doshas are made up of same element(mahabhutas) which forms our body i.e. Akash, Vayu, Agni, Jala, Prithvi. The three doshas are considered as three pillars of the body. Their balance is the key for the body to be healthy.

Osisanwo, F. Y., Akinsola, J. E. T., Awodele, O., Hinmikaiye, J. O., Olakanmi, O., & Akinjobi, J. (2017). Supervised machine learning algorithms: classification and comparison. *International Journal of Computer Trends and Technology (IJCTT)*, *48*(3), 128-138. In this paper, Supervised Machine Learning (SML) is the search for algorithms that reason from externally supplied instances to produce general hypotheses, which then make predictions about future instances. Supervised classification is one of the tasks most frequently carried out by the intelligent systems. This paper describes various Supervised Machine Learning (ML) classification techniques, compares various supervised learning algorithms as well as determines the most efficient classification algorithm based on the data set, the number of instances and variables (features).Seven different machine learning algorithms were considered: Decision Table, Random Forest (RF), Naïve Bayes (NB) , Support Vector Machine (SVM), Neural Networks (Perceptron), JRip and Decision Tree (J48) using Waikato Environment for Knowledge Analysis (WEKA)machine learning tool. To implement the algorithms, Diabetes data set was used for the classification with 786 instances with eight attributes as independent variable and one as dependent variable for the analysis. The results show that SVM was found to be the algorithm with most precision and accuracy. Naïve Bayes and Random Forest classification algorithms were found to be the next accurate after SVM accordingly. The research shows that time taken to build a model and precision (accuracy) is a factor on one hand; while kappa statistic and Mean Absolute Error (MAE) is another factor on the other hand. Therefore, ML algorithms

requires precision, accuracy and minimum error to have supervised predictive machine learning. There are several applications for Machine Learning (ML), the most significant of which is data mining. People are often prone to making mistakes during analyses or, possibly, when trying to establish relationships between multiple features. Data Mining and Machine Learning are Siamese twins from which several insights can be derived through proper learning algorithms. There has been tremendous progress in data mining and machine learning as a result of evolution of smart and Nano technology which brought about curiosity in finding hidden patterns in data to derive value. The fusion of statistics, machine learning, information theory, and computing has created a solid science, with a firm mathematical base, and with very powerful tools. Machine learning algorithms are organized into a taxonomy based on the desired outcome of the algorithm. Supervised learning generates a function that maps inputs to desired outputs.

[Nasteski, V. (2017). An overview of the supervised machine learning methods. *Horizons. b*, *4*, 51-62.]. In the last decade a large number of supervised learning methods have been introduced in the field of the machine learning. Supervised learning became an area for a lot of research activity in machine learning. Many of the supervised learning techniques have found application in their processing and analysing variety of data. One of the main characteristics is that the supervised learning has the ability of annotated training data. The so-called labels are class labels in the classification process. There is a variety of algorithms that are used in the supervised learning methods. This paper summarizes the fundamental aspects of couple of supervised methods. The main goal and contribution of this review paper is to present the overview of machine learning and provide machine learning techniques. Machine learning represents a large field presented in information technology, statistics, probability, artificial intelligence, psychology, neurobiology and many other disciplines. With machine learning the problems can be solved simply by building a model that is a good representation of a selected dataset. Machine learning has become an advanced area from teaching the computers to mimic the human brain, and has brought the field of statistic to a broad discipline that produces fundamental statistical computational theories of the learning processes. Machine learning is all about creating algorithms that allow the computer to learn. Learning is a process of finding statistical regularities or other patterns of data.

[Zhongguo, Y., Hongqi, L., Ali, S., & Yile, A. (2017) Choosing classification algorithms and its optimum parameters based on data set characteristics. Journal of

Computers, 28(5), 26-38.] Choosing a correct classification algorithm for a given data set is an important task considering the existing multiple classifiers. A method of recommending a suitable algorithm and its optimum parameters for a given data set is proposed. Firstly, six different types of measures are computed for each data set to be representation of its characteristics. Then, the performance and optimum parameters for a given algorithm are computed by using grid search method. Afterwards, a model was built to predict the variance of classifiers for a given data set and another model was built to predict the best suitable algorithm. The proposed method tries to predict the optimum parameter for a certain algorithm based on knowledge learning from history data sets. To evaluate the performance of the proposed method, some extensive experiments for four different types of algorithms are conducted upon the UCI data sets. The results indicate that the proposed method is effective.

[Kallurkar, P., Patil, K., Sharma, G., Sharma, S., & Sharma, N. (2015, July). Analysis of Tridosha in various physiological conditions. In *2015 IEEE International Conference on Electronics, Computing and Communication Technologies (CONECCT)* (pp. 1-5). IEEE.] Ayurveda is one of the oldest literatures which deals with the nature, scope and purpose of life. In the ancient times, pulse diagnosis using the signals obtained from the three precise locations on the wrist at the radial artery, viz. vata, pitta and kapha, played an important role in the Traditional Chinese Medicine and Ayurveda. The Nadi Vidwans using their experience and skill feel this signal on the patient's wrist. Any change in the nature of signal felt is a means of identifying any kind of imbalance in Doshas. In this paper, we have analysed Variation in Tridosha during fever, before and after meal, epileptic jerks, and recovery phase of typhoid. An automated Instrumentation system is implemented to mimic the Nadi Vidwan's method. We have acquired the pulse signals using a suitable pressure sensor and processed in MATLAB. The imbalances of radial arterial signal in various abnormalities were observed. Graphical User Interface has been developed using MATLAB for displaying results.

[Gadre, G. (2019). Classification of Humans into Ayurvedic Prakruti Types Using Computer Vision.] The three Doshas (Tridosha) Vata, Pitta, and Kapha originated from the combinations of these elements. Every person has a unique combination of Tridosha elements contributing to a person’s ‘Prakruti’. Prakruti governs the physiological and psychological tendencies in all living beings as well as the way they interact with the environment. This balance influences their physiological

features like the texture and colour of skin, hair, eyes, length of fingers, the shape of the palm, body frame, strength of digestion and many more as well as the psychological features like their nature (introverted, extroverted, calm, excitable, intense, laidback), and their reaction to stress and diseases. All these features are coded in the constituents at the time of a person's creation and do not change throughout their lifetime. Ayurvedic doctors analyse the Prakruti of a person either by assessing the physical features manually and/or by examining the nature of their heartbeat (pulse). Based on this analysis, they diagnose, prevent and cure the disease in patients by prescribing precision medicine. This project focuses on identifying Prakruti of a person by analysing his facial features like hair, eyes, nose, lips and skin colour using facial recognition techniques in computer vision. This is the first of its kind research in this problem area that attempts to bring image processing into the domain of Ayurveda.

Chapter 4

PROJECT DESCRIPTION

Chapter 4

PROJECT DESCRIPTION

4.1 Proposed Design

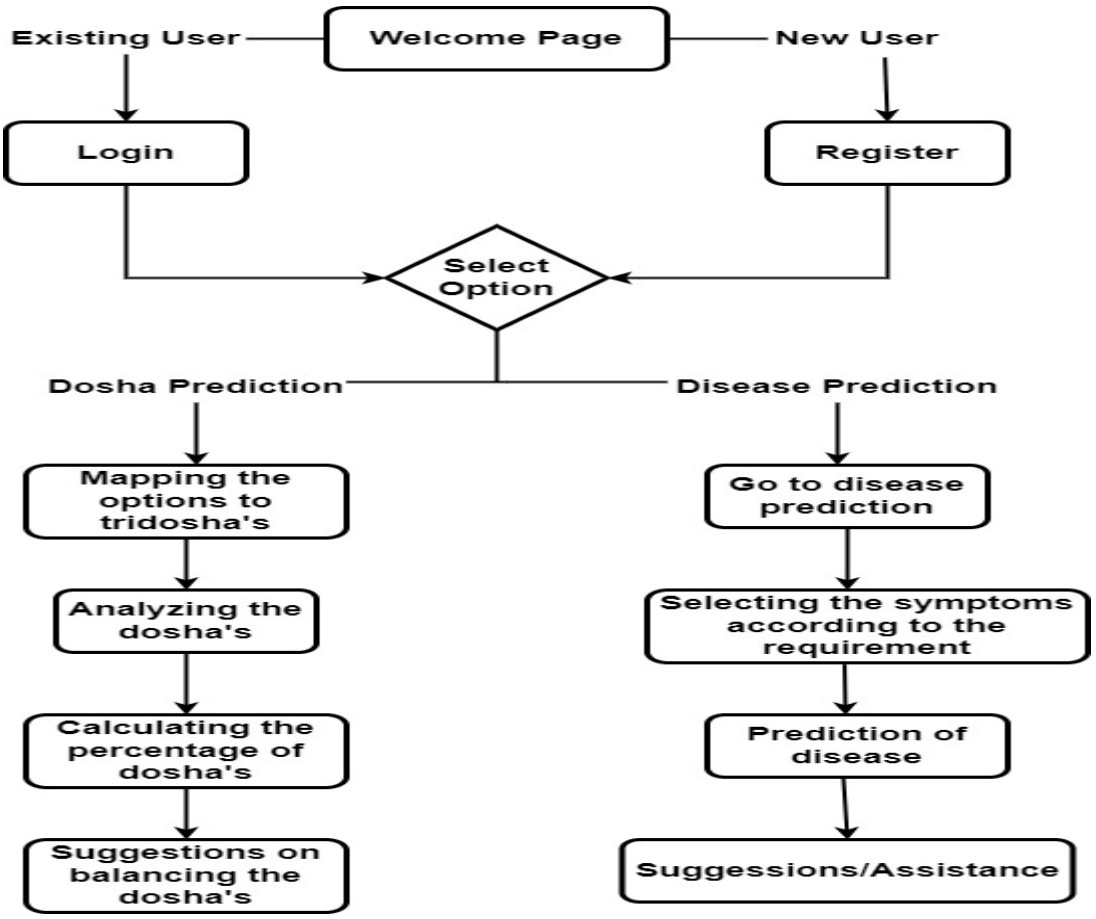

Fig no: 4.1.1. Flowchart of the project

The above flowchart shows how the website works. This web application has two parts- Dosha prediction and Disease prediction. In Dosha prediction we analyze the body type of the user based on the physical and mental characteristics selected by the user. In Disease prediction, we analyze the disease or illness based on the symptoms selected by the user.

Chapter 5

REQUIREMENTS

Chapter 5

REQUIREMENTS

5.1. Functional Requirements:

- The Data Mining: Collecting all the clinical data from clinic's and patient's.
- Perform Exploratory data analysis of symptoms of a disease.

5.2. Non-Functional Requirements:

There are several more reasons for its requirement, such as:

- The implementation must clearly specify the analysis of illness for diseases.
- The prediction should take the minimum time possible to make the predictions.
- The implementation must provide easy availability, correctness, flexibility and usability to the user to achieve above mentioned specific goals with effectiveness, efficiency and satisfaction.

5.3. Hardware Requirements:

- Ram - Minimum 4GB (recommended 8GB)
- Processor - Any processor with base clock frequency 2.0 GHz or more recommended octa core.
- Windows 8/windows 10 recommended.

Chapter 6

METHODOLOGY

Chapter 6

METHODOLOGY

6.1. Algorithm:

The proposed methodology is divided into two steps:

A. Tridosha Analysis Algorithm

B. Disease Prediction Algorithm

A. Tridosha Analysis Algorithm:

Dosha of the user / the body constitution of the user is analysed based on the physical and mental characteristics of the user.

- Analyzing the body constitution and displaying the constitution in percentage:
- Every first option in the questionnaire is mapped to VATA, every second option is mapped to PITTA and every third option is mapped to KAPHA.
- Based on the options user have chosen, the percentage is calculated.
- The percentage is calculated as:

  Percentage = (count of the options selected/total number of question's)*100
- The percentage displayed after analyzing will represent the body constitution of the user in the pie chart, showing the percentage of the each dosha based on the option's selected.

B. Disease Prediction Algorithm:

- Data set which consists of the symptoms and the assistance /suggestions for some the common diseases is stored in the data base as csv file.
- And the data set is read using python.
- Symptoms are displayed on the first page of disease prediction.
- And those symptoms are divided into two different columns.

- And the user has to select the symptoms based on the specifications:
  - User have to select a minimum of two symptoms from the first column.
  - And have to select zero or more from the second column.
- The symptoms are divided into two columns based on the most common and the rare symptoms which won't be specified to the user.
- Based on the symptoms selected from the columns the disease is predicted
- And some suggestions/assistance is displayed for the disease predicted
- Error pop-ups:
- If the user select's only one symptom or zero symptom from the first column- please select at least two symptoms.

Chapter 7

EXPERIMENTATION

Chapter 7

EXPERIMENTATION

Tridosha Analysis:

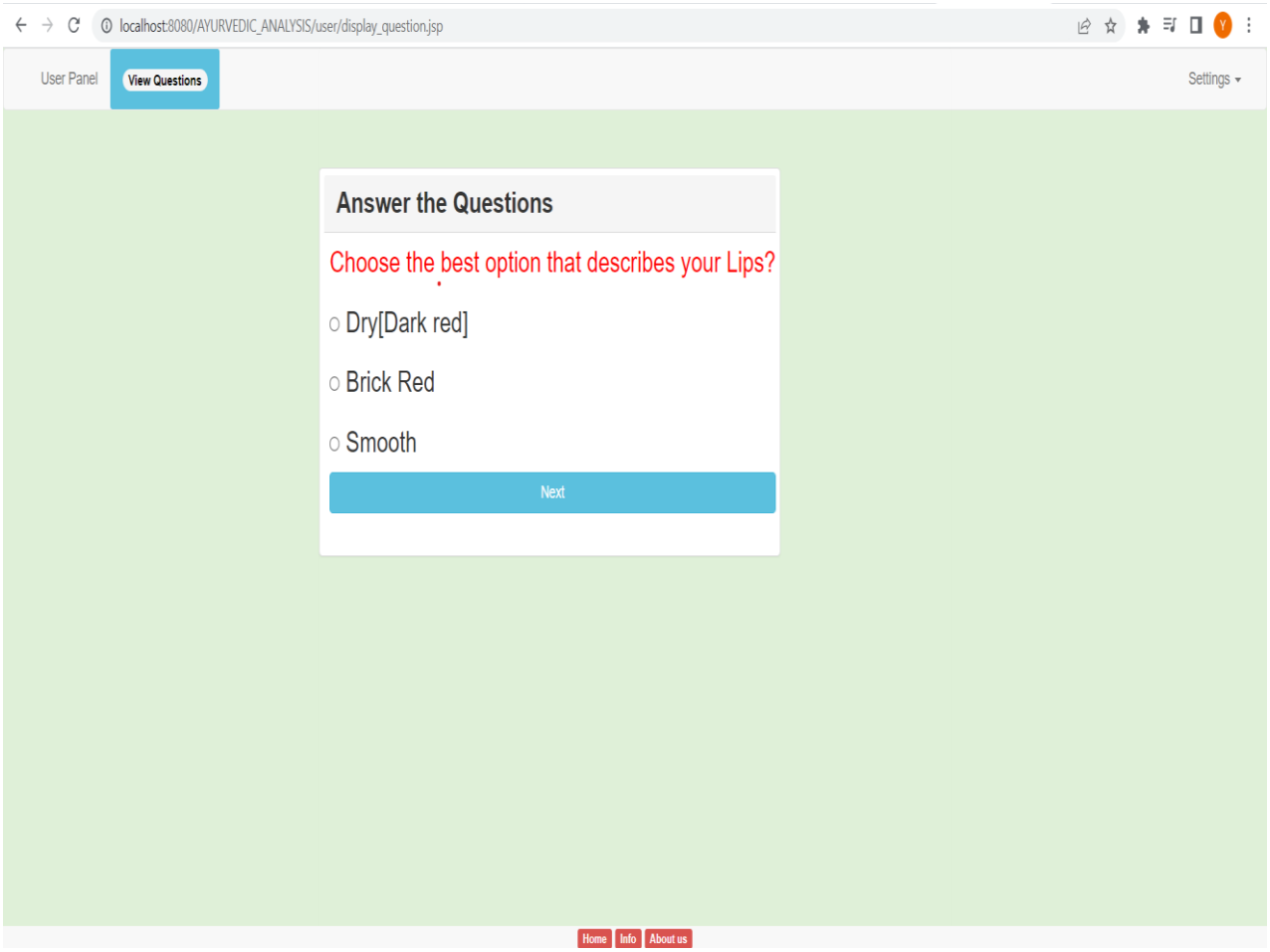

Fig no: 7.1. Selecting the options

The above figure represents the questionnaire from the first part of the project which is Tridosha Analysis. Here user have to select an option from the given three options which are related to Vata, Pitta and Kapha.

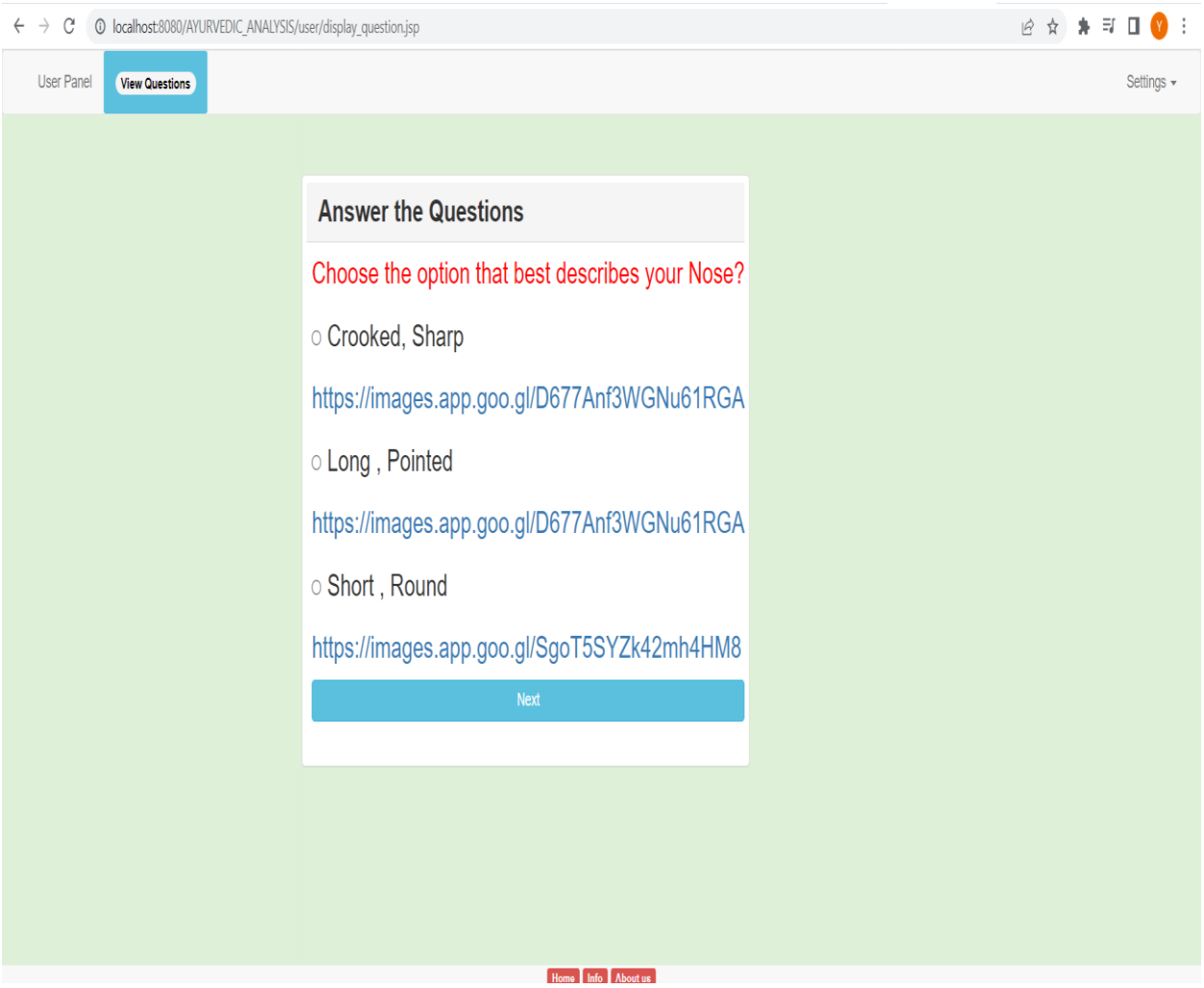

Fig no: 7.2. Selecting the options

The above figure represents the questionnaire from the first part of the project which is Tridosha Analysis. Here user have to select an option from the given three options which are related to Vata, Pitta and Kapha. To make it easy for user to understand the words used in the option's, related links are provided below the option, so that user can refer and select the option.

Disease Prediction:

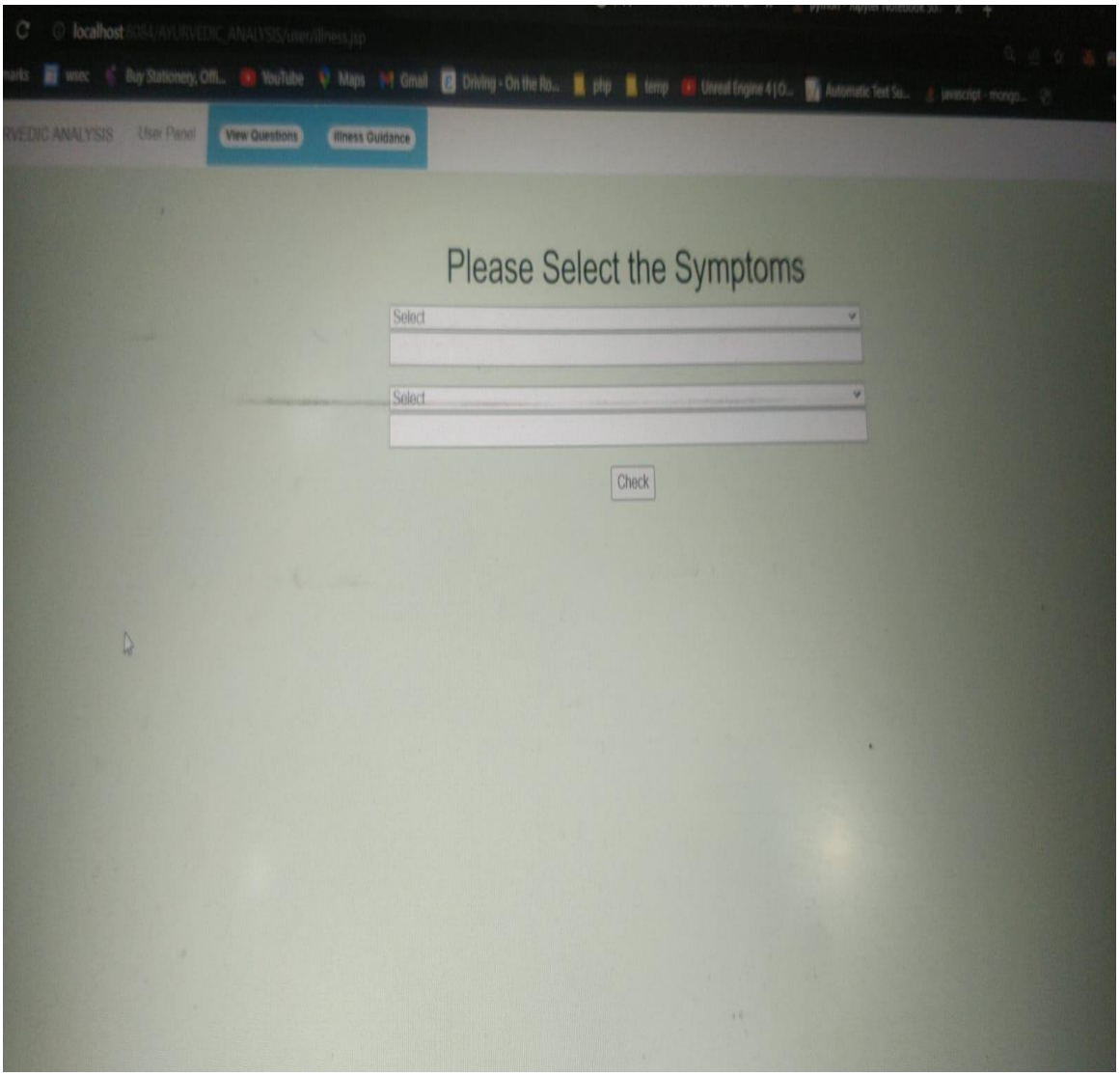

Fig no: 7.3. Selecting the symptoms

The above figure represents the page from the second part which is the Disease prediction, where the user has to select the symptoms which the user is having from each of the column from the displayed list of symptoms categorized from the dataset. The first column here contains the most common symptoms and the second column contains the rare symptoms (which is not displayed to the user).

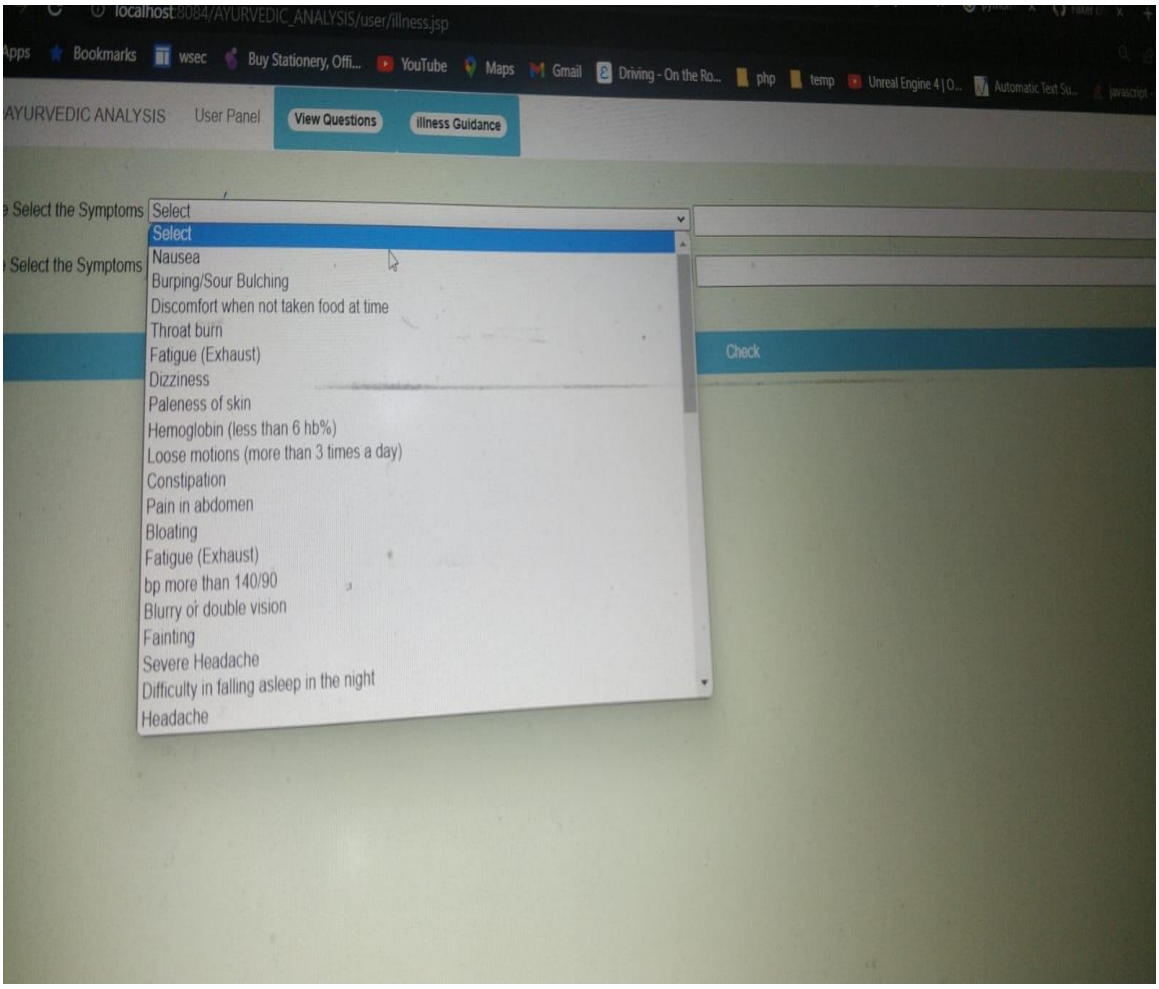

Fig no: 7.4. List of the symptoms

The above figure shows how the list of symptoms will be displayed in the second part which is Disease prediction where the user has to select at least two symptoms from the first column and zero or more from the second column to analyze the disease. The user has to select the symptoms in such a way that he/she meets the requirements to predict the disease. An error message will be displayed if the user has not selected the required number of symptoms.

Chapter 8

TESTING AND RESULTS

Chapter 8

TESTING AND RESULTS

Tridosha Analysis:

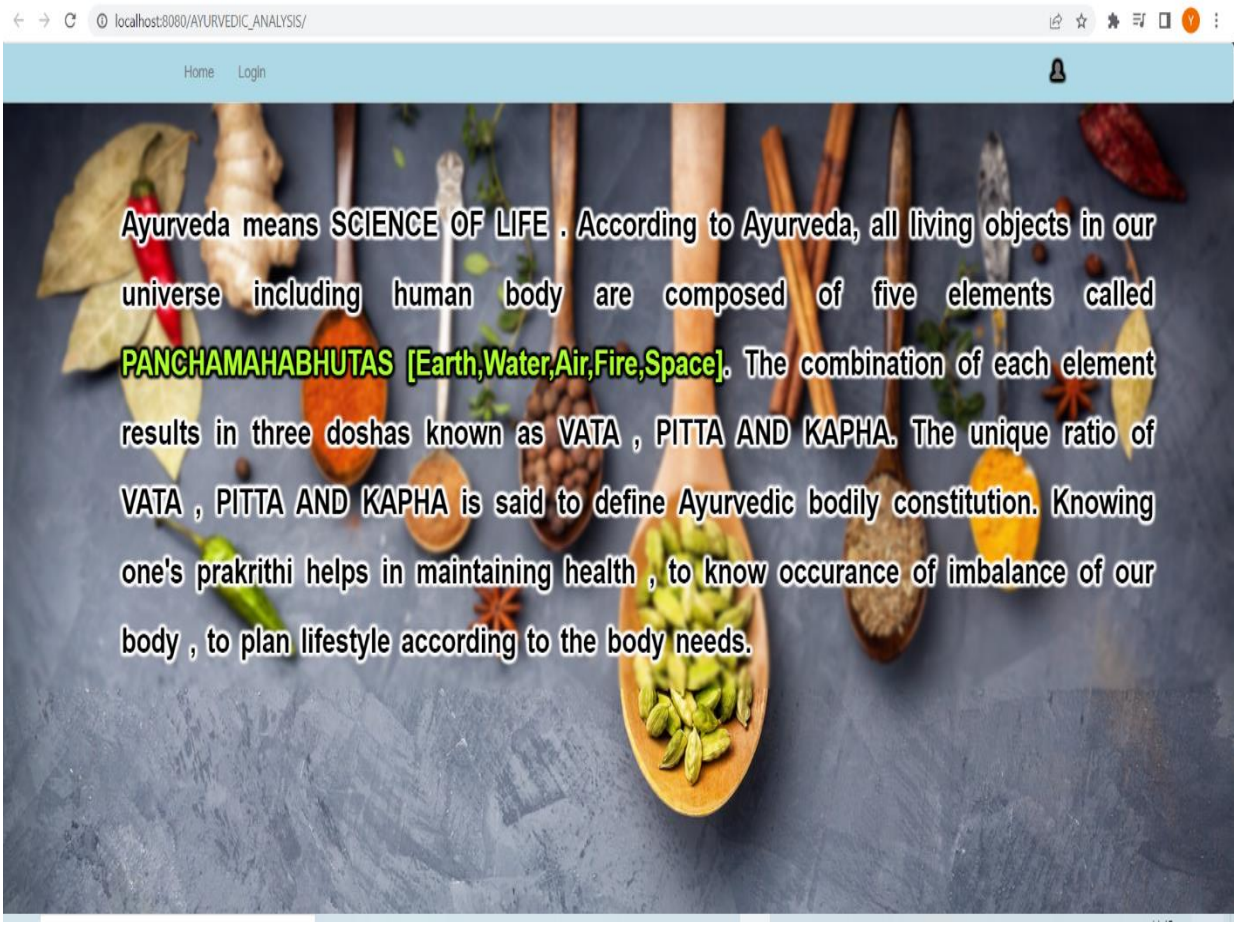

Fig no: 8.1. Home Page

The above figure represents the home page of the project, the content which is displayed on the home page gives an idea of Tridosha's – Vata, Pitta and kapha to the user and it also tells the importance of knowing once prakriti and how it can help in maintaining our health. Home page also has a login option, where user can click on the button to login to the website to know their prakriti and also for the disease prediction.

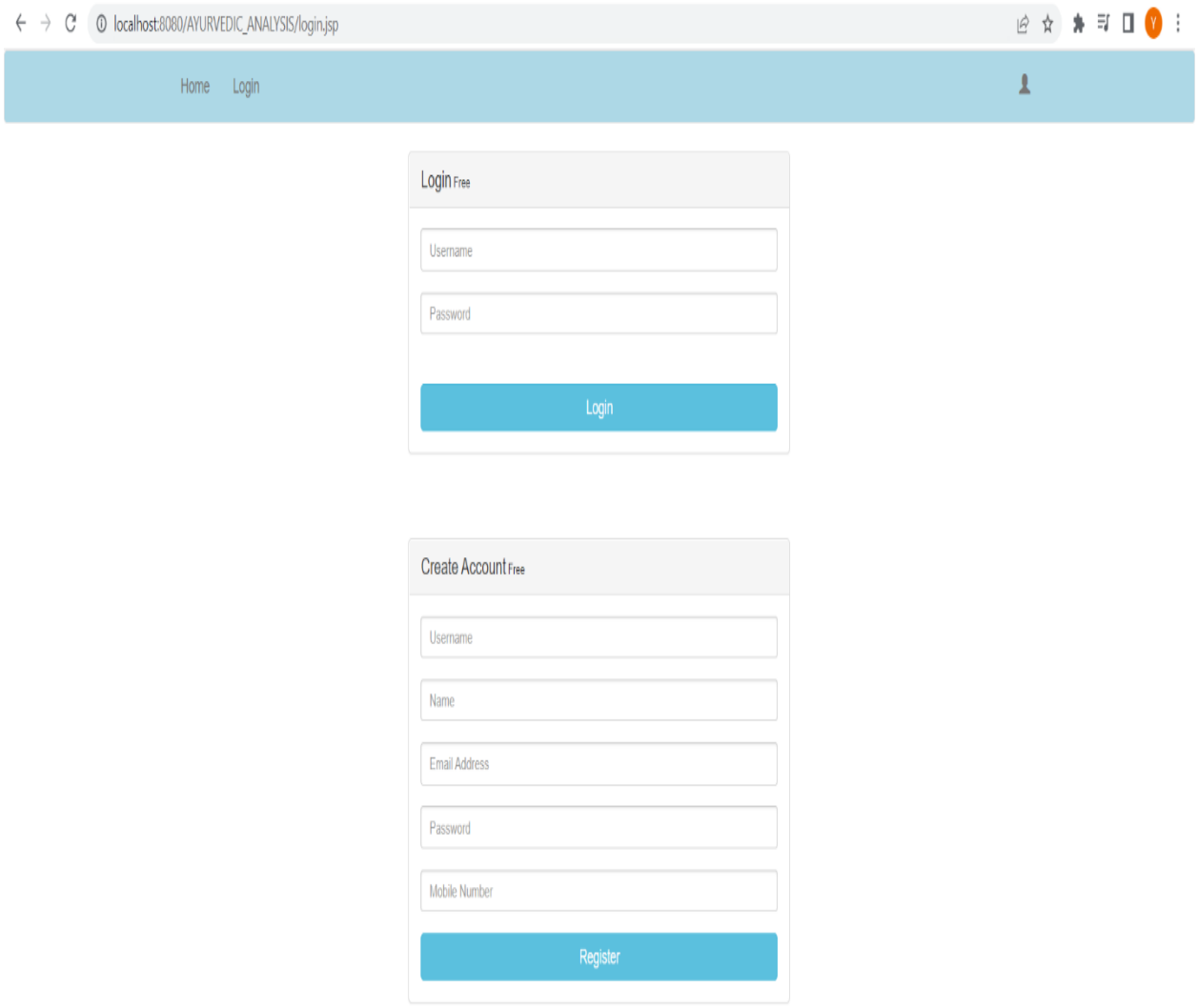

Fig no: 8.2. Login and Register Page

The above figure represents the Login and Register page of the project. After clicking on the login button on the home page, the user gets to see the above login and register page where the user can login if he/she already have an account in this web application or the user can create a new account if he/she has not yet created an account in this web application.

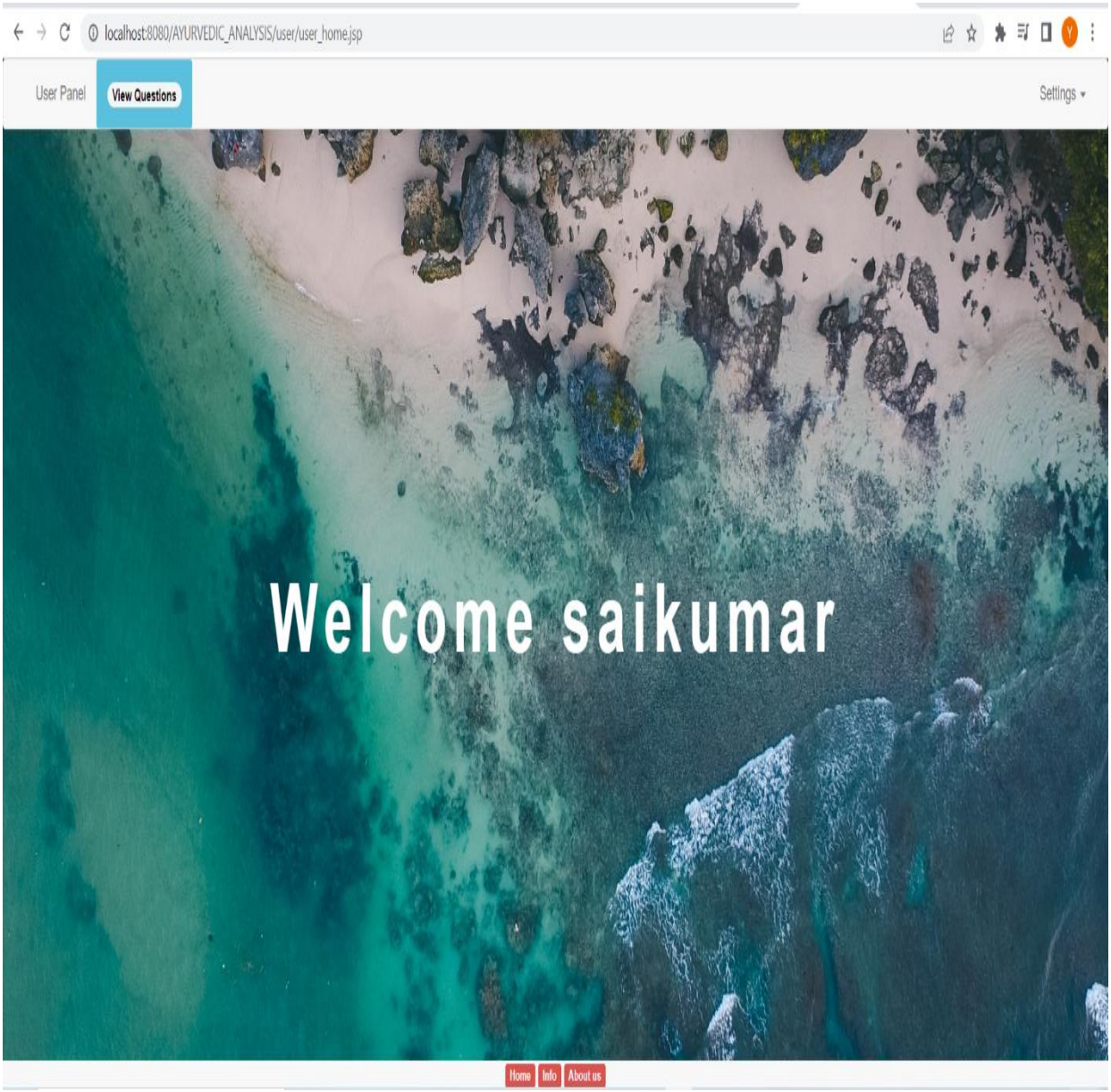

Fig no: 8.3. Welcome Page

The above figure represents the welcome page of the project. After logging in by creating an account, the user will see this welcome page with the text message as Welcome <username>. From here the user can be directed to the questions page by clicking on the view questions bottom on the top where the user has to answer the questions for Tridosha Analysis.

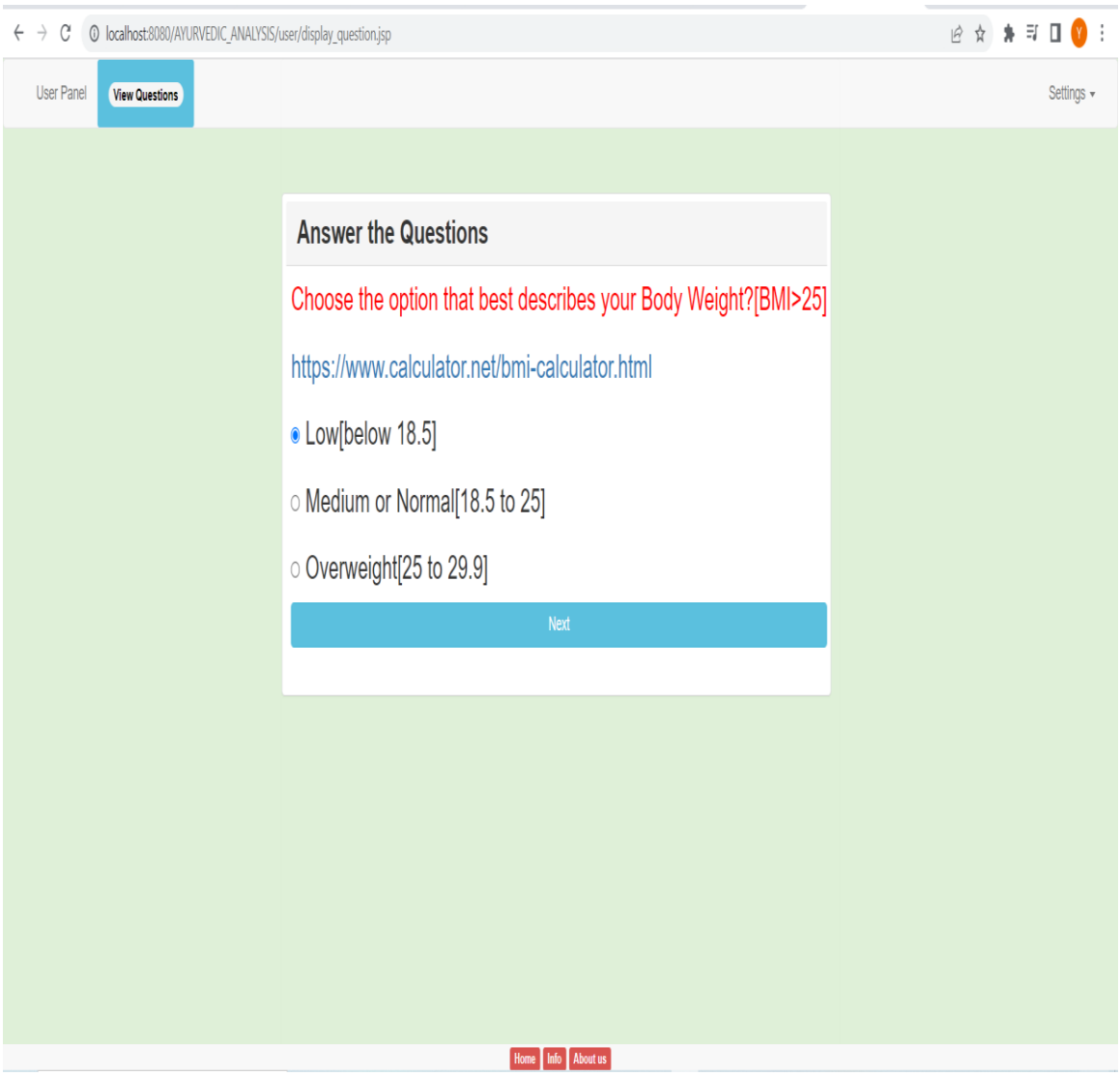

Fig no: 8.4. Answering the questions

The above figure represents the questionnaire from the first part which is the Tridosha Analysis, where the user has to select the option which describes his/her characteristics or physical appearance from the questions given to analyze their prakriti – the bodily constitution.

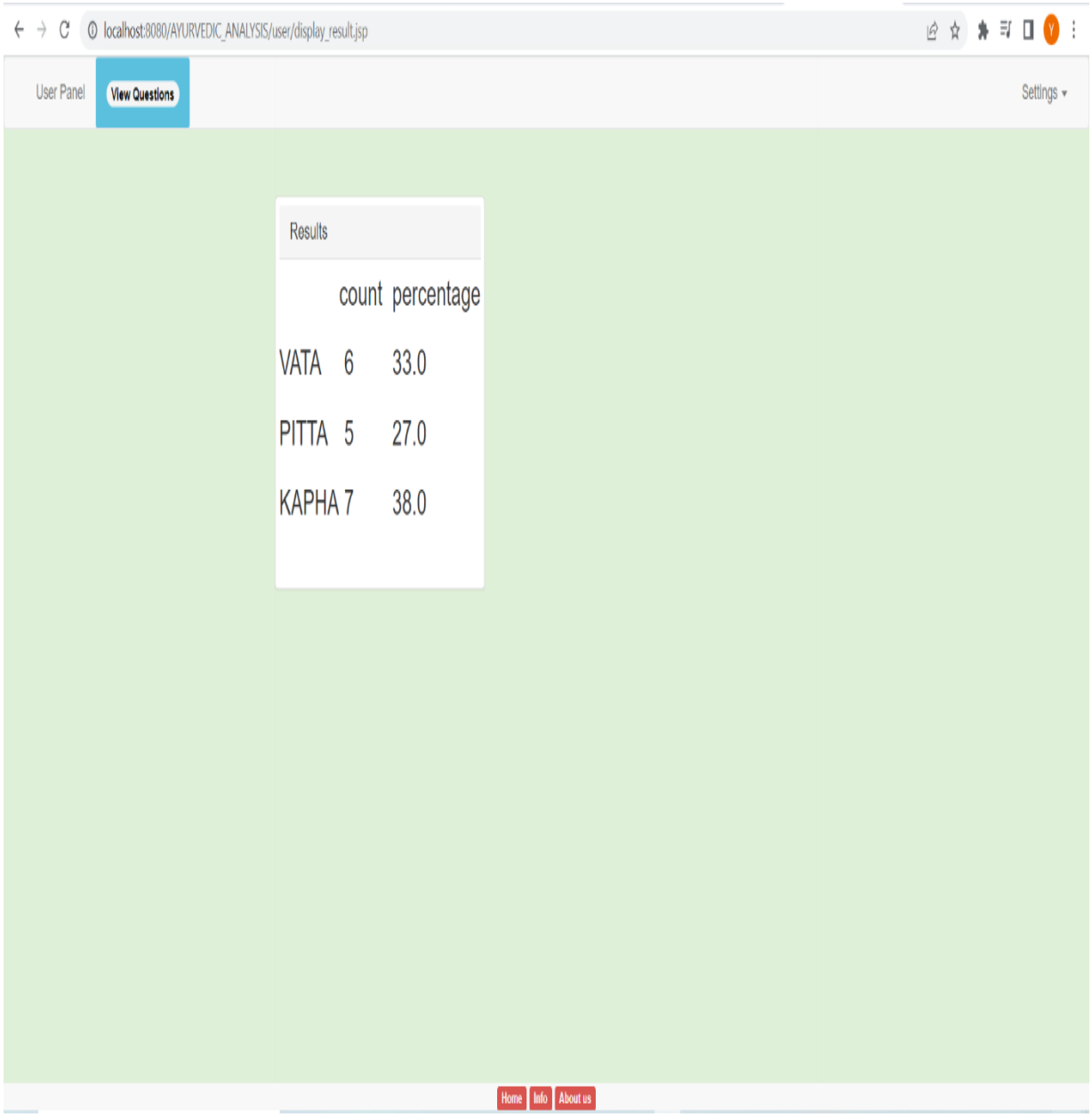

Fig no: 8.5. Result for Tridosha Analysis

The above figure represents the result which will be displayed after analyzing the prakriti of the user after answering all the questions from the first part. The output represents the percentage of Vata, Pitta and kapha based on the options selected by the user.

Disease Prediction:

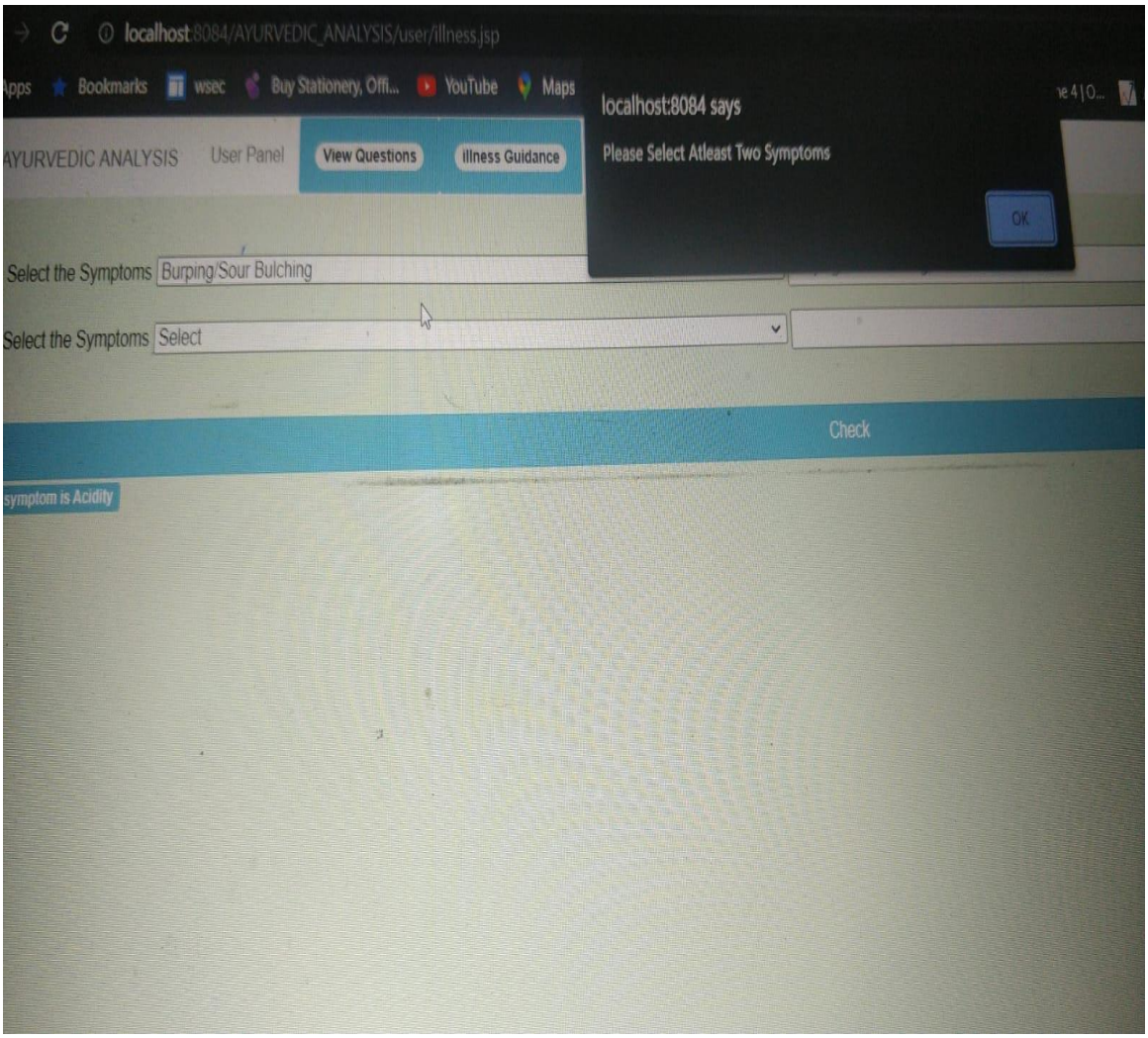

Fig no: 8.6. Error Message

The above figure shows the error message which will be displayed as a pop-up when the user has not selected the minimum number of required symptoms. The requirement is the user has to select at least two symptoms from the first column and zero or more number of symptoms from the second column in order to analyze the selected symptoms and predict the accurate disease.

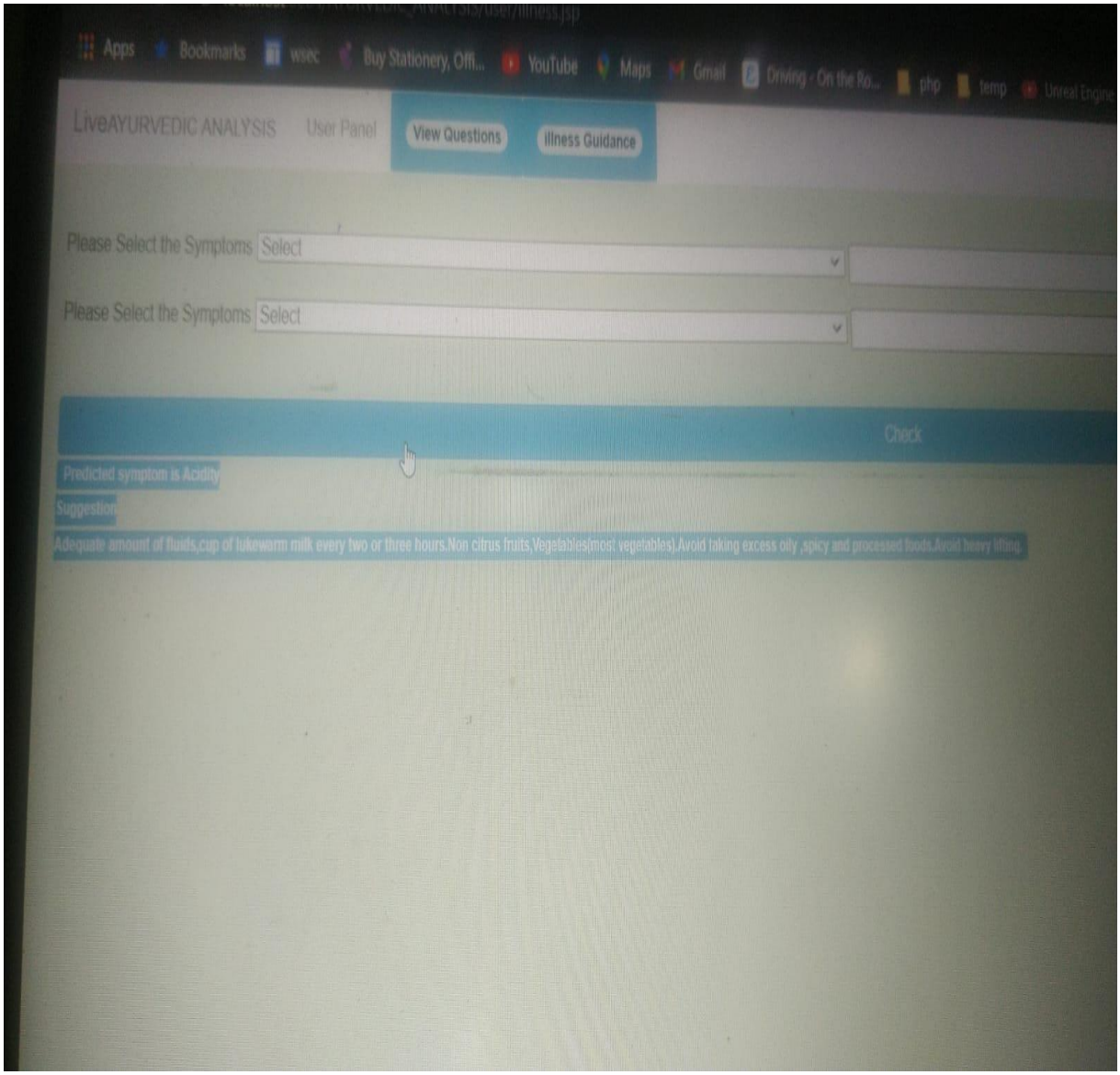

Fig no: 8.7. Result for Disease Prediction

The above figure represents the result which will be displayed after analyzing the symptoms based on which user has selected by satisfying the requirements and specifications. Some suggestions/assistance will also be provided to the user based on the disease predicted.

Chapter 9

CONCLUSION AND FUTURE WORK

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In this project, we perform tridosha analysis – VATA, PITTA and KAPHA and display the body constitution of the user based on the physical and mental characteristics chosen. And we also perform disease prediction, for this prediction we use the real time dataset collected from the clinic's and patient's. The disease is predicted based on the symptoms selected by the user which are displayed according to the specifications and requirements to perform the analysis and also based on the disease predicted, some suggestions/assistance will be provided in order to reduce the effects or to control the severity during episodes.

For future work, we can ask the patient's to upload the prescription and connect them to a nearby ayurvedic doctor's for the check up to get a detailed idea about their illness.

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