MULTIPLE DISEASE PREDICTION WEB APPLICATION

A PROJECT REPORT

Submitted by

KARTHICK S (2116210701109)

KARTHIK R M (2116210701110)

HEMANTH KUMAR D (2116210701083)

in partial fulfillment for the award of the degree

of

BACHELOR OF ENGINEERING

in

COMPUTER SCIENCE AND ENGINEERING

RAJALAKSHMI ENGINEERING COLLEGE

ANNA UNIVERSITY, CHENNAI

MAY 2024

RAJALAKSHMI ENGINEERING COLLEGE, CHENNAI

BONAFIDE CERTIFICATE

Certified that this Report titled "**Multiple Disease Prediction Web Application**" is the bonafide work of "**Karthick S (210701109), Karthik R M(210701110) and Hemath Kumar D (210701083)**" who carried out the work under my supervision. Certified further that to the best of my knowledge the work reported herein does not form part of any other thesis or dissertation on the basis of which a degree or award was conferred on an earlier occasion on this or any other candidate.

SIGNATURE

Dr .K.Anand ME, Ph.D

Professor

Department of Computer Science and Engineering

Rajalakshmi Engineering College

Chennai - 602 105

Submitted to Project Viva-Voce Examination held on_____

Internal Examiner **External Examine**r

ABSTRACT

Machine learning (ML) has revolutionized healthcare by developing predictive models for multiple disease outcomes, emphasizing the importance of early detection and prediction in managing the growing burden of chronic and complex health diseases. This abstract presents an approach using Support Vector Machine (SVM) to predict the onset and progression of multiple diseases simultaneously, enabling early intervention and care. It outlines SVM's foundational principles for multi-classification tasks, ideal for multiple disease prediction. The abstract details a web application's architecture and functionality, integrating user-friendly interfaces with powerful ML algorithms. Users input various health-related parameters, including medical history and lifestyle factors, to predict the likelihood of multiple diseases. The application employs supervised learning techniques like ensemble methods and deep learning architectures to handle diverse data types and generate accurate predictions. Ultimately, the abstract discusses the potential impact of this ML- based web application on healthcare, empowering individuals to take precautionary steps, facilitating early intervention and disease prevention, and optimizing resource allocation within healthcare systems.

ACKNOWLEDGMENT

First, we thank the almighty god for the successful completion of the project. Our sincere thanks to our chairman **Mr. S. Meganathan B.E., F.I.E.,** for his sincere endeavor in educating us in his premier institution. We would like to express our deep gratitude to our beloved Chairperson **Dr. Thangam Meganathan Ph.D.,** for her enthusiastic motivation which inspired us a lot in completing this project and Vice Chairman **Mr. Abhay Shankar Meganathan B.E., M.S.,** for providing us with the requisite infrastructure.

We also express our sincere gratitude to our college Principal, **Dr. S. N. Murugesan M.E., PhD.,** and **Dr. P. KUMAR M.E., PhD, Director computing and information science , and Head Of Department of Computer Science and Engineering** and our project coordinator **Dr. K.Anand M.E.,Ph.D.,** for her encouragement and guiding us throughout the project towards successful completion of this project and to our parents, friends, all faculty members and supporting staffs for their direct and indirect involvement in successful completion of the project for their encouragement and support.

KARTHICK S

KARTHIK R M

HEMANTH KUMAR D

TABLE OF CONTENTS

LIST OF FIGURES

CHAPTER 1

INTRODUCTION

The Multiple Disease Prediction Web Application is an innovative digital health tool designed to provide users with accurate predictions for a variety of medical conditions, including diabetes, heart disease, liver disease, and kidney disease. By leveraging advanced machine learning algorithms and extensive medical data, this application delivers reliable health assessments that facilitate early intervention and personalized healthcare management. The platform's user-friendly interface ensures that individuals of all ages and technical proficiencies can easily input their data and receive detailed health insights. Additionally, the application integrates seamlessly with various health monitoring devices, allowing for real-time data input and enhancing the accuracy of its predictions.

A key feature of the application is its ability to provide personalized health recommendations based on individual risk profiles. Users receive tailored advice on lifestyle modifications, preventive measures, and when to seek medical consultation, empowering them to take proactive steps towards better health. The application also prioritizes data privacy and security, employing robust encryption methods and adhering to global data protection regulations to ensure user information is safeguarded.

The Multiple Disease Prediction Web Application not only aids in early disease detection but also supports ongoing health management, making it an invaluable tool for individuals looking to maintain their health and prevent chronic conditions. By offering a comprehensive approach to disease prediction and management, this application helps improve overall healthcare outcomes and quality of life. Users are empowered with knowledge and tools to make informed decisions about their health, fostering greater engagement and proactive healthcare practices. This cutting-edge application stands at the forefront of digital health innovations, transforming how we predict, prevent, and manage diseases, and contributing to a healthier future for everyone.

1.1 PROBLEM STATEMENT

In today's fast-paced world, managing health proactively and efficiently remains a significant challenge, particularly with the rising prevalence of chronic diseases such as diabetes, heart disease, liver disease, and kidney disease. Many individuals lack access to timely and accurate medical insights, resulting in late diagnosis and inadequate disease management. Traditional healthcare systems often fail to provide continuous monitoring and personalized advice, leaving gaps in preventive care. There is a pressing need for a comprehensive, user-friendly solution that can predict multiple diseases based on individual health data, provide personalized recommendations, and integrate seamlessly with health monitoring devices. The challenge lies in developing a web application that not only utilizes advanced machine learning algorithms for accurate disease prediction but also ensures robust data privacy, easy accessibility, and actionable health insights, thereby empowering users to take control of their health and prevent the onset of chronic conditions.

1.2 SCOPE OF THE WORK

The scope of work for the Multiple Disease Prediction Web Application encompasses the development of a comprehensive and user-friendly platform capable of predicting multiple diseases, including diabetes, heart disease, liver disease, and kidney disease. The project involves designing and implementing advanced machine learning algorithms to analyze user-provided health data and generate accurate predictions. It includes the creation of an intuitive user interface that facilitates easy data entry and displays personalized health insights and recommendations. Additionally, the application will integrate with various health monitoring devices to enable real-time data input and enhance prediction accuracy. Ensuring robust data privacy and security measures is critical, involving encryption and compliance with global data protection regulations. The scope also covers continuous model updates and improvements based on the latest medical research and user feedback. Furthermore, the application will feature a feedback mechanism for users to report issues and suggest enhancements, ensuring ongoing refinement and user satisfaction. The project aims to empower users with actionable health information, support proactive disease management, and ultimately contribute to better healthcare outcomes.

