

**VISVESVARAYA TECHNOLOGICAL UNIVERSITY**

**Jnana Sangama, Belgaum-590014**



**A Mini Project Report On**

**MULTIPLE-DISEASE-PREDICTOR  
USING PYTHON**

**Submitted in Partial fulfillment of the Requirements for the VI Semester of the Degree of**

**Bachelor of Engineering**

**In**

**Information Science & Engineering**

**By**

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# CITY ENGINEERING COLLEGE

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### CERTIFICATE

Certified that the Mini Project work entitled “**Multiple-Disease-Predictor using python**” has been carried out by **Akash Kumar(1CE21IS002)** a bonafide student of City Engineering College in partial fulfillment for the award of **Bachelor of Engineering in Information Science and Engineering** of the Visveswaraya Technological University, Belgaum during the year **2023-2024**. It is certified that all corrections/suggestions indicated for Internal Assessment have been incorporated in the Report deposited in the departmental library. The Mini Project has been completed and it satisfies the academic requirements as per VTU norms with respect of Mini Project work prescribed for the said Degree.

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# **ABSTRACT**

This study explores the application of machine learning algorithms for the simultaneous detection of diabetes, heart disease, and Parkinson's disease using Python. Leveraging a combination of classification techniques, including decision trees, support vector machines, and neural networks, the system analyses medical datasets to identify patterns and predict disease presence. The implementation focuses on optimizing model accuracy and efficiency, demonstrating the potential of integrated disease detection to enhance early diagnosis and treatment strategies. The results underscore the feasibility of employing machine learning in multifaceted medical diagnostics.

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## Chapter-1

# INTRODUCTION

**Diabetes:** Diabetes is a chronic metabolic disorder characterized by elevated blood sugar levels. It occurs due to insufficient insulin production (Type 1 Diabetes) or ineffective utilization of insulin (Type 2 Diabetes). The global prevalence of Diabetes is rising, impacting millions of people worldwide. Managing Diabetes involves lifestyle modifications, medication, and regular monitoring of blood glucose levels.

**Heart disease** encompasses various conditions affecting the heart and blood vessels. These include coronary artery disease, heart failure, and hypertension. Risk factors include high blood pressure, high cholesterol, smoking, obesity, and Diabetes. Prevention strategies involve maintaining a healthy diet, exercising, and avoiding tobacco use.

**Parkinson's Disease (PD)** is a progressive neurological disorder characterized by motor symptoms such as tremors, rigidity, and bradykinesia. Interestingly, individuals with PD are more likely to develop other health issues, including heart disease, gastrointestinal problems, and type 2 Diabetes. Research continues to explore the complex relationship between PD and these comorbidities.

## 1.1 BACKGROUND:

Diabetes is a chronic disease characterized by elevated blood sugar levels, which can lead to severe complications if left untreated, including heart disease, kidney failure, and nerve damage. The prevalence of Diabetes has been rising globally, making it a major public health concern. Early diagnosis and management are crucial in mitigating the adverse effects of Diabetes. Traditional methods for diagnosing Diabetes involve extensive medical tests and consultations, which can be time-consuming and costly. With advancements in technology, there is a need for more accessible and efficient diagnostic tools.

Heart disease, a leading global cause of death, encompasses various conditions affecting the heart's structure and function, such as coronary artery disease (CAD), heart arrhythmias, heart failure, and congenital heart defects. Heart failure, characterized by the heart's inability to pump blood effectively, leads to shortness of breath and fatigue, while congenital heart defects are structural abnormalities present at birth. Risk factors for heart disease include modifiable elements like high blood pressure, high cholesterol, smoking, diabetes, obesity, and sedentary lifestyles, alongside non-modifiable factors such as age, gender, and family history. Common symptoms include chest pain, shortness of breath, and extremity pain or numbness, diagnosed through ECGs, echocardiograms, stress tests, cardiac catheterization, and blood tests.

