



NEIL GOGTE INSTITUTE OF TECHNOLOGY

A Unit of Keshav Memorial Technical Education (KMTES)

Approved by AICTE, New Delhi & Affiliated to Osmania University, Hyderabad

A

MINI PROJECT REPORT

ON

DISEASE PROGNOSIS USING RANDOM FOREST

For the award of Degree of

BACHELOR OF ENGINEERING

IN

CSE (AI ML)

Submitted By

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Under the guidance of

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CERTIFICATE

*This is to certify that the Mini project work entitled “**DISEASE PROGNOSIS USING RANDOM FOREST**” is a bonafide work carried out by **N. VISHAL(245321748064)** of III-year V semester **Bachelor of Engineering in CSE(AIML)** by Osmania University, Hyderabad during the academic year **2023-2024** is a record of bonafide work carried out by them. The results embodied in this report have not been submitted to any other University or Institution for the award of any degree*

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External



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DECLARATION

I hereby declare that the Mini Project Report entitled, “**DIESEASE PROGNOSIS USING Random Forest**” submitted for the B.E degree is entirely my work and all ideas and references have been duly acknowledged. It does not contain any work for the award of any other degree.

Date:

N. VISHAL

245321748064

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ABSTRACT

Technological Landscape: In the contemporary landscape dominated by Machine Learning and Deep Learning, there exists a critical need to bridge the gap between theoretical knowledge and its practical application, especially in fields crucial to human welfare.

Purpose of the Project: This project is conceived with the explicit goal of channeling the burgeoning expertise in machine learning towards the realm of Medical Science. The overarching objective is to simplify the complexities of medical diagnosis by providing a dataset designed for predictive analysis.

Dataset Overview: A dataset comprising 132 parameters has been meticulously curated, presenting a unique opportunity for practitioners to harness their existing knowledge in machine learning. The dataset enables the prediction of 42 distinct diseases, covering a diverse range of medical conditions.

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CHAPTER – 1

INTRODUCTION

1.1 PROBLEM STATEMENT

Accurate diagnosis of diseases based on symptoms can be challenging due to the complexity and variability of human health conditions. Traditional diagnostic methods may rely on subjective interpretation or limited medical knowledge, leading to misdiagnosis or delayed treatment.

1.2 MOTIVATION

The motivation behind this project lies in the potential to revolutionize disease prognosis by leveraging machine learning techniques. By developing a model capable of accurately predicting diseases based on symptoms, we aim to enhance healthcare delivery, improve patient outcomes, and optimize resource allocation in the medical field.

1.3 SCOPE

This project focuses on developing a machine learning-based system for health prognosis using symptoms provided by the user. The scope encompasses a wide range of diseases, with a primary focus on common ailments such as respiratory infections, gastrointestinal disorders, and cardiovascular diseases. The system will consider a variety of symptoms, including but not limited to fever, cough, chest pain, nausea, and fatigue. However, it is important to note that the system's performance may vary depending on the complexity and specificity of the disease.

1.4 OUTLINE

The VGG16 CNN model classifies the dataset into three parts, i.e., training dataset, testing dataset and lastly, validation dataset. The model learns from the training dataset and then using the validation dataset, inputs are validated. I used “Streamlit” to create web application that is flexible to use 200MB sized images as its input.

CHAPTER – 2

LITERATURE SURVEY

EXISTING SYSTEM:

In the domain of health prognosis using machine learning (ML), prior research has emphasized the importance of feature extraction or classification from symptom data to improve diagnostic accuracy. The effectiveness of these systems is heavily dependent on the quality and relevance of the features extracted from the input symptoms. Within the medical domain, researchers have explored various methodologies to differentiate between different health conditions based on symptom patterns. For example, a study introduced a novel feature selection approach leveraging statistical methods and domain knowledge to identify key symptoms associated with specific diseases. These features were then integrated into machine learning models such as random forests and decision trees, achieving notable success in accurately predicting disease prognosis from symptom data.

PROPOSED SYSTEM:

The proposed system employs a Random Forest algorithm, a popular machine learning ensemble method, for health prognosis based on user-provided symptoms. Unlike traditional machine learning algorithms, Random Forest requires minimal preprocessing of symptom data and can effectively handle both numerical and categorical features. The algorithm operates by constructing multiple decision trees during training and combining their predictions through voting to determine the final prognosis. This ensemble approach enhances the robustness and generalization of the model, making it suitable for handling diverse symptom patterns and predicting various health conditions. The proposed system aims to leverage Random Forest for disease prognosis by utilizing symptom data provided by users. By analyzing the symptom profiles and learning from historical datasets, the Random Forest model can effectively identify patterns and associations indicative of different diseases. Through rigorous training and validation procedures, the model is expected to achieve high accuracy and reliability in predicting disease prognosis based on user symptoms.

CHAPTER - 3

SOFTWARE REQUIREMENTS SPECIFICATION

3.1 Overall Description:

This SRS is an overview of the whole project scenario. This document is to present a detailed description of the course management system. It will explain the purpose and features of the system, the interfaces of the system will do, the constraints under which it must operate and how the system will react to external stimuli. This document is intended for both stakeholders and developers of the system.

3.2. Operating Environment:

Software Requirements:

| | | |
|------------------|---|-----------------|
| Operating System | : | Windows 7 (Min) |
| Front End | : | Html, CSS, JS |
| Back End | : | Nodejs ,Express |
| Database | : | Microsoft Excel |

Hardware Requirements:

| | | |
|-----------|---|--|
| Processor | : | Intel Pentium® Dual Core Processor (Min) |
| Speed | : | 2.9 GHz (Min) |
| RAM | : | 2 GB (Min) |
| Hard Disk | : | 2 GB (Min) |

3.3 Functional Requirements:

User Functionality:

- The user will be able to select symptoms regarding the disease he/she wants to find
- The user will be able to insert symptoms of 132 types.
- The user can see information regarding the disease he/she will also be provided with disease's Wikipedia.

Admin Functionality:

- The admin manages the website.
- The admin can increase database size.
- The admin can make changes to the website such as modifying the UI and making it more interactive than earlier.
- The admin can implement a better algorithm if at all a better algorithm is created in future.

3.4 Non-Functional Requirements:

3.4.1 Performance Requirements:

Performance requirements refer to static numerical requirements placed on the interaction between the users and the software.

Response Time:

Average response time shall be less than 5 sec.

Recovery Time:

In case of system failure, the redundant system shall resume operations within 30 secs. Average repair time shall be less than 45 minutes.

Start-Up/Shutdown Time:

The system shall be operational within 1 minute of starting up.

Capacity:

The system accommodates 1000 Concurrent Users.

Utilization of Resources:

The system shall store in the database no more than 450 different species with room for improvement.

3.4.2 Safety Requirements:

-NA-

3.4.3 Security Requirements:

The model will be running on a secure website i.e., an HTTPS website and on a secure browser such as Google Chrome, Brave, etc.

3.4.4 Software Quality Attributes:

Reliability:

The system shall be reliable i.e., in case the webpage crashes, progress will be saved.

Availability:

The website will be available to all its users round the clock i.e., they can access the website at any time.

Security:

The model will be running on a secure website i.e., an HTTPS website and on a secure browser such as Google Chrome, Brave, etc.

Maintainability:

The model shall be designed in such a way that it will be very easy to maintain it in future. Our model is a neural network model and a web-based system and will depend much on the web server and on the neural networks. However, the web application will be designed using Streamlit which is based on neural network approach and proper database modeling along with extensive documentation which will make it easy to develop, troubleshoot and maintain in future.

Usability:

The interfaces of the system will be user friendly enough that every user will be able to use it easily.

Scalability:

The system will be designed in such a way that it will be extendable. If more species or algorithms are going to be added in the system, then it would easily be done.

The same system can also be developed to become a mobile application rather than just a website.

CHAPTER-4

SYSTEM DESIGN

Use case Diagrams:

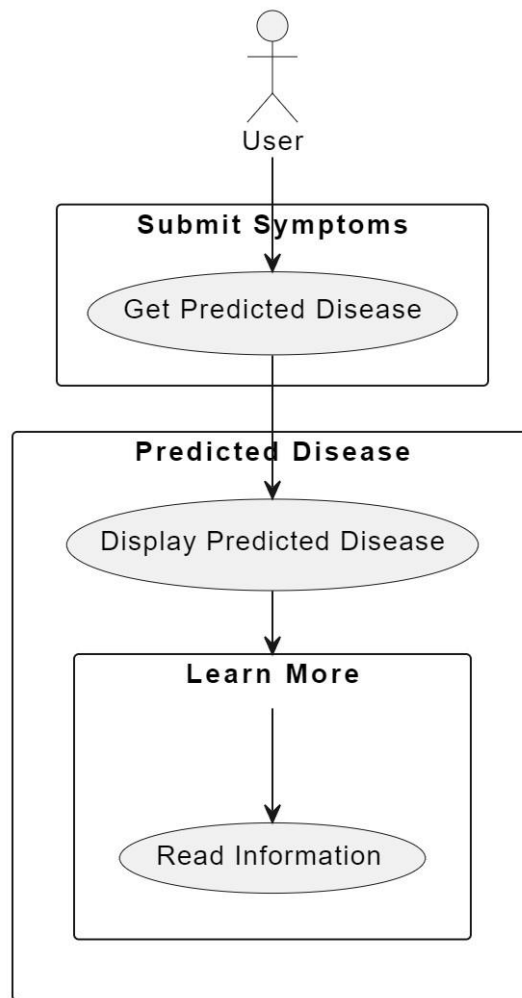


Fig 4.1: Use case diagram for User

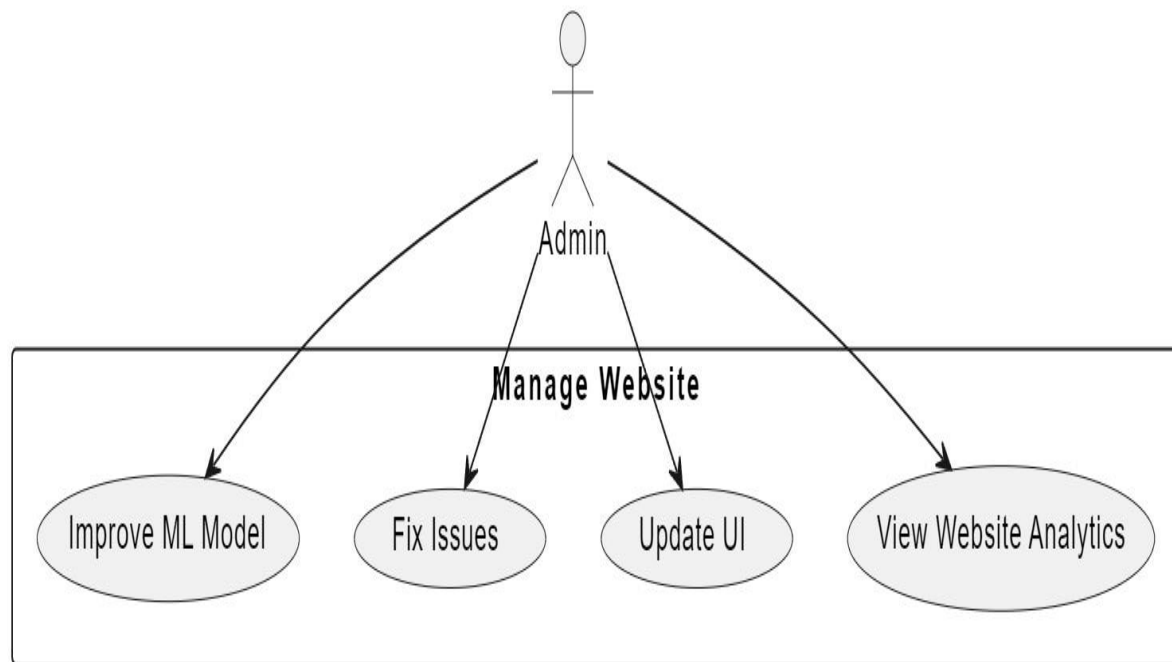


Fig 4.2: Use case diagram for Admin

Class Diagram:

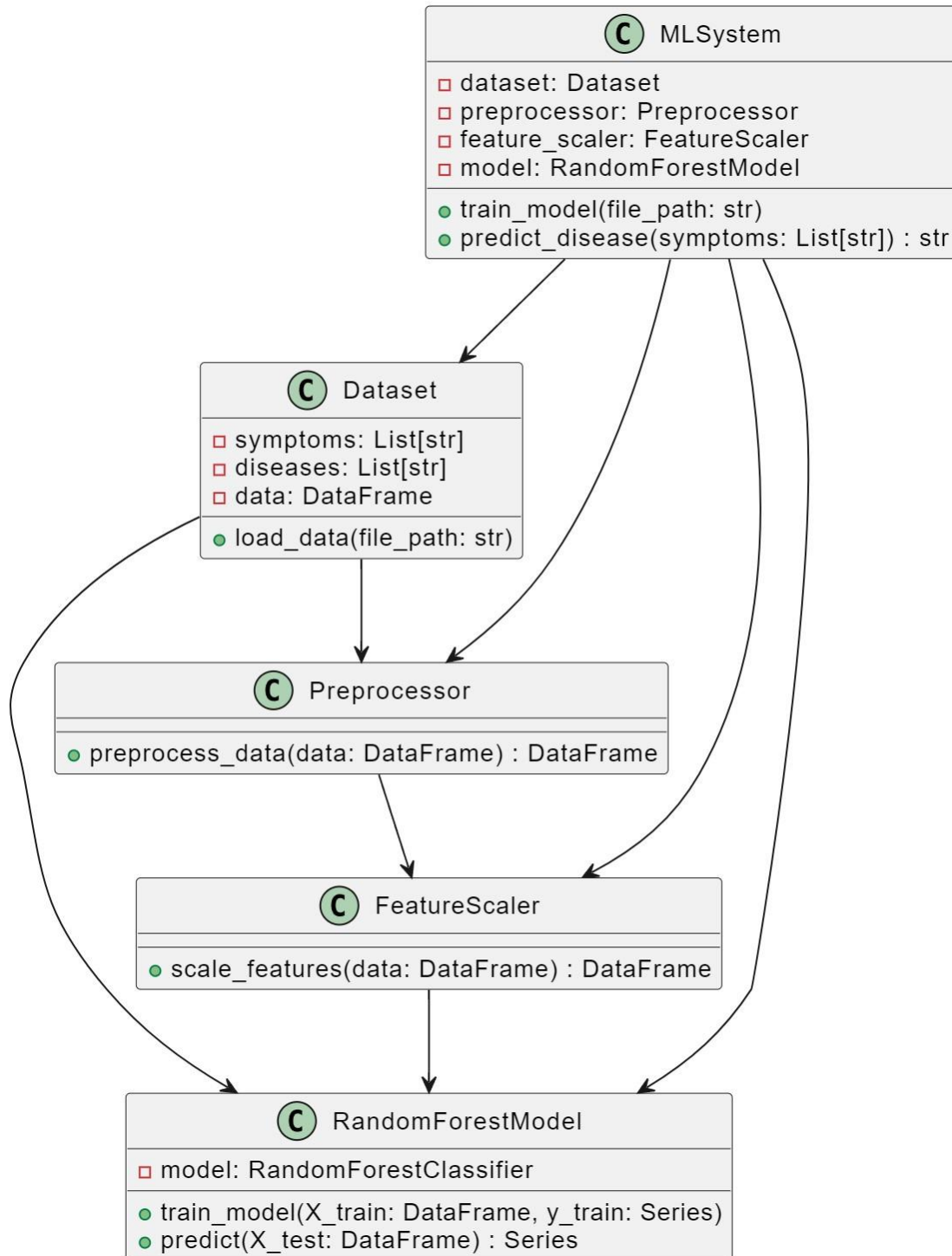


Fig.4.3 : Class diagram for Model Training.

Sequence Diagram:

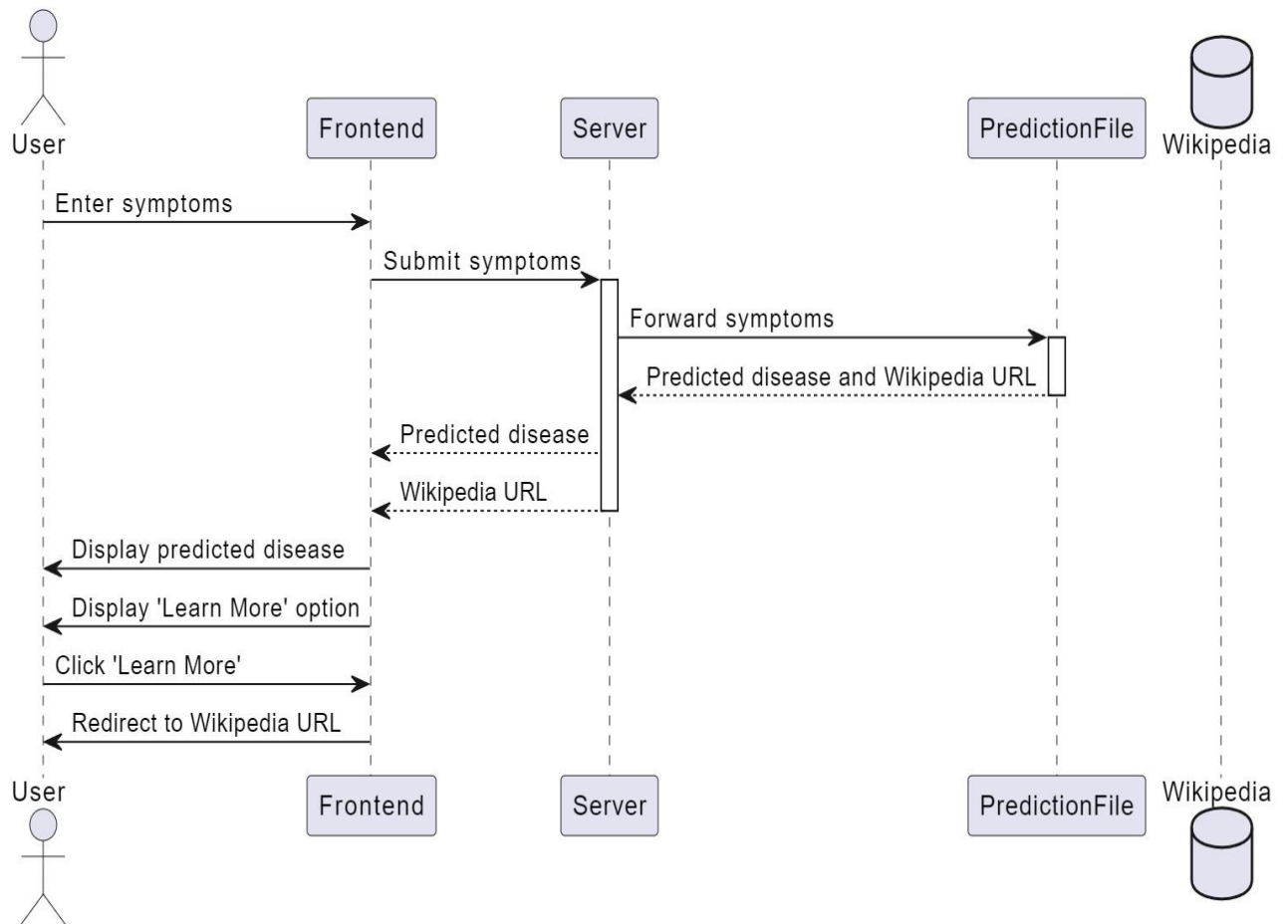


Fig4.3 : Sequence Diagram for Disease Prediction.

CHAPTER – 5

IMPLEMENTATION

5.1 SAMPLE CODE

Model Training Code :-

```
import pandas as pd
import numpy as np

df = pd.read_csv('Training.csv')
df.info(verbose=True)
df

<class 'pandas.core.frame.DataFrame'>
RangeIndex: 4920 entries, 0 to 4919
Data columns (total 134 columns):
#   Column                                Dtype
---  -
0   itching                               int64
1   skin_rash                             int64
2   nodal_skin_eruptions                 int64
3   continuous_sneezing                 int64
4   shivering                             int64
5   chills                               int64
6   joint_pain                           int64
7   stomach_pain                         int64
8   acidity                              int64
9   ulcers_on_tongue                     int64
10  muscle_wasting                       int64
11  vomiting                             int64
12  burning_micturition                  int64
13  spotting_urination                  int64
14  fatigue                              int64
15  weight_gain                          int64
16  anxiety                              int64
17  cold_hands_and_feets                 int64
18  mood_swings                          int64
19  weight_loss                          int64
20  restlessness                         int64
21  lethargy                             int64
22  patches_in_throat                    int64
23  irregular_sugar_level                int64
24  cough                                int64
25  high_fever                           int64
26  sunken_eyes                          int64
27  breathlessness                       int64
28  sweating                             int64
29  dehydration                          int64
30  indigestion                          int64
31  headache                             int64
32  yellowish_skin                       int64
33  dark_urine                           int64
34  nausea                               int64
35  loss_of_appetite                     int64
```

| | | |
|----|------------------------------|-------|
| 36 | pain_behind_the_eyes | int64 |
| 37 | back_pain | int64 |
| 38 | constipation | int64 |
| 39 | abdominal_pain | int64 |
| 40 | diarrhoea | int64 |
| 41 | mild_fever | int64 |
| 42 | yellow_urine | int64 |
| 43 | yellowing_of_eyes | int64 |
| 44 | acute_liver_failure | int64 |
| 45 | fluid_overload | int64 |
| 46 | swelling_of_stomach | int64 |
| 47 | swelled_lymph_nodes | int64 |
| 48 | malaise | int64 |
| 49 | blurred_and_distorted_vision | int64 |
| 50 | phlegm | int64 |
| 51 | throat_irritation | int64 |
| 52 | redness_of_eyes | int64 |
| 53 | sinus_pressure | int64 |
| 54 | runny_nose | int64 |
| 55 | congestion | int64 |
| 56 | chest_pain | int64 |
| 57 | weakness_in_limbs | int64 |
| 58 | fast_heart_rate | int64 |
| 59 | pain_during_bowel_movements | int64 |
| 60 | pain_in_anal_region | int64 |
| 61 | bloody_stool | int64 |
| 62 | irritation_in_anus | int64 |
| 63 | neck_pain | int64 |
| 64 | dizziness | int64 |
| 65 | cramps | int64 |
| 66 | bruising | int64 |
| 67 | obesity | int64 |
| 68 | swollen_legs | int64 |
| 69 | swollen_blood_vessels | int64 |
| 70 | puffy_face_and_eyes | int64 |
| 71 | enlarged_thyroid | int64 |
| 72 | brittle_nails | int64 |
| 73 | swollen_extremeties | int64 |
| 74 | excessive_hunger | int64 |
| 75 | extra_marital_contacts | int64 |
| 76 | drying_and_tingling_lips | int64 |
| 77 | slurred_speech | int64 |
| 78 | knee_pain | int64 |
| 79 | hip_joint_pain | int64 |
| 80 | muscle_weakness | int64 |
| 81 | stiff_neck | int64 |
| 82 | swelling_joints | int64 |
| 83 | movement_stiffness | int64 |
| 84 | spinning_movements | int64 |
| 85 | loss_of_balance | int64 |
| 86 | unsteadiness | int64 |
| 87 | weakness_of_one_body_side | int64 |
| 88 | loss_of_smell | int64 |
| 89 | bladder_discomfort | int64 |
| 90 | foul_smell_of_urine | int64 |
| 91 | continuous_feel_of_urine | int64 |
| 92 | passage_of_gases | int64 |
| 93 | internal_itching | int64 |
| 94 | toxic_look_(typhos) | int64 |
| 95 | depression | int64 |
| 96 | irritability | int64 |

```

97 muscle_pain int64
98 altered_sensorium int64
99 red_spots_over_body int64
100 belly_pain int64
101 abnormal_menstruation int64
102 dischromic_patches int64
103 watering_from_eyes int64
104 increased_appetite int64
105 polyuria int64
106 family_history int64
107 mucoid_sputum int64
108 rusty_sputum int64
109 lack_of_concentration int64
110 visual_disturbances int64
111 receiving_blood_transfusion int64
112 receiving_unsterile_injections int64
113 coma int64
114 stomach_bleeding int64
115 distention_of_abdomen int64
116 history_of_alcohol_consumption int64
117 fluid_overload.1 int64
118 blood_in_sputum int64
119 prominent_veins_on_calf int64
120 palpitations int64
121 painful_walking int64
122 pus_filled_pimples int64
123 blackheads int64
124 scurring int64
125 skin_peeling int64
126 silver_like_dusting int64
127 small_dents_in_nails int64
128 inflammatory_nails int64
129 blister int64
130 red_sore_around_nose int64
131 yellow_crust_ooze int64
132 prognosis object
133 Unnamed: 133 float64
dtypes: float64(1), int64(132), object(1)
memory usage: 5.0+ MB

```

```

      itching skin_rash nodal_skin_eruptions continuous_sneezing
0         1         1             1             0
1         0         1             1             0
2         1         0             1             0
3         1         1             0             0
4         1         1             1             0
...
4915      0      0             0             0
4916      0      1             0             0
4917      0      0             0             0
4918      0      1             0             0
4919      0      1             0             0

```

```

      shivering chills joint_pain stomach_pain acidity ulcers_on_tongue
0         0      0         0         0      0         0
1         0      0         0         0      0         0
2         0      0         0         0      0         0
3         0      0         0         0      0         0
4         0      0         0         0      0         0
...
4915      0      0         0         0      0         0

```

| | | | | | | |
|------|---|---|---|---|---|---|
| 4916 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4917 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4918 | 0 | 0 | 1 | 0 | 0 | 0 |
| 4919 | 0 | 0 | 0 | 0 | 0 | 0 |

| | ... | scurrying | skin_peeling | silver_like_dusting | small_dents_in_nails |
|------|-----|-----------|--------------|---------------------|----------------------|
| 0 | ... | 0 | 0 | 0 | 0 |
| 1 | ... | 0 | 0 | 0 | 0 |
| 2 | ... | 0 | 0 | 0 | 0 |
| 3 | ... | 0 | 0 | 0 | 0 |
| 4 | ... | 0 | 0 | 0 | 0 |
| ... | ... | ... | ... | ... | ... |
| 4915 | ... | 0 | 0 | 0 | 0 |
| 4916 | ... | 1 | 0 | 0 | 0 |
| 4917 | ... | 0 | 0 | 0 | 0 |
| 4918 | ... | 0 | 1 | 1 | 1 |
| 4919 | ... | 0 | 0 | 0 | 0 |

| | | inflammatory_nails | blister | red_sore_around_nose | yellow_crust_ooze |
|------|--|--------------------|---------|----------------------|-------------------|
| 0 | | 0 | 0 | 0 | 0 |
| 1 | | 0 | 0 | 0 | 0 |
| 2 | | 0 | 0 | 0 | 0 |
| 3 | | 0 | 0 | 0 | 0 |
| 4 | | 0 | 0 | 0 | 0 |
| ... | | ... | ... | ... | ... |
| 4915 | | 0 | 0 | 0 | 0 |
| 4916 | | 0 | 0 | 0 | 0 |
| 4917 | | 0 | 0 | 0 | 0 |
| 4918 | | 1 | 0 | 0 | 0 |
| 4919 | | 0 | 1 | 1 | 1 |

| | | prognosis | Unnamed: 133 |
|------|-----------|-------------------------|--------------------|
| 0 | | Fungal infection | NaN |
| 1 | | Fungal infection | NaN |
| 2 | | Fungal infection | NaN |
| 3 | | Fungal infection | NaN |
| 4 | | Fungal infection | NaN |
| ... | | ... | ... |
| 4915 | (vertigo) | Parosymal | Positional Vertigo |
| 4916 | | Acne | NaN |
| 4917 | | Urinary tract infection | NaN |
| 4918 | | Psoriasis | NaN |
| 4919 | | Impetigo | NaN |

[4920 rows x 134 columns]

print(df.columns.tolist())

['itching', 'skin_rash', 'nodal_skin_eruptions', 'continuous_sneezing', 'shivering', 'chills', 'joint_pain', 'stomach_pain', 'acidity', 'ulcers_on_tongue', 'muscle_wasting', 'vomiting', 'burning_micturition', 'spotting_urination', 'fatigue', 'weight_gain', 'anxiety', 'cold_hands_and_feets', 'mood_swings', 'weight_loss', 'restlessness', 'lethargy', 'patches_in_throat', 'irregular_sugar_level', 'cough', 'high_fever', 'sunken_eyes', 'breathlessness', 'sweating', 'dehydration', 'indigestion', 'headache', 'yellowish_skin', 'dark_urine', 'nausea', 'loss_of_appetite', 'pain_behind_the_eyes', 'back_pain', 'constipation', 'abdominal_pain', 'diarrhoea', 'mild_fever', 'yellow_urine', 'yellowing_of_eyes', 'acute_liver_failure', 'fluid_overload', 'swelling_of_stomach', 'swelled_lymph_nodes', 'malaise',

'blurred_and_distorted_vision', 'phlegm', 'throat_irritation', 'redness_of_eyes', 'sinus_pressure',
 'runny_nose', 'congestion', 'chest_pain', 'weakness_in_limbs', 'fast_heart_rate',
 'pain_during_bowel_movements', 'pain_in_anal_region', 'bloody_stool', 'irritation_in_anus', 'neck_pain',
 'dizziness', 'cramps', 'bruising', 'obesity', 'swollen_legs', 'swollen_blood_vessels', 'puffy_face_and_eyes',
 'enlarged_thyroid', 'brittle_nails', 'swollen_extremeties', 'excessive_hunger', 'extra_marital_contacts',
 'drying_and_tingling_lips', 'slurred_speech', 'knee_pain', 'hip_joint_pain', 'muscle_weakness',
 'stiff_neck', 'swelling_joints', 'movement_stiffness', 'spinning_movements', 'loss_of_balance',
 'unsteadiness', 'weakness_of_one_body_side', 'loss_of_smell', 'bladder_discomfort', 'foul_smell_of
 urine', 'continuous_feel_of_urine', 'passage_of_gases', 'internal_itching', 'toxic_look_(typhos)',
 'depression', 'irritability', 'muscle_pain', 'altered_sensorium', 'red_spots_over_body', 'belly_pain',
 'abnormal_menstruation', 'dischromic_patches', 'watering_from_eyes', 'increased_appetite', 'polyuria',
 'family_history', 'mucooid_sputum', 'rusty_sputum', 'lack_of_concentration', 'visual_disturbances',
 'receiving_blood_transfusion', 'receiving_unsterile_injections', 'coma', 'stomach_bleeding',
 'distention_of_abdomen', 'history_of_alcohol_consumption', 'fluid_overload.1', 'blood_in_sputum',
 'prominent_veins_on_calf', 'palpitations', 'painful_walking', 'pus_filled_pimples', 'blackheads', 'scurring',
 'skin_peeling', 'silver_like_dusting', 'small_dents_in_nails', 'inflammatory_nails', 'blister',
 'red_sore_around_nose', 'yellow_crust_ooze', 'prognosis', 'Unnamed: 133']

```
df.drop('Unnamed: 133',axis=1,inplace=True)
```

```
df.info(verbose=True, show_counts=True)
```

```
<class 'pandas.core.frame.DataFrame'>
```

```
RangeIndex: 4920 entries, 0 to 4919
```

```
Data columns (total 133 columns):
```

| # | Column | Non-Null Count | Dtype |
|----|----------------------|----------------|-------|
| 0 | itching | 4920 non-null | int64 |
| 1 | skin_rash | 4920 non-null | int64 |
| 2 | nodal_skin_eruptions | 4920 non-null | int64 |
| 3 | continuous_sneezing | 4920 non-null | int64 |
| 4 | shivering | 4920 non-null | int64 |
| 5 | chills | 4920 non-null | int64 |
| 6 | joint_pain | 4920 non-null | int64 |
| 7 | stomach_pain | 4920 non-null | int64 |
| 8 | acidity | 4920 non-null | int64 |
| 9 | ulcers_on_tongue | 4920 non-null | int64 |
| 10 | muscle_wasting | 4920 non-null | int64 |
| 11 | vomiting | 4920 non-null | int64 |
| 12 | burning_micturition | 4920 non-null | int64 |
| 13 | spotting_urination | 4920 non-null | int64 |
| 14 | fatigue | 4920 non-null | int64 |
| 15 | weight_gain | 4920 non-null | int64 |
| 16 | anxiety | 4920 non-null | int64 |
| 17 | cold_hands_and_feets | 4920 non-null | int64 |
| 18 | mood_swings | 4920 non-null | int64 |
| 19 | weight_loss | 4920 non-null | int64 |
| 20 | restlessness | 4920 non-null | int64 |

| | | |
|----|------------------------------|---------------------|
| 21 | lethargy | 4920 non-null int64 |
| 22 | patches_in_throat | 4920 non-null int64 |
| 23 | irregular_sugar_level | 4920 non-null int64 |
| 24 | cough | 4920 non-null int64 |
| 25 | high_fever | 4920 non-null int64 |
| 26 | sunken_eyes | 4920 non-null int64 |
| 27 | breathlessness | 4920 non-null int64 |
| 28 | sweating | 4920 non-null int64 |
| 29 | dehydration | 4920 non-null int64 |
| 30 | indigestion | 4920 non-null int64 |
| 31 | headache | 4920 non-null int64 |
| 32 | yellowish_skin | 4920 non-null int64 |
| 33 | dark_urine | 4920 non-null int64 |
| 34 | nausea | 4920 non-null int64 |
| 35 | loss_of_appetite | 4920 non-null int64 |
| 36 | pain_behind_the_eyes | 4920 non-null int64 |
| 37 | back_pain | 4920 non-null int64 |
| 38 | constipation | 4920 non-null int64 |
| 39 | abdominal_pain | 4920 non-null int64 |
| 40 | diarrhoea | 4920 non-null int64 |
| 41 | mild_fever | 4920 non-null int64 |
| 42 | yellow_urine | 4920 non-null int64 |
| 43 | yellowing_of_eyes | 4920 non-null int64 |
| 44 | acute_liver_failure | 4920 non-null int64 |
| 45 | fluid_overload | 4920 non-null int64 |
| 46 | swelling_of_stomach | 4920 non-null int64 |
| 47 | swelled_lymph_nodes | 4920 non-null int64 |
| 48 | malaise | 4920 non-null int64 |
| 49 | blurred_and_distorted_vision | 4920 non-null int64 |
| 50 | phlegm | 4920 non-null int64 |
| 51 | throat_irritation | 4920 non-null int64 |
| 52 | redness_of_eyes | 4920 non-null int64 |
| 53 | sinus_pressure | 4920 non-null int64 |
| 54 | runny_nose | 4920 non-null int64 |
| 55 | congestion | 4920 non-null int64 |
| 56 | chest_pain | 4920 non-null int64 |
| 57 | weakness_in_limbs | 4920 non-null int64 |
| 58 | fast_heart_rate | 4920 non-null int64 |
| 59 | pain_during_bowel_movements | 4920 non-null int64 |
| 60 | pain_in_anal_region | 4920 non-null int64 |
| 61 | bloody_stool | 4920 non-null int64 |
| 62 | irritation_in_anus | 4920 non-null int64 |
| 63 | neck_pain | 4920 non-null int64 |
| 64 | dizziness | 4920 non-null int64 |
| 65 | cramps | 4920 non-null int64 |
| 66 | bruising | 4920 non-null int64 |
| 67 | obesity | 4920 non-null int64 |
| 68 | swollen_legs | 4920 non-null int64 |
| 69 | swollen_blood_vessels | 4920 non-null int64 |
| 70 | puffy_face_and_eyes | 4920 non-null int64 |
| 71 | enlarged_thyroid | 4920 non-null int64 |
| 72 | brittle_nails | 4920 non-null int64 |
| 73 | swollen_extremeties | 4920 non-null int64 |
| 74 | excessive_hunger | 4920 non-null int64 |
| 75 | extra_marital_contacts | 4920 non-null int64 |
| 76 | drying_and_tingling_lips | 4920 non-null int64 |
| 77 | slurred_speech | 4920 non-null int64 |
| 78 | knee_pain | 4920 non-null int64 |
| 79 | hip_joint_pain | 4920 non-null int64 |
| 80 | muscle_weakness | 4920 non-null int64 |
| 81 | stiff_neck | 4920 non-null int64 |

```

82 swelling_joints          4920 non-null int64
83 movement_stiffness      4920 non-null int64
84 spinning_movements       4920 non-null int64
85 loss_of_balance          4920 non-null int64
86 unsteadiness             4920 non-null int64
87 weakness_of_one_body_side 4920 non-null int64
88 loss_of_smell            4920 non-null int64
89 bladder_discomfort       4920 non-null int64
90 foul_smell_of_urine      4920 non-null int64
91 continuous_feel_of_urine 4920 non-null int64
92 passage_of_gases         4920 non-null int64
93 internal_itching         4920 non-null int64
94 toxic_look_(typhos)      4920 non-null int64
95 depression               4920 non-null int64
96 irritability             4920 non-null int64
97 muscle_pain              4920 non-null int64
98 altered_sensorium        4920 non-null int64
99 red_spots_over_body      4920 non-null int64
100 belly_pain              4920 non-null int64
101 abnormal_menstruation   4920 non-null int64
102 dischromic_patches      4920 non-null int64
103 watering_from_eyes      4920 non-null int64
104 increased_appetite       4920 non-null int64
105 polyuria                 4920 non-null int64
106 family_history           4920 non-null int64
107 mucoid_sputum            4920 non-null int64
108 rusty_sputum             4920 non-null int64
109 lack_of_concentration    4920 non-null int64
110 visual_disturbances     4920 non-null int64
111 receiving_blood_transfusion 4920 non-null int64
112 receiving_unsterile_injections 4920 non-null int64
113 coma                     4920 non-null int64
114 stomach_bleeding         4920 non-null int64
115 distention_of_abdomen    4920 non-null int64
116 history_of_alcohol_consumption 4920 non-null int64
117 fluid_overload.1        4920 non-null int64
118 blood_in_sputum          4920 non-null int64
119 prominent_veins_on_calf  4920 non-null int64
120 palpitations            4920 non-null int64
121 painful_walking          4920 non-null int64
122 pus_filled_pimples       4920 non-null int64
123 blackheads              4920 non-null int64
124 scurring                4920 non-null int64
125 skin_peeling             4920 non-null int64
126 silver_like_dusting     4920 non-null int64
127 small_dents_in_nails    4920 non-null int64
128 inflammatory_nails      4920 non-null int64
129 blister                  4920 non-null int64
130 red_sore_around_nose     4920 non-null int64
131 yellow_crust_ooze        4920 non-null int64
132 prognosis                4920 non-null object
dtypes: int64(132), object(1)
memory usage: 5.0+ MB

```

```

from sklearn.preprocessing import LabelEncoder
LE = LabelEncoder()
df['prognosis'] = LE.fit_transform(df['prognosis'])
df['prognosis']

```

```

0    15
1    15

```

```
2    15
3    15
4    15
```

```
..
4915    0
4916    2
4917   38
4918   35
4919   27
```

```
Name: prognosis, Length: 4920, dtype: int32
```

```
from sklearn.model_selection import train_test_split
X = df.iloc[:, :132]
y = df['prognosis']
```

```
from sklearn.preprocessing import StandardScaler
std = StandardScaler()
X = std.fit_transform(X)
```

```
X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.3, random_state=0)
print(y_train.info())
print(y_test.info())
```

```
<class 'pandas.core.series.Series'>
Int64Index: 3444 entries, 3972 to 2732
Series name: prognosis
Non-Null Count  Dtype
-----
3444 non-null   int32
dtypes: int32(1)
memory usage: 40.4 KB
None
<class 'pandas.core.series.Series'>
Int64Index: 1476 entries, 1525 to 3275
Series name: prognosis
Non-Null Count  Dtype
-----
1476 non-null   int32
dtypes: int32(1)
memory usage: 17.3 KB
None
```

```
from sklearn.ensemble import RandomForestClassifier
RFC = RandomForestClassifier()
RFC.fit(X_train, y_train)
```

```
RandomForestClassifier()
```

```
y_pred = RFC.predict(X_test)
y_pred
```

```
array([18, 40, 36, ..., 30, 39,  0])
```

```
from sklearn.metrics import accuracy_score
print(accuracy_score(y_test, y_pred)*100)
```

```
100.0
```

```
y_train_pred = RFC.predict(X_train)
```

```
print(accuracy_score(y_train, y_train_pred)*100)
```

100.0

```
from sklearn.model_selection import KFold
from sklearn.model_selection import cross_val_score
from sklearn.ensemble import RandomForestClassifier
```

```
model = RandomForestClassifier(n_estimators=100)
```

```
num_folds = 5
```

```
kfold = KFold(n_splits=num_folds, shuffle=True, random_state=42)
```

```
results = cross_val_score(model, X, y, cv=kfold)
```

```
print("Cross-Validation Results:")
print("Accuracy: %.2f%%" % (results.mean() * 100))
print("Standard Deviation: %.2f%%" % (results.std() * 100))
```

Cross-Validation Results:
Accuracy: 100.00%
Standard Deviation: 0.00%

```
from sklearn.metrics import classification_report
cr = classification_report(y_test,y_pred)
print(cr)
```

| | precision | recall | f1-score | support |
|----|-----------|--------|----------|---------|
| 0 | 1.00 | 1.00 | 1.00 | 32 |
| 1 | 1.00 | 1.00 | 1.00 | 31 |
| 2 | 1.00 | 1.00 | 1.00 | 38 |
| 3 | 1.00 | 1.00 | 1.00 | 34 |
| 4 | 1.00 | 1.00 | 1.00 | 33 |
| 5 | 1.00 | 1.00 | 1.00 | 36 |
| 6 | 1.00 | 1.00 | 1.00 | 39 |
| 7 | 1.00 | 1.00 | 1.00 | 41 |
| 8 | 1.00 | 1.00 | 1.00 | 33 |
| 9 | 1.00 | 1.00 | 1.00 | 35 |
| 10 | 1.00 | 1.00 | 1.00 | 42 |
| 11 | 1.00 | 1.00 | 1.00 | 27 |
| 12 | 1.00 | 1.00 | 1.00 | 33 |
| 13 | 1.00 | 1.00 | 1.00 | 40 |
| 14 | 1.00 | 1.00 | 1.00 | 40 |
| 15 | 1.00 | 1.00 | 1.00 | 31 |
| 16 | 1.00 | 1.00 | 1.00 | 42 |
| 17 | 1.00 | 1.00 | 1.00 | 36 |
| 18 | 1.00 | 1.00 | 1.00 | 49 |
| 19 | 1.00 | 1.00 | 1.00 | 31 |
| 20 | 1.00 | 1.00 | 1.00 | 32 |
| 21 | 1.00 | 1.00 | 1.00 | 41 |
| 22 | 1.00 | 1.00 | 1.00 | 37 |
| 23 | 1.00 | 1.00 | 1.00 | 35 |
| 24 | 1.00 | 1.00 | 1.00 | 34 |
| 25 | 1.00 | 1.00 | 1.00 | 21 |
| 26 | 1.00 | 1.00 | 1.00 | 33 |
| 27 | 1.00 | 1.00 | 1.00 | 39 |
| 28 | 1.00 | 1.00 | 1.00 | 36 |
| 29 | 1.00 | 1.00 | 1.00 | 31 |
| 30 | 1.00 | 1.00 | 1.00 | 42 |

| | | | | |
|--------------|------|------|------|------|
| 31 | 1.00 | 1.00 | 1.00 | 37 |
| 32 | 1.00 | 1.00 | 1.00 | 41 |
| 33 | 1.00 | 1.00 | 1.00 | 38 |
| 34 | 1.00 | 1.00 | 1.00 | 34 |
| 35 | 1.00 | 1.00 | 1.00 | 31 |
| 36 | 1.00 | 1.00 | 1.00 | 37 |
| 37 | 1.00 | 1.00 | 1.00 | 42 |
| 38 | 1.00 | 1.00 | 1.00 | 36 |
| 39 | 1.00 | 1.00 | 1.00 | 38 |
| 40 | 1.00 | 1.00 | 1.00 | 38 |
| accuracy | | 1.00 | | 1476 |
| macro avg | 1.00 | 1.00 | 1.00 | 1476 |
| weighted avg | 1.00 | 1.00 | 1.00 | 1476 |

CHAPTER – 6

TESTING

6.1 TEST CASES

| | |
|----------------------|---|
| Test Case ID: | 1 |
| Test Case Name: | Required Software Testing |
| Purpose: | To check whether the required Software is installed on the systems |
| Input: | Enter python command |
| Expected Result: | Should Display the version number for the python |
| Actual Result: | Displays python version |
| Failure | If the python environment is not installed, then the Deployment fails |

Test Case to check whether the required Software is installed on the systems

Table 6.1.1 python Installation verification

Test Case to check Program Integration Testing

| | |
|----------------------|---|
| Test Case ID: | 2 |
| Test Case Name: | Programs Integration Testing |
| Purpose: | To ensure that all the modules work together |
| Input: | All the modules should be accessed. |
| Expected Result: | All the modules should be functioning properly. |
| Actual Result: | All the modules should be functioning properly. |
| Failure | If any module fails to function properly, the implementation fails. |

Table 6.1.2 python Programs Integration Testing

Test Case to Collect Dataset and Load the Dataset

| | |
|----------------------|---|
| Test Case ID: | 3 |
| Test Case Name: | Collect Dataset and Load the Dataset |
| Purpose: | Check Dataset is collected, and the data is stored |
| Input: | Provide Dataset as input |
| Expected Result: | Dataset is collected and view the Dataset and store the Dataset |
| Actual Result: | Load the Dataset and view the Dataset and store |
| Failure | If the dataset is not loaded, it will throw an error. |

Table 6.1.3 Collect Dataset and Load the Dataset

Test Case to check whether the species is recognized

| | |
|----------------------|---|
| Test Case ID: | 4 |
| Test Case Name: | Disease Prediction |
| Purpose: | Disease Prediction using RandomForestClassifier |
| Input: | Provide dataset and input the symptoms |
| Expected Result: | After Evaluation I get the Disease Predicted |
| Actual Result: | After Evaluation I get the Disease Predicted |
| Failure | If the data is not Evaluated, it does not show anything |

Table 6.1.4 Disease Prediction

CHAPTER – 7

SCREENSHOTS

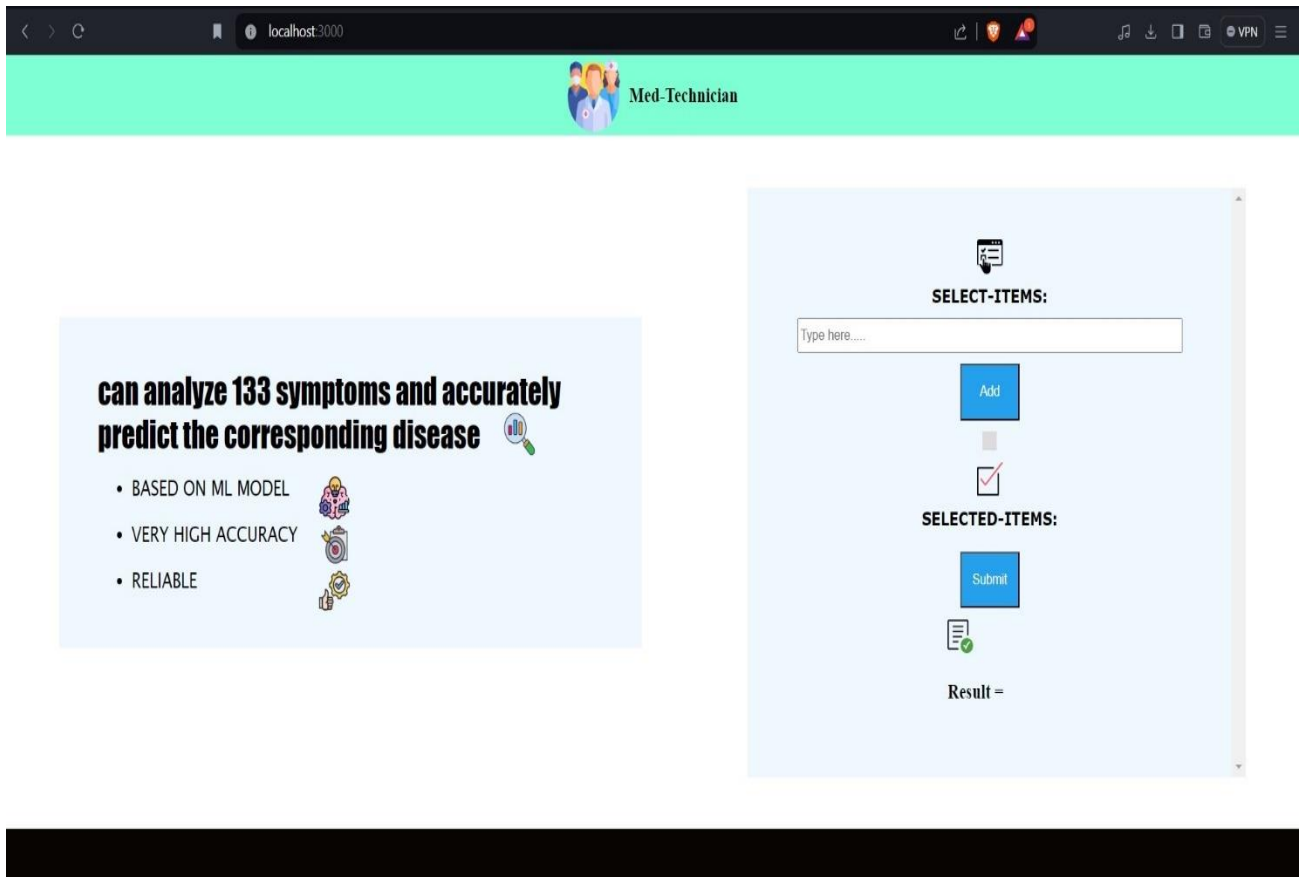


Figure 7.1: Frontend of website

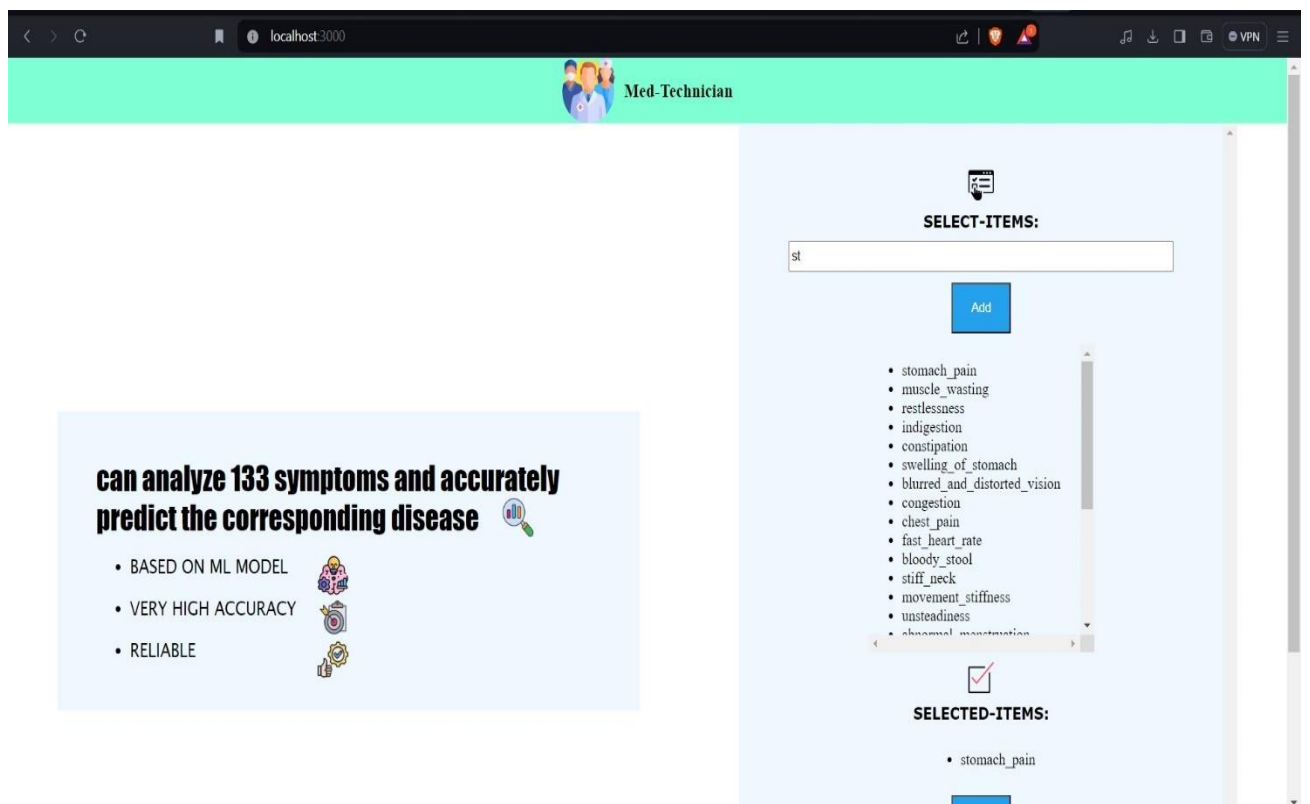


Figure 7.1: Selecting the symptoms

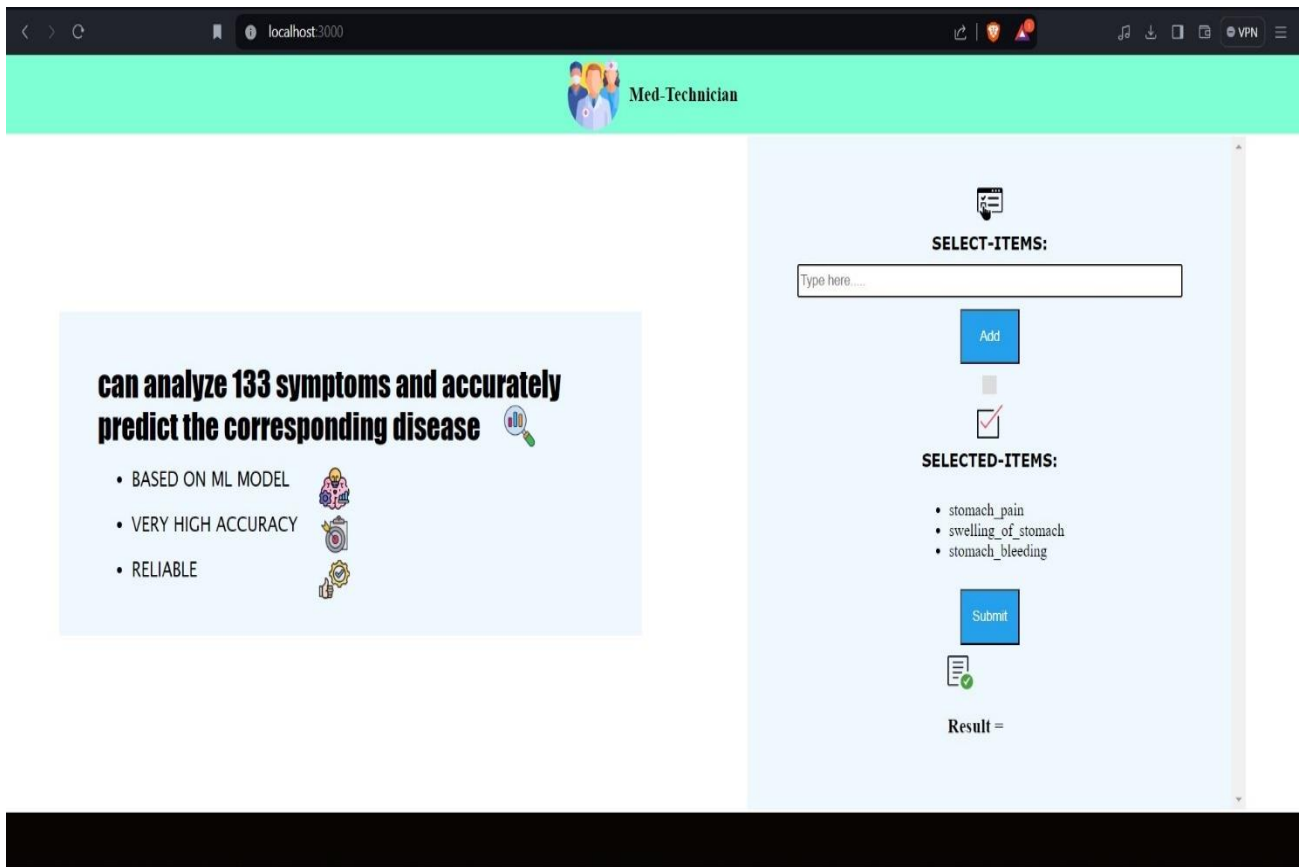


Figure 7.2: Submitting the symptoms

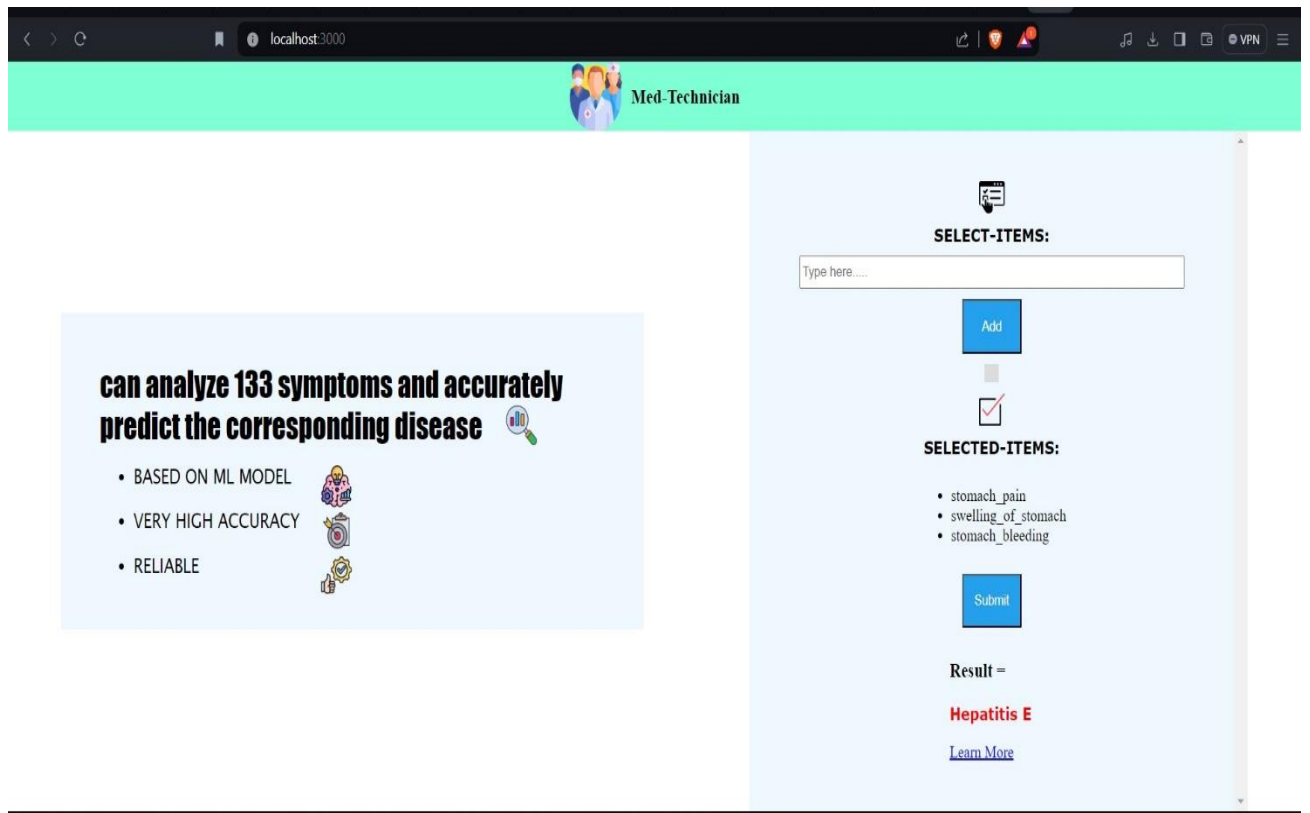


Figure 7.2: Getting the Predicted Disease and clicking on learn more

CHAPTER - 8

CONCLUSION AND FUTURE SCOPE

The future of disease prognosis using the Random Forest classifier holds great promise due to several factors. Firstly, advancements in data collection techniques, such as wearable devices, electronic health records, and genetic testing, are generating vast amounts of diverse and high-dimensional healthcare data. Random Forest, with its ability to handle large datasets with high dimensionality and mixed data types, is well-suited for analyzing such complex healthcare data.

Secondly, the integration of Random Forest with other machine learning techniques, such as deep learning and ensemble methods, can further enhance its predictive accuracy and robustness. By combining the strengths of different algorithms, more comprehensive and accurate disease prognosis models can be developed.

Additionally, ongoing research in feature selection, model interpretability, and explainable AI techniques will improve the transparency and interpretability of Random Forest models, making them more clinically relevant and trustworthy for healthcare professionals.

Furthermore, the application of Random Forest in personalized medicine and precision healthcare, where treatment decisions are tailored to individual patient characteristics, holds significant potential. By leveraging patient-specific data and clinical variables, Random Forest models can assist in early detection, risk stratification, and personalized treatment planning for various diseases.

Overall, the future of disease prognosis using Random Forest classifier is bright, with opportunities for further innovation and advancements in healthcare analytics and personalized medicine.

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APPENDIX A: TOOLS AND TECHNOLOGIES

- **HTML (Hypertext Markup Language):** Markup language for creating web pages and web applications.
- **CSS (Cascading Style Sheets):** Style sheet language for describing the presentation of HTML and XML documents.
- **JavaScript (JS):** High-level, interpreted scripting language used for adding interactivity to web pages.
- **Node.js:** Server-side JavaScript runtime environment for building scalable network applications.
- **Express.js:** Minimal and flexible Node.js web application framework for building web applications and APIs.
- **Python:** High-level, general-purpose programming language known for its readability and versatility.
- **Jupyter Notebook:** Open-source web application for creating and sharing documents containing live code, equations, visualizations, and narrative text.
- **Random Forest:** Ensemble learning method for classification, regression, and other tasks using multiple decision trees.