1.3 AIM AND OBJECTIVES OF THE PROJECT

The aim of the Multiple Disease Prediction Web Application project is to develop a sophisticated, user-friendly platform that leverages advanced machine learning algorithms to predict a range of diseases, including diabetes, heart disease, liver disease, and kidney disease. The primary objectives of this project are to provide users with accurate, personalized health assessments and actionable recommendations to facilitate early disease detection and effective management. Key objectives include designing an intuitive interface for easy data input and interpretation, ensuring seamless integration with various health monitoring devices for real-time data analysis, and maintaining stringent data privacy and security standards to protect user information. Additionally, the project aims to continuously update and refine the predictive models based on the latest medical research and user feedback, ensuring the highest accuracy and relevance. By achieving these objectives, the application seeks to empower users to take proactive steps in managing their health, thereby reducing the incidence of chronic diseases and improving overall healthcare outcomes.

1.4 RESOURCES

Developing a multiple disease prediction web application requires a comprehensive set of resources spanning data collection, model development, web development, deployment, and security. For data collection, platforms like Kaggle and the UCI Machine Learning Repository provide diverse medical datasets essential for training robust predictive models. In model development, frameworks such as Scikit-Learn, TensorFlow, and Keras are crucial for building and refining machine learning algorithms. Web development necessitates a combination of frontend technologies like React.js for creating interactive user interfaces, and backend frameworks like Flask and Django for handling server-side logic and database interactions. Deployment is facilitated by cloud services such as Heroku and AWS, which offer scalable infrastructure to host the application. Ensuring security and compliance involves adhering to guidelines from OWASP and understanding HIPAA requirements to protect user data. Throughout the development process, community support from forums like Stack Overflow and Reddit (e.g., r/MachineLearning) provides valuable insights and troubleshooting assistance, making these resources indispensable for creating a reliable and effective multiple disease prediction web application.

1.5 MOTIVATION

Developing a multiple disease prediction web application is motivated by the profound potential to transform healthcare delivery and management. Early detection and prevention are critical in improving treatment outcomes and reducing healthcare costs, as timely alerts can enable users to take preventive measures and seek early intervention. A comprehensive platform that predicts various diseases offers a holistic view of health, allowing users to monitor multiple health parameters conveniently in one place. This accessibility ensures users can manage their health from anywhere, empowering them with knowledge about potential risks to make informed decisions. Personalized predictions tailored to individual health profiles enhance user engagement and adherence to healthier lifestyles. Moreover, automated predictive analytics can optimize medical resource allocation, alleviating the burden on healthcare professionals. Integration with modern health devices facilitates continuous monitoring, improving prediction accuracy. Additionally, the application supports medical research by providing valuable, anonymized data, contributing to advancements in medical knowledge. By offering a cost-effective solution that scales to serve large populations, a multiple disease prediction web application fosters proactive, personalized, and efficient healthcare, ultimately benefiting both individuals and the broader healthcare system.

CHAPTER 2

2.1 LITRETURE SURVEY

In[1] The review analyzes research from over 100 publications, focusing on six key areas. The datasets were used for training ML models.Many AI techniques for cleaning and preparing the data.AI methods for extracting relevant features from the data.ML algorithms for identifying, classifying, and diagnosing diabetes in a more effective way.AI-powered tools for supporting self-management.Performance measures used to evaluate these techniques.The review also highlights important research gaps in diabetes detection, diagnosis, and personalized self- management.This is predicted Model for diabetes prediction.

In[2] Data quality significantly impacts the effectiveness of machine learning models in diabetes research. Feature selection, the process of identifying and selecting the most informative data points, is the initial and most critical step. This meticulous selection offers several advantages like it has reduced Overfitting by eliminating irrelevant data, the model is less likely to make choices based on noise, leading to superior generalization and real-world applicability.It has enhanced accuracy that focuses on pertinent data points significantly the model or the system for a prediction and its role in improving patients health outcomes.

In[3] The research offers a critical analysis emphasizing the effectiveness of those that incorporate behavioral change techniques. The review follows useful guidelines to identify these applications impact on behavior change, blood sugar control, healthy habits formation, and weight loss. It highlights the success of interventions that leverage these combined methodologies, including AI. The review concludes by identifying limitations and proposing directions for future research and app development. This knowledge can be used by application developers to create more effective self-management tools for diabetes.

In[4] Researchers conducted a four-step model .They searched major databases for studies since 2019 on AI applications in diabetes prevention, diagnosis, or management. Relevant studies were selected based on how they investigated AI's role in improving various aspects of diabetes care. Key information from these studies was then extracted and analyzed to identify areas where AI has a significant influence and to clarify its specific roles in diabetes management Type 2 diabetes.This shows the advantages of these in .

In[5] They suggest that Diabetes Mellitus is crucial to prevent complications.This investigated the effectiveness of the machine learning.A classification model was built using data from tested humans and healthy controls,including many improved

techniques are made.They were trained with algorithms like Random Forest which achieved 98% accuracy in detecting Type 2 diabetes.This shows the advantages of the model or the system for a prediction and its role in improving patients health outcomes by empowering healthcare proving with better screening tools. to evaluate different combinations of features and selected.

In[6] The study has increased efficiency as it processes a smaller, more focused dataset translates to faster and more efficient training of the model.The research also states that there are two primary approaches to feature selection in diabetes research they are filter method where these methods preprocess the data by filtering out irrelevant features before building the model. They rely on statistical techniques to assess the importance of each feature.it also includes wrapper methods where these methods employ a machine learning algorithm to evaluate different combinations of features and select the combination that yields the highest accuracy.

In[7] Feature Selection is critical for building the effective ML model in diabetes research. But the potential of AI-based intelligent assistants to support diabetes self-management. These tools can help guide the patients to monitor the sugar level and improve the health conditions.Studies often use different datasets and evaluation methods, making it difficult to directly compare .it also includes wrapper methods where these methods employ a machine learning algorithm to evaluate different combinations of features and select the combination that yields the highest accuracy. 12 results. techniques to assess the importance of each feature.it also includes wrapper methods where these methods employ a machine learning algorithm to evaluate different combinations of features and select the combination that yields the highest accuracy. to evaluate different combinations of features and select.

In[8] Heart-related illnesses have been the primary cause of death worldwide over the last several decades, leading to cardiac arrest or cardiovascular disease (CVD). Predictive models are improved and modified with machine learning (ML) to more effectively test the health industry. Machine learning algorithms are expected to be useful in predicting early outcomes for individuals who may require lifestyle modifications and appropriate medical care. Our work introduces supervised machine learning classifiers that can predict heart disease by identifying important features through machine learning techniques. For learning from imbalanced datasets, an oversampling technique is provided here. In our prediction model, many categorization Overall it helps in early prediction,prognosis risk stratification in detecting the diabetes

In[9] The research used Random Forest as it offers high accuracy for detecting the diabetes and that is a ,they survey states that this algorithm as accuracy of 95%.So,it make effective predictions from the available dataset.Its robustness and inherent feature

selection process reduces overfitting problems,a common challenge in machine learning.It can also help to handle complex datasets numerical blood sugar level and categorical information like demographics.Overall it helps in early prediction,prognosis risk stratification in detecting the diabetes mellitus. SVM as the best performing classification method for this A person's well-being is depending upon a crucial aspect called mental wellness which remains overlooked. The main reason for this significant drop is due to covid-19 pandemic.

In[10] is to reduce the barrier associated with mental health and also to increase the awareness about this issue to the public particularly to the younger generation who has been done. . Therefore, we proposed and developed an integrated chatbot in this study that is intended especially to assist people with mental illnesses. We used a Bi-directional Long Short-Term Memory in the encoder. A beam search decoder is used for giving more accurate and sympathetic responses compared to greedy search decoder for the SVM model issued Researchers explored using support vector machines (SVMs) to identify diabetes. They also implemented a "blackbox model" to explain the SVM's decision-making process. They give more specific and correct prediction by using these kind of models so they are make the human life more easier .This suggests that modelcould be a valuable model, potentially helping to prevent diabetic complications. Their analysis using ROC curves for both training and testing data further supported SVM as the best performing classification method for this dataset.

2.2 PROPOSED SYSTEM

The proposed system for a multiple disease prediction web application aims to provide users with predictive insights into their potential health risks by analyzing a variety of health parameters. The application leverages advanced machine learning algorithms to deliver accurate predictions based on user-provided data, facilitating early detection and prevention of diseases. The system is designed with a user-friendly frontend, a robust backend, secure data storage, and scalable deployment infrastructure, ensuring a seamless and reliable user experience.

The frontend of the application is developed using React.js, HTML, and CSS to create an intuitive interface where users can easily register, log in, and input their health data. The dashboard displays prediction results and health insights through interactive visualizations, helping users understand their health status and trends over time. This interface is designed to be accessible and easy to navigate, encouraging users to regularly monitor their health.

The backend is built using either Flask or Django, two popular Python frameworks known for their flexibility and scalability. The backend handles API requests for user

authentication, data submission, and retrieval, ensuring smooth communication between the frontend and the server. It also integrates with machine learning models to process the input data and generate predictions. The system uses PostgreSQL or MongoDB for secure and efficient data storage, enabling quick access to user profiles and prediction results.

Machine learning models, implemented with Scikit-Learn, TensorFlow, and Keras, are at the core of the predictive functionality. These models are trained on extensive datasets to recognize patterns and make predictions about various diseases based on the input data. The application pre-processes and normalizes user data before feeding it into these models to ensure accuracy and reliability in the predictions.

2.3 FLASK FRAMEWORK

The proposed system for a multiple disease prediction web application will be developed using the Flask framework, a lightweight and flexible Python web framework ideal for building robust and scalable applications. Flask's simplicity and modularity make it an excellent choice for creating the backend of the application, where it will handle user authentication, data processing, and communication with machine learning models. The framework will facilitate the development of RESTful APIs that enable seamless interaction between the frontend and backend, ensuring efficient data submission and retrieval. Flask will also integrate with machine learning libraries such as Scikit-Learn and TensorFlow to process user-provided health data and generate accurate disease predictions. Additionally, Flask's compatibility with various database systems, including PostgreSQL and MongoDB, ensures secure and efficient storage of user data and prediction results. By leveraging Flask's capabilities, the application will provide a reliable, user-friendly platform for early disease detection and health monitoring. The frontend of the web application, developed using HTML, CSS, and JavaScript, communicates with the Flask backend through asynchronous HTTP requests. This enables dynamic interaction with the application without requiring the entire page to reload, enhancing user experience and responsiveness.

2.4 MACHINE LEARNING ALGORITHM

In the multiple disease prediction web application, machine learning algorithms play a pivotal role in analyzing user-provided health data to generate accurate disease predictions. The application leverages advanced algorithms such as logistic regression, decision trees, random forests, and neural networks, implemented using libraries like Scikit-Learn, TensorFlow, and Keras. These algorithms are trained on extensive

medical datasets to learn patterns and relationships between various health parameters and disease outcomes. Data preprocessing techniques, including normalization and feature selection, ensure the quality and relevance of the input data. The trained models are then used to predict the likelihood of various diseases based on the user's health inputs. The system continuously updates and refines these models with new data, enhancing their accuracy and reliability over time. By incorporating these machine learning algorithms, the application provides users with personalized, data-driven health insights, enabling early detection and proactive management of potential health risks.

CHAPTER 3

SYSTEM DESIGN

3.1 GENERAL

In this section, we would like to show how the general outline of how all the components end up working when organized and arranged together. It is further represented in the form of a flow chart below.

3.2 SYSTEM ARCHITECTURE DIAGRAM

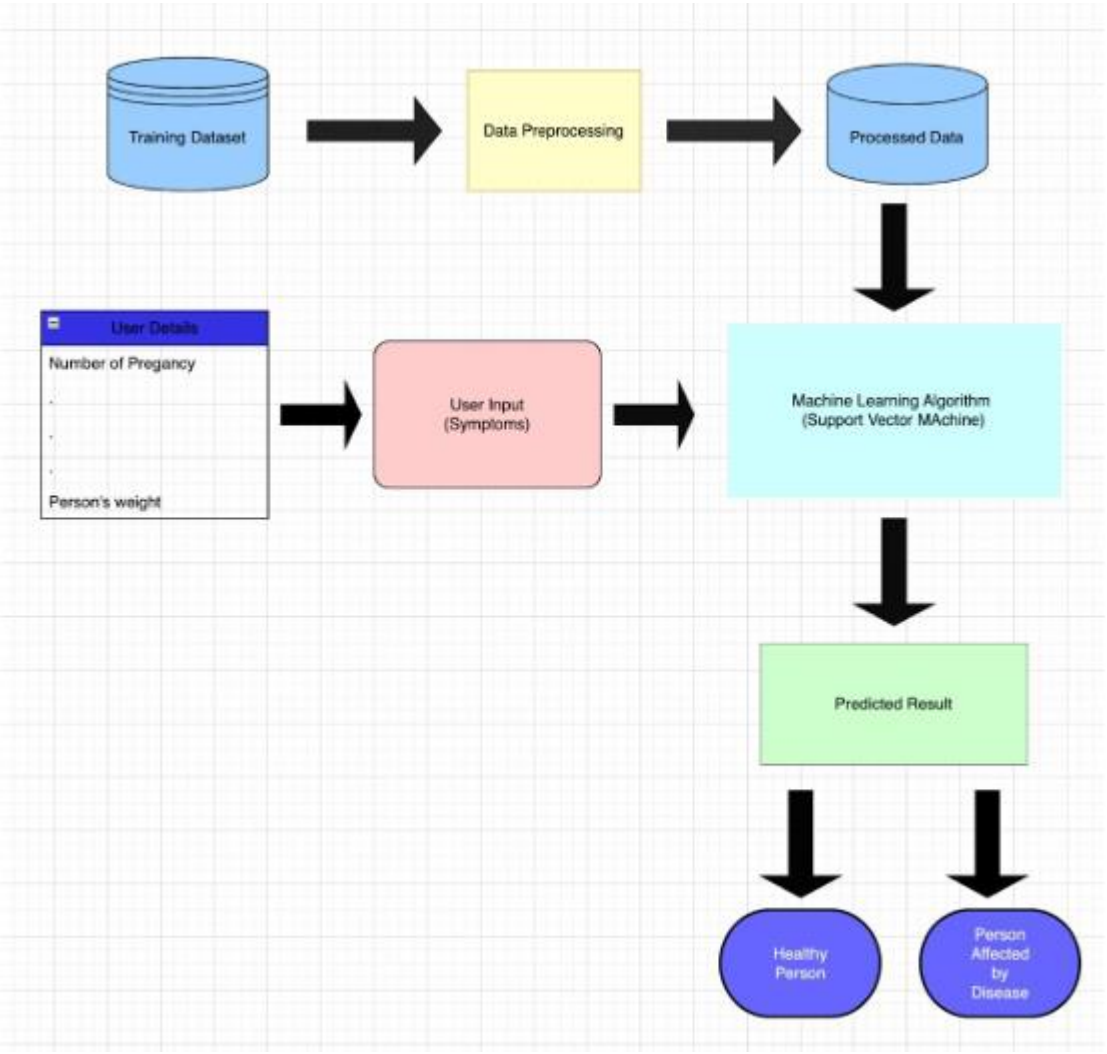


Fig 3.1: System Architecture

3.3 DEVELOPMENTAL ENVIRONMENT

3.3.1 HARDWARE REQUIREMENTS

This project uses minimal hardware but in order to run the project efficiently without any lack of user experience, the following specifications are recommended

Table 3.1 Hardware Requirements

COMPONENTS	SPECIFICATION
PROCESSOR	Intel Core i5
RAM	4 GB RAM or Above (DDR4 RAM)
GPU	Intel Integrated Graphics
MONITOR	14” COLOR
HARD DISK	6GB
PROCESSOR SPEED	1.5 GHz or above

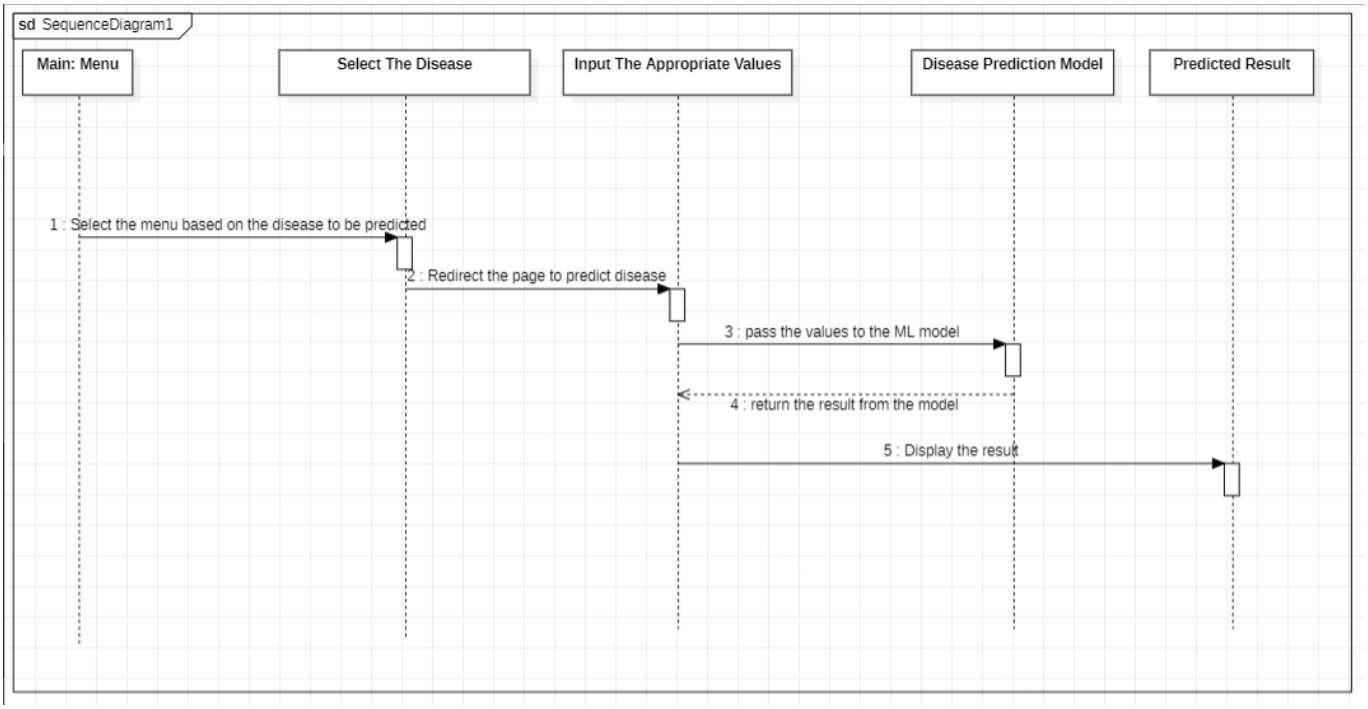
3.3.2 SOFTWARE REQUIREMENTS

The software requirements document is the specifications of the system. It should include both a definition and a specification of requirements. It is aset of what the system should rather be doing than focus on how it should be done. The software requirements provide a basis for creating the software requirements specification. It is useful in estimating the cost, planning team activities, performing tasks, tracking the team, and tracking the team’s progressthroughout the development activity.

Python IDLE, Visual Studio code and **chrome** would all be required.

3.4 DESIGN OF THE ENTIRE SYSTEM

3.4.1 SEQUENCE DIAGRAM



The sequence diagram illustrates the interaction between the user and the fitness analyzer system where the user selects fitness goal and inputs nutritional details.Next the system processes data and generates personalized fitness recommendations. At lastthe recommendations displayed to the user for diet and exercise.

CHAPTER 4

PROJECT DESCRIPTION

4.1 METHODOLODGY

The first phase involves gathering comprehensive data from users to inform personalized fitness recommendations. Utilizing the Flask framework in Python, the system collects user inputs encompassing demographic information, health status, fitness goals, dietary habits, and exercise preferences. Through intuitive interfaces, users provide details on their nutritional intake, physical activity levels, and any existing medical conditions, ensuring a holistic understanding of their fitness profile.

The core of the fitness analyzer lies in the development of sophisticated algorithms capable of processing user data and generating tailored fitness plans. Leveraging Python libraries and machine learning techniques, including regression and classification algorithms, the system analyzes user inputs to identify correlations, patterns, and dependencies. This enables the algorithm to derive insights regarding optimal dietary recommendations, exercise regimens, and lifestyle modifications aligned with individual fitness objectives.

Integration of the algorithm within the Flask framework facilitates seamless communication between the user interface and backend processing. Python's Flask framework enables the development of web-based applications, allowing users to access the fitness analyzer through browsers across various devices. The system architecture ensures scalability, responsiveness, and real-time data processing, enhancing user experience and engagement.

Validation and testing constitute critical phases to ensure the accuracy, reliability, and effectiveness of the fitness analyzer. Rigorous testing protocols, including unit tests, integration tests, and user acceptance testing, validate the functionality and performance of the system across diverse scenarios. Additionally, user feedback and iterative refinement further enhance the system's usability, ensuring alignment with user expectations and fitness goals.

The methodology outlined above delineates a systematic approach to developing an AI-enabled fitness analyzer. By integrating data collection, algorithm development, system integration, and validation, the project aims to deliver a robust and user-centric fitness tool capable of empowering individuals to achieve their fitness aspirations effectively and sustainably.

4.2 MODULE DESCRIPTION

The development of the AI-driven Fitness Analyzer encompasses several key modules, each playing a crucial role in achieving the overarching goal of providing personalized fitness guidance to users.

4.2.1 User Interface Module:

This module focuses on creating an intuitive and user-friendly interface for the Fitness Analyzer. It includes the design and implementation of a single-page interface using Python's Flask framework, allowing users to access comprehensive reports, recommended meals, portion sizes, nutrient breakdowns, and exercise routines.

4.2.2 Data Pre - Processing:

In this data preprocessing the dataset is first imported by using the pandas library in order to load the data. In this process it performs data exploration and cleaning process it checks whether there is any null values and remove them. It also performs data encoding if there is any categorical values this process converts it into a numeric values and pass that to the model for predicting the outcome

4.2.3 Traning Set:

The Dataset is a collection of different numeric values of human current condition. The Diabetes dataset include the no of pregnancies,Glucose level, blood pressure, SkinThickness, Insulin, BMI, Age and Outcome.The Heart disease dataset includes the age, sex,chest pain type, resting blood pressure, serum cholesterol in mg/dl, fasting blood sugar, maximum heart rate achieved, exercise induced angina, The heart disease dataset contains all the datas about the input values such as age , chest pain, glucose level and body weight to predict the outcome.

4.2.4 Traning Model:

The training module for the multiple disease prediction web application utilizes diverse health- related data to train the model using supervised learning techniques such as Support Vector Machine The Multiple Disease Prediction Web Application is an innovative tool designed to assist in the early detection and diagnosis of various diseases through machine learning. This application leverages a robust dataset, incorporating patient history, symptoms, demographic information, and diagnostic results to train predictive models. By utilizing algorithms such as decision trees, support vector machines, and neural networks, the application can accurately identify patterns and correlations that are indicative of specific diseases.Training the model involves preprocessing the data to handle missing values, normalize features, and split the dataset into training and testing subsets. The training phase includes hyperparameter tuning and cross-validation to enhance model performance and ensure generalizability. The model's effectiveness is evaluated using metrics like accuracy, precision, recall, and F1-score to determine its predictive capability.This web application not only streamlines the diagnostic process but also provides healthcare professionals with a valuable decision support tool. By predicting potential diseases early, it enables timely intervention, personalized treatment plans, and ultimately, improved patient outcomes. Additionally, its user-friendly interface ensures that medical practitioners can easily input data and receive real-time predictions, making it an essential addition to modern healthcare

4.3 SOURCE CODE

SOURCE CODE:

```
import os
import pickle
import streamlit as st
from streamlit_option_menu import option_menu

# Set page configuration
st.set_page_config(page_title="Health Assistant",
                   layout="wide",
                   page_icon="")


# getting the working directory of the main.py
working_dir = os.path.dirname(os.path.abspath(__file__))

# loading the saved models

diabetes_model = pickle.load(open(f'{working_dir}/saved_models/diabetes_model.sav', 'rb'))

heart_disease_model = pickle.load(open(f'{working_dir}/saved_models/heart_disease_model.sav', 'rb'))

parkinsons_model = pickle.load(open(f'{working_dir}/saved_models/parkinsons_model.sav', 'rb'))

# sidebar for navigation
with st.sidebar:
    selected = option_menu('Multiple Disease Prediction System',

                           ['Diabetes Prediction',
                            'Heart Disease Prediction',
                            'Parkinsons Prediction'],
                           menu_icon='hospital-fill',
                           icons=['activity', 'heart', 'person'],
                           default_index=0)


# Diabetes Prediction Page
if selected == 'Diabetes Prediction':

    # page title
    st.title('Diabetes Prediction using ML')

    # getting the input data from the user
    col1, col2, col3 = st.columns(3)

    with col1:
        Pregnancies = st.text_input('Number of Pregnancies')
```

```
    with col2:
        Glucose = st.text_input('Glucose Level')

    with col3:
        BloodPressure = st.text_input('Blood Pressure value')

    with col1:
        SkinThickness = st.text_input('Skin Thickness value')

    with col2:
        Insulin = st.text_input('Insulin Level')

    with col3:
        BMI = st.text_input('BMI value')

    with col1:
        DiabetesPedigreeFunction = st.text_input('Diabetes Pedigree Function value')

    with col2:
        Age = st.text_input('Age of the Person')


    # code for Prediction
    diab_diagnosis = ''

    # creating a button for Prediction

    if st.button('Diabetes Test Result'):

        user_input = [Pregnancies, Glucose, BloodPressure, SkinThickness, Insulin,
                      BMI, DiabetesPedigreeFunction, Age]

        user_input = [float(x) for x in user_input]

        diab_prediction = diabetes_model.predict([user_input])

        if diab_prediction[0] == 1:
            diab_diagnosis = 'The person is diabetic'
        else:
            diab_diagnosis = 'The person is not diabetic'

    st.success(diab_diagnosis)

# Heart Disease Prediction Page
if selected == 'Heart Disease Prediction':

    # page title
    st.title('Heart Disease Prediction using ML')

    col1, col2, col3 = st.columns(3)

    with col1:
        age = st.text_input('Age')
```

```
with col2:
    sex = st.text_input('Sex')

with col3:
    cp = st.text_input('Chest Pain types')

with col1:
    trestbps = st.text_input('Resting Blood Pressure')

with col2:
    chol = st.text_input('Serum Cholestoral in mg/dl')

with col3:
    fbs = st.text_input('Fasting Blood Sugar > 120 mg/dl')

with col1:
    restecg = st.text_input('Resting Electrocardiographic results')

with col2:
    thalach = st.text_input('Maximum Heart Rate achieved')

with col3:
    exang = st.text_input('Exercise Induced Angina')

with col1:
    oldpeak = st.text_input('ST depression induced by exercise')

with col2:
    slope = st.text_input('Slope of the peak exercise ST segment')

with col3:
    ca = st.text_input('Major vessels colored by flourosopy')

with col1:
    thal = st.text_input('thal: 0 = normal; 1 = fixed defect; 2 = reversable defect')

# code for Prediction
heart_diagnosis = ''

# creating a button for Prediction

if st.button('Heart Disease Test Result'):

    user_input = [age, sex, cp, trestbps, chol, fbs, restecg, thalach, exang, oldpeak, slope, ca, thal]

    user_input = [float(x) for x in user_input]

    heart_prediction = heart_disease_model.predict([user_input])

    if heart_prediction[0] == 1:
        heart_diagnosis = 'The person is having heart disease'
    else:
        heart_diagnosis = 'The person does not have any heart disease'
```

```
    st.success(heart_diagnosis)

# Parkinson's Prediction Page
if selected == "Parkinsons Prediction":

    # page title
    st.title("Parkinson's Disease Prediction using ML")

    col1, col2, col3, col4, col5 = st.columns(5)

    with col1:
        fo = st.text_input('MDVP:Fo(Hz)')

    with col2:
        fhi = st.text_input('MDVP:Fhi(Hz)')

    with col3:
        flo = st.text_input('MDVP:Flo(Hz)')

    with col4:
        Jitter_percent = st.text_input('MDVP:Jitter(%)')

    with col5:
        Jitter_Abs = st.text_input('MDVP:Jitter(Abs)')

    with col1:
        RAP = st.text_input('MDVP:RAP')

    with col2:
        PPQ = st.text_input('MDVP:PPQ')

    with col3:
        DDP = st.text_input('Jitter:DDP')

    with col4:
        Shimmer = st.text_input('MDVP:Shimmer')

    with col5:
        Shimmer_dB = st.text_input('MDVP:Shimmer(dB)')

    with col1:
        APQ3 = st.text_input('Shimmer:APQ3')

    with col2:
        APQ5 = st.text_input('Shimmer:APQ5')

    with col3:
        APQ = st.text_input('MDVP:APQ')

    with col4:
        DDA = st.text_input('Shimmer:DDA')

    with col5:
        NHR = st.text_input('NHR')
```

```
with col1:
    HNR = st.text_input('HNR')

with col2:
    RPDE = st.text_input('RPDE')

with col3:
    DFA = st.text_input('DFA')

with col4:
    spread1 = st.text_input('spread1')

with col5:
    spread2 = st.text_input('spread2')

with col1:
    D2 = st.text_input('D2')

with col2:
    PPE = st.text_input('PPE')

# code for Prediction
parkinsons_diagnosis = ''

# creating a button for Prediction
if st.button("Parkinson's Test Result"):

    user_input = [fo, fhi, flo, Jitter_percent, Jitter_Abs,
                  RAP, PPQ, DDP,Shimmer, Shimmer_dB, APQ3, APQ5,
                  APQ, DDA, NHR, HNR, RPDE, DFA, spread1, spread2, D2, PPE]

    user_input = [float(x) for x in user_input]

    parkinsons_prediction = parkinsons_model.predict([user_input])

    if parkinsons_prediction[0] == 1:
        parkinsons_diagnosis = "The person has Parkinson's disease"
    else:
        parkinsons_diagnosis = "The person does not have Parkinson's disease"

st.success(parkinsons_diagnosis)
```

CHAPTER 5

RESULTS AND DISCUSSIONS

5.1 OUTPUT

The following images contain images attached below of the working application predicted graphs and its performances table

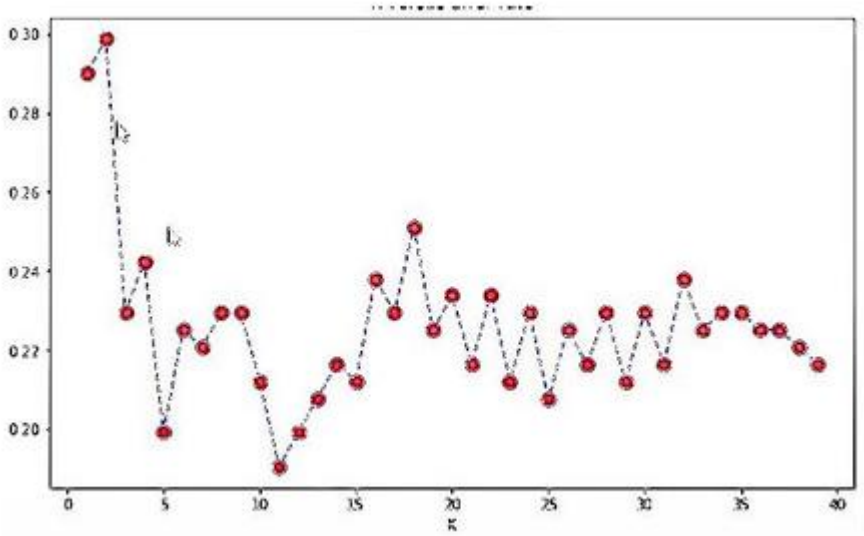


Fig 5.1.1: Prediction Graph

Precision	Accuracy	Recall	F1 Score	FPR
60-78%	76-80%	50-76%	61-68%	10-22%
-	74-77%	-	-	-
70–73%	73-76%	69-71%	-	-
75-82%	78-85%	72-78%	73-80%	-
62-72%	-	6-87%	62-79%	-
73-80%	73-79%	73-79%	73-79%	-
70-89%	70-80%	79-89%	78-85%	-
-	74-79%	-	-	-
64-72%	-	68-74%	64-74%	-
-	72-75%	-	-	-
0-65%	68-75%	0-66%	0-66%	-

Fig 5.1.2: Model Performance Table

Web interface :

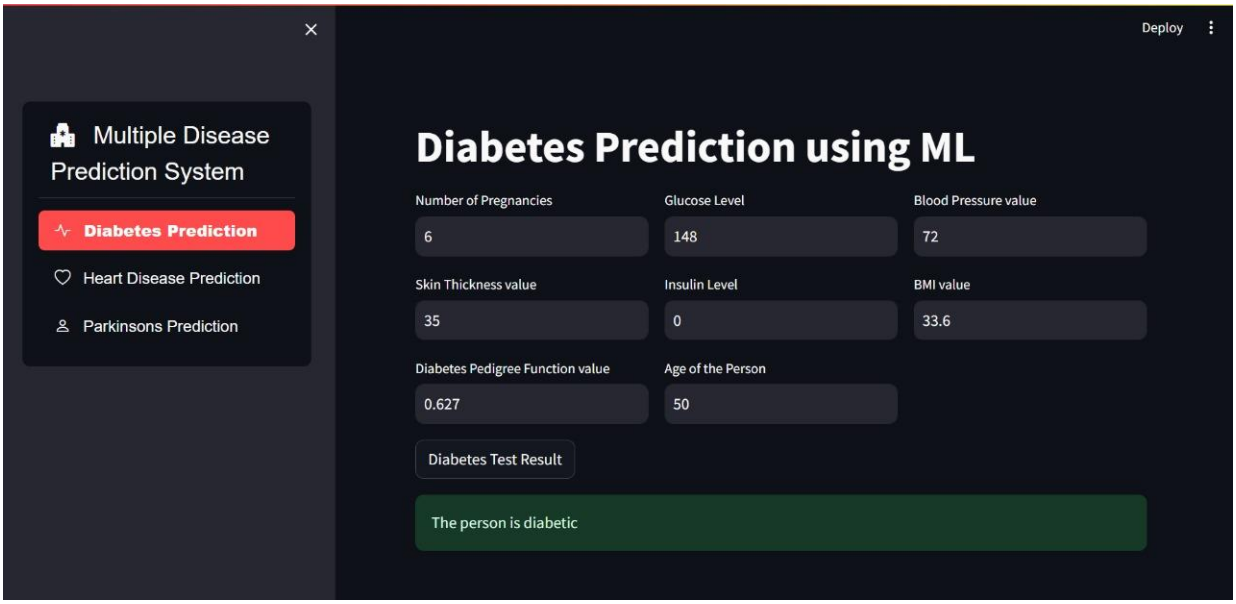


Fig 5.2 Diabetes Prediction Page

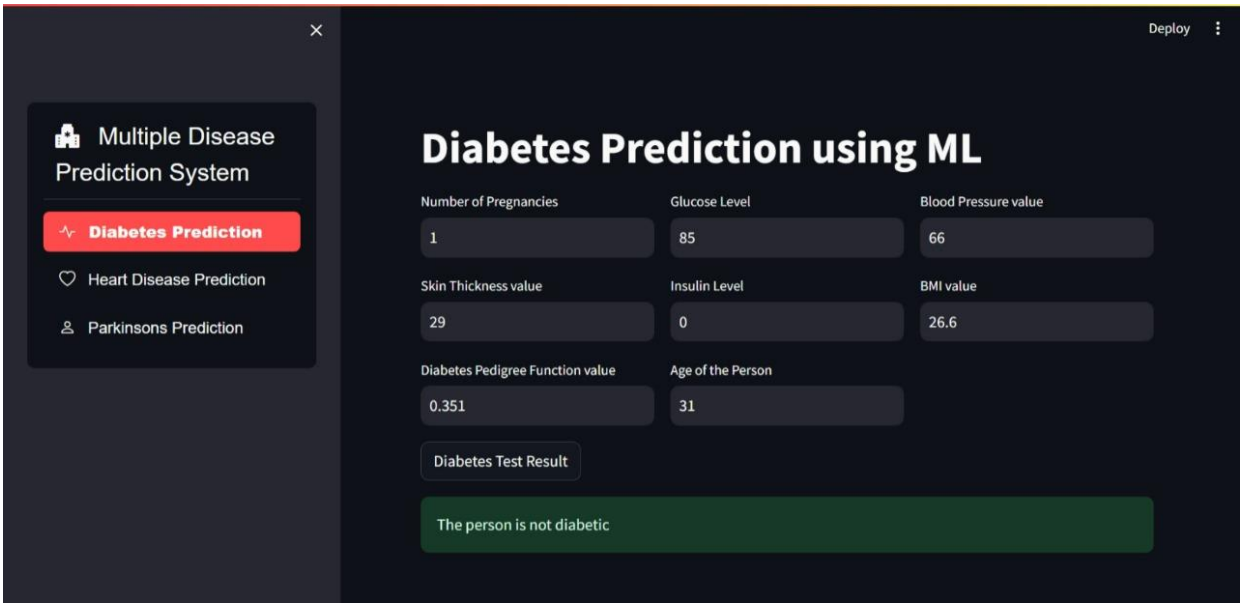


Fig 5.3 Diabetes Predicted Page

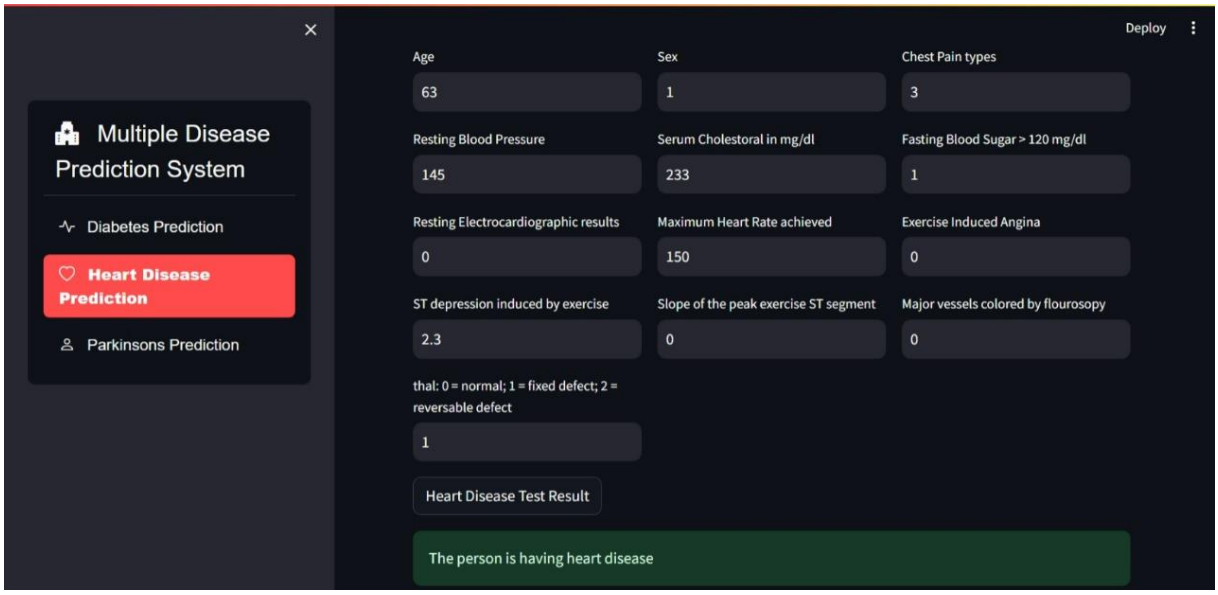


Fig 5.4 Heart Disease Prediction Page

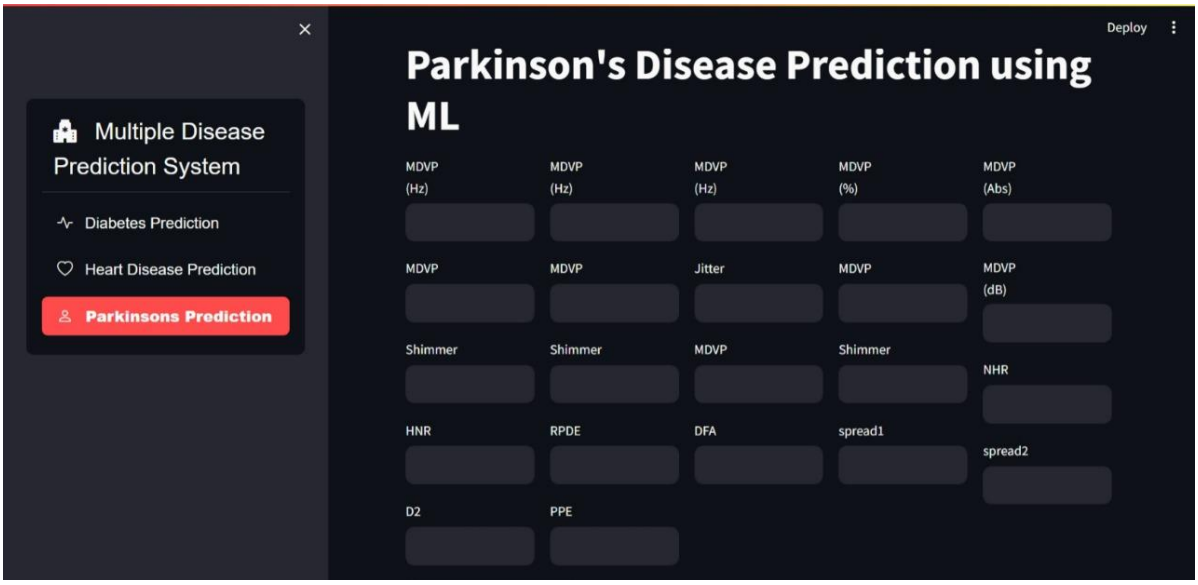


Fig 5.5 Parkinson's Disease Prediction Page

5.2 RESULT

The multiple disease prediction web application yields transformative results by harnessing the power of advanced machine learning algorithms to analyze comprehensive health data provided by users. Through an intuitive and user-friendly interface, individuals can input various health parameters, from medical history to lifestyle factors, facilitating the generation of personalized predictions for multiple diseases. These predictions serve as early indicators of potential health risks, enabling users to adopt proactive measures to mitigate their impact. By identifying patterns and correlations within the data, the application offers valuable insights into individual health profiles, empowering users to make informed decisions about their well-being.

Moreover, the application facilitates continuous monitoring of health trends over time, allowing users to track changes in their health status and receive timely alerts for significant deviations. Through interactive visualizations and personalized recommendations, users gain a deeper understanding of their health risks and potential interventions, fostering a proactive approach to disease prevention and management. By integrating seamlessly into users' daily lives, the multiple disease prediction web application becomes a valuable tool for promoting health awareness and empowering individuals to take control of their health journey. Ultimately, the application's results contribute to improved health outcomes, enhanced disease prevention, and a higher quality of life for users across diverse demographics and health profiles.

CHAPTER 6

CONCLUSION AND FUTURE ENHANCEMENT

6.1 CONCLUSION

In conclusion, the development of a multiple disease prediction web application represents a significant advancement in healthcare technology, offering users personalized insights and empowering them to take proactive steps towards better health outcomes. Through the integration of advanced machine learning algorithms, comprehensive datasets, and user-friendly interfaces, the application facilitates early detection and prevention of various diseases, transforming the way individuals approach health management.By harnessing the predictive capabilities of machine learning, the application provides users with timely alerts and personalized recommendations based on their unique health profiles, enabling them to make informed decisions about their well-being. Moreover, the continuous monitoring of health trends and the provision of actionable insights empower users to adopt healthier lifestyles and seek timely medical interventions when necessary. Furthermore, the multiple disease prediction web application fosters a collaborative approach to healthcare, bridging the gap between patients and healthcare providers by facilitating informed discussions and shared decision-making. Through its user-friendly interface and accessible features, the application promotes health awareness and encourages individuals to take an active role in managing their health.

In summary, the multiple disease prediction web application represents a promising tool for promoting preventive healthcare and improving health outcomes for individuals across diverse demographics. By leveraging technology to deliver personalized predictions and actionable insights, the application has the potential to revolutionize the way individuals engage with their health, ultimately leading to a healthier and more informed society.

6.2 FUTURE ENHANCEMENT

Future enhancements for the multiple disease prediction web application could include:

1. Integration of real-time health monitoring through wearable devices.
2. Expansion of predictive capabilities to include rare diseases and emerging health threats.
3. Incorporation of genomic data for more personalized predictions and targeted interventions.
4. Implementation of advanced data visualization techniques for enhanced interpretation of prediction results.

REFERENCES

1) Carpinteiro, C., Lopes, J., Abelha, A., & Santos, M. F. (2023, January 1). A Comparative Study of Classification Algorithms for Early Detection of Diabetes. Procedia Computer Science. https://doi.org/10.1016/j.procs.2023.03.117
2) Guan, Z., Li, H., Liu, R., Cai, C., Liu, Y., Li, J., Wang, X., Huang, S., Wu, L., Liŭ, D., Yu, S., Wang, Z., Jia, S., Hou, X., Yang, X., Jia, W., & Sheng, B. (2023, October 1). Artificial intelligence in diabetes management: Advancements, opportunities, and challenges. Cell Reports Medicine. https://doi.org/10.1016/j.xcrm.2023.101213
3) Gowthami, S., Reddy, V. S., & Ahmed, M. R. (2024, February 1). Exploring the effectiveness of machine learning algorithms for early detection of Type-2 Diabetes Mellitus. Measurement. Sensors. https://doi.org/10.1016/j.measen.2023.100983
4) Sharma, A., Prasad, K., Chakrasali, S. V., Gowda, D., Kumar, C., Chaturvedi, A., & Pazhani, A. A. J. (2023, June 1). Computer vision based healthcare system for identification of diabetes & its types using AI. Measurement. Sensors. https://doi.org/10.1016/j.measen.2023.100751Sharma, A., Prasad, K., Chakrasali, S. V., Gowda, D., Kumar, C., Chaturvedi, A., & Pazhani, A. A. J. (2023, June 1). Computer vision based healthcare system for identification of diabetes & its types using https://doi.org/10.1016/j.measen.2023.100751\
5) Carpinteiro, C., Lopes, J., Abelha, A., & Santos, M. F. (2023, January 1). A Comparative Study of Classification Algorithms for Early Detection of Diabetes. Procedia Computer Science. https://doi.org/10.1016/j.procs.2023.03.117
6) Althobaiti, T., Althobaiti, S., & Selim, M. M. (2024, May 1). An optimized diabetes mellitus detection model for improved prediction of accuracy and clinical decision- making. Alexandria Engineering Journal /Alexandria Engineering Journal. https://doi.org/10.1016/j.aej.2024.03.044
7) Chaki, J., Ganesh, S. T., Cidham, S., & Theertan, S. A. (2022, June 1). Machine learning and artificial intelligence based Diabetes Mellitus detection and self - management: A systematic review. Journal of King Saud University. Computer and Information Sciences/Mağalaẗ Ğam'aẗ Al-malīk Saud : Ùlm Al-ḥasib Wa Al- ma'lumat. https://doi.org/10.1016/j.jksuci.2020.06.013
8) Dharmarathne, G., Jayasinghe, T. N., Bogahawaththa, M., Meddage, D., & Rathnayake, U. (2024, June 1). A novel machine learning approach for diagnosing diabetes with a self explainable interface. Healthcare Analytics. https://doi.org/10.1016/j.health.2024.100301.
9) Chee, L. Z., Sivakumar, S., Lim, K. H., & Gopalai, A. A. (2024, June 1). Gait acceleration based diabetes detection using hybrid deep learning. Biomedical Signal Processing and Control. https://doi.org/10.1016/j.bspc.2024.10599
10) Althobaiti, T., Althobaiti, S., & Selim, M. M. (2024, May 1). An optimized diabetes mellitus detection model for improved prediction of accuracy and clinical decision- making. Alexandria Engineering Journal /Alexandria Engineering Journal. https://doi.org/10.1016/j.aej.2024.03.044