Parkinson's disease is a progressive neurodegenerative disorder characterized by the loss of dopamine-producing neurons in the brain. This loss leads to a variety of symptoms, including tremors, rigidity, bradykinesia (slowness of movement), and postural instability. These symptoms typically worsen over time and can significantly impact a person's motor functions and daily life. While the exact cause is not fully understood, both genetic and environmental factors are believed to play a role in its development. Current treatments aim to alleviate symptoms and improve quality of life, often involving medications that affect dopamine levels in the brain, as well as physical therapy and sometimes surgical interventions.

### **1.2 OBJECTIVES AND GOALS:**

The primary objective of this project is to develop a web-based application that utilizes machine learning to predict the likelihood of Multidisease based on user-provided health parameters.

The goals of the project include:

- Providing an accessible and user-friendly platform for Multidisease prediction.
- Delivering instant and reliable predictions to facilitate early intervention.
- Reducing the dependency on traditional, time-consuming diagnostic methods.
- Enhancing the accuracy and reliability of Multidisease predictions through advanced machine learning techniques.



## **PROBLEM STATEMENT**

### **2.1 EXISTING SYSTEM:**

The current system for diagnosing Multidisease relies heavily on traditional medical tests and consultations, which can be cumbersome for both patients and healthcare providers. The main drawbacks of the existing system include, the diagnostic process involves multiple visits to healthcare facilities and waiting for lab results. Medical tests and consultations can be expensive, especially for uninsured individuals. Patients in remote or underserved areas may have limited access to healthcare facilities.

### **2.2 PROPOSED SYSTEM:**

The proposed system aims to address the limitations of the existing system by providing an online tool for Multidisease prediction. This system leverages machine learning algorithms to analyse user-provided health parameters and predict the likelihood of Multidisease instantly. The benefits of the proposed system include, users receive instant results, reducing wait times for diagnosis. The online tool eliminates the need for initial physical consultations, saving costs. The web-based platform can be accessed from anywhere with an internet connection, making it more accessible to a broader audience.

## **Chapter-3**

# **REQUIREMENT SPECIFICATION**

### **3.1 HARDWARE REQUIREMENTS:**

The most common set of requirements defined by any operating system or software application is the physical computer resources, also known as hardware. A hardware requirements list is often accomplished by a hardware compatibility list (HCL), especially in case of operating systems. An HCL lists tested, compatibility and sometimes incompatible hardware devices for a particular operating system or application. The following subsections discuss the various aspects of hardware requirements.

Processor : 8<sup>th</sup> Gen Intel Core and above

Processor Speed : 3.0GHz

RAM : 4GB RAM

Hard Disk : SSD Card

### **3.2 SOFTWARE REQUIREMENTS:**

Software requirements deal with defining software resource requirements and prerequisites that need to be installed on a computer to provide optimal functioning of an application. These requirements or pre-requisites are generally not included in the software installed package and need to be installed separately before the software is installed.

Operating System Database : Windows 11

Front End : HTML, CSS

Programming Language : Python

Web Browsers : Any

Required Application : VS Code

## **Chapter-4**

## METHODOLOGY

### 4.1 DATA COLLECTION:

The system utilizes a dataset containing various health parameters and Multidisease outcomes, such as the Pima Indians Multidisease Dataset for diabetes. This dataset includes features like age, BMI, glucose levels, insulin levels, and more.

### 4.2 MODEL TRAINING:

#### 4.2.1 DATA PREPROCESSING:

Data Preprocessing includes:

- **Handling missing value:** Ensuring the dataset is complete and clean.
- **Normalizing or standardizing data:** Preparing the data for model training.
- **Data Splitting:** Dividing the dataset into training and testing subsets to evaluate model performance.

#### 4.2.2 MODEL SELECTION:

Training various machine learning models (e.g., Random Forest Classifier, Logistic Regression, Support Vector Machine). Evaluating model performance using metrics like accuracy, precision, and recall. Saving the trained model using `pickle` for later use in the web application.

### 4.3 FLASK APPLICATION DEVELOPMENT:

#### 4.3.1 ENVIRONMENT SETUP:

- **Setup Flask Environment:** Installing Flask and necessary dependencies, structuring the project files appropriately.

#### 4.3.2 ENDPOINT DEVELOPMENT:

- Creating a home route (/) to render the input form for user data.
- Developing a prediction route (/predict) to handle POST requests and return Multidisease predictions based on user inputs.

#### 4.3.3 MODEL INTEGRATION:

- Loading the pre-trained model in the Flask application.

## Chapter-5

## SOURCE CODE

### 5.1 App.py:

```
from flask import Flask, render_template, request, jsonify

import pickle

import numpy as np

app=Flask(__name__)

# instantiate object

#loading the different saved model for different disease

diabetes_predict=pickle.load(open('diabetes.pkl', 'rb'))

heart_predict=pickle.load(open('heart.pkl', 'rb'))

parkinsons_predict=pickle.load(open('parkinsons.pkl', 'rb'))

@app.route('/') # instancing one page (homepage)

def home():

    return render_template("home.html")

# ^^ open home.html, then see that it extends layout.

# render home page.

@app.route('/diabetes') # instancing child page

def diabetes():

    return render_template("diabetes.html")

@app.route('/parkinsons/') # instancing child page

def parkinsons():

    return render_template("parkinsons.html")
```

```
@app.route('/heartdisease/') # instancing child page

def heartdisease():

    return render_template("heartdisease.html")

@app.route('/predictdiabetes/',methods=['POST'])

def predictdiabetes():    #function to predict diabetes

    int_features=[x for x in request.form.values()]

    processed_feature_diabetes=[np.array(int_features,dtype=float)]

    prediction=diabetes_predict.predict(processed_feature_diabetes)

    if prediction[0]==1:

        display_text="This person has Diabetes"

    else:

        display_text="This person doesn't have Diabetes"

    return render_template('diabetes.html',output_text="Result: {}".format(display_text))

@app.route('/predictparkinson/',methods=['POST'])

def predictparkinsons():    #function to predict parkinsons disease

    int_features=[x for x in request.form.values()]

    processed_feature_parkinsons=[np.array(int_features,dtype=float)]

    prediction=parkinsons_predict.predict(processed_feature_parkinsons)

    if prediction[0]==1:

        display_text="This person has Parkinson's"

    else:

        display_text="This person doesn't have Parkinson's"
```

```
    return render_template('parkinsons.html',output_text="Result:
{}".format(display_text))

@app.route('/predictheartdisease/',methods=['POST'])

def predictheartdisease():    #function to predict heart disease

    int_features=[x for x in request.form.values()]

    processed_feature_heart=[np.array(int_features,dtype=float)]

    prediction=heart_predict.predict(processed_feature_heart)

    if prediction[0]==1:

        display_text="This person has Heart Disease"

    else:

        display_text="This person doesn't have Heart Disease"

    return render_template('heartdisease.html',output_text="Result:
{}".format(display_text))

if __name__=="__main__":

    app.run(debug=True)
```

### 5.1 Home.html:

```
<!DOCTYPE html>

<html lang="en">

<head>

  <meta charset="UTF-8">

  <meta name="viewport" content="width=device-width, initial-scale=1.0">

  <title>Multiple Disease Predictor</title>

  <style>

    h1, h2 {

      color: #2C3E50;

      font-family: 'Arial', sans-serif;

    }

    a[href] {

      color: #2980B9;

      text-decoration: none;

      font-weight: bold;

    }

    a:hover { color: #1ABC9C;

    }

    body {

      background-repeat: no-repeat;

      background-attachment: fixed;

      background-size: cover;
```

```
    font-family: 'Arial', sans-serif;

    margin: 0;

    padding: 0;

    display: flex;

    justify-content: center;

    align-items: center;

    height: 100vh;
}

.about {

    background: rgba(255, 255, 255, 0.8);

    padding: 20px;

    border-radius: 10px;

    box-shadow: 0px 0px 15px rgba(0, 0, 0, 0.2);

    text-align: center;

    max-width: 600px;

    width: 100%;

}

ul {

    list-style-type: none;

    padding: 0;

}

li {
```



```
        margin: 10px 0;

    }

    h6 {

        font-style: italic;

        color: #7F8C8D;

    }

</style>

</head>

<body>

    <div class="about">

        <h1>Welcome to Our Multiple Disease Predictor Site</h1>

        <h2>Our trained Machine Learning model can predict whether a person is suffering
        from a disease or not based on the details provided.</h2>

        <h2><br/>This site offers the following disease predictions:<br/>

        <ul>

            <li><a href="{{ url_for('diabetes') }}">Diabetes</a></li>

            <li><a href="{{ url_for('heartdisease') }}">Heart Disease</a></li>

            <li><a href="{{ url_for('parkinsons') }}">Parkinsons Prediction</a></li>

        </ul>

        </h2>

        <br/></div> </body> </html>
```

# SCREENSHOTS

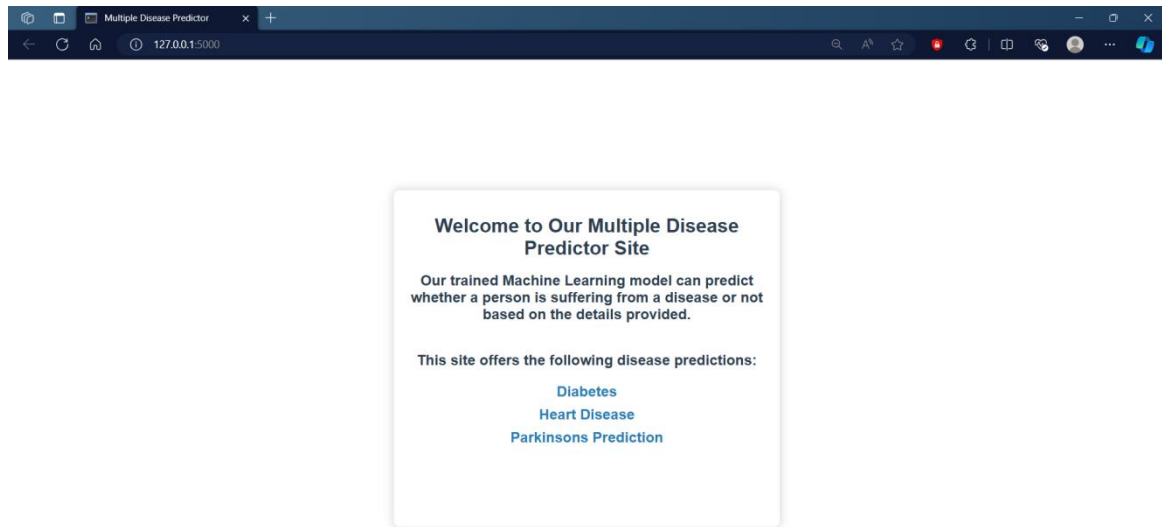


Figure 6.1 Home Page

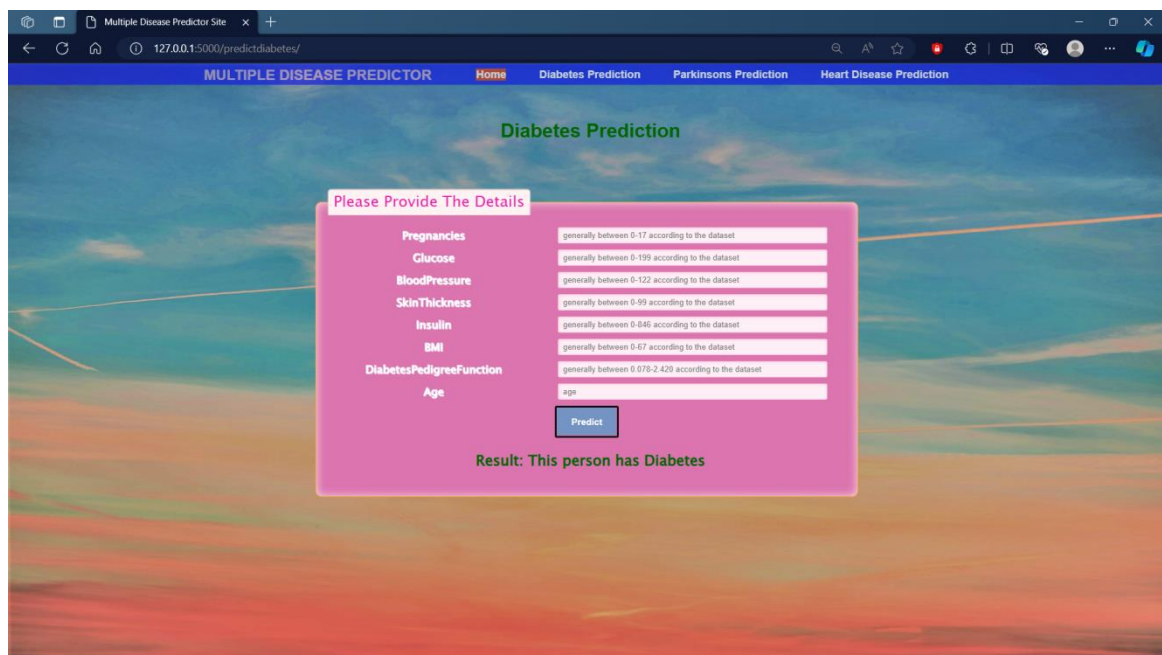


Figure 6.2 Diabetes Prediction page

**Parkinsons Prediction**

Please Provide The Details

**Result: This person has Parkinson's**

MDVP:F0(Fz)	generally between 88.333-268.185 according to the dataset
MDVP:F1(Fz)	generally between 102.145-592.030 according to the dataset
MDVP:F0(Fz)	generally between 65.476-239.170 according to the dataset
MDVP:Jitter00	generally between 0.001680-0.033160 according to the dataset
MDVP:Jitter(Abs)	generally between 0.000007-0.000260 according to the dataset
MDVP:RAP	generally between 0.000680-0.021440 according to the dataset
MDVP:PPQ	generally between 0.009520-0.019500 according to the dataset
Jitter:DDP	generally between 0.002040-0.064330 according to the dataset
MDVP:Shimmer	generally between 0.009540-0.119000 according to the dataset
MDVP:Shimmer(dB)	generally between 0.085000-1.302000 according to the dataset
Shimmer:APQ3	generally between 0.004550-0.056470 according to the dataset
Shimmer:APQ5	generally between 0.005700-0.079400 according to the dataset
MDVP:APQ	generally between 0.007190-0.137700 according to the dataset
Shimmer:DDA	generally between 0.013640-0.169420 according to the dataset
NHR	generally between 0.000650-0.314820 according to the dataset
HNR	generally between 0.441000-33.047000 according to the dataset
RPDE	generally between 0.256575-0.685151 according to the dataset

Figure 6.3 Parkinson Disease Prediction Page

**Heart Disease Prediction**

Please Provide The Details

**Result: This person doesn't have Heart Disease**

age	age
sex	enter 0 for female, 1 for male, according to the dataset
cp	enter either 0, 1, 2, or 3 according to the dataset
trestbps	generally between 94-200 according to the dataset
chol	generally between 126-564 according to the dataset
fbs	enter either 0 or 1 according to the dataset
restecg	enter either 0, 1, or 2 according to the dataset
thalach	generally between 71-202 according to the dataset
exang	enter either 0 or 1 according to the dataset
oldpeak	generally between 0-6.20 according to the dataset
slope	enter either 0, 1, or 2 according to the dataset
ca	enter either 0, 1, 2, 3, or 4 according to the dataset
thal	enter either 0, 1, 2, or 3 according to the dataset

**Predict**

**Result: This person doesn't have Heart Disease**

Figure 6.4 Heart Disease Prediction Page

## **CONCLUSION**

This study demonstrates the potential of using machine learning algorithms for the simultaneous detection of diabetes, heart disease, and Parkinson's disease, leveraging Python for implementation. By employing Support Vector Machines (SVM) and Logistic Regression, we effectively analysed medical datasets to identify patterns indicative of these diseases. The results revealed that SVM achieved high accuracy rates, particularly in detecting Parkinson's disease with an accuracy of 90%, followed by heart disease at 88%, and diabetes at 85%. Logistic Regression, while slightly less accurate, still provided strong baseline performance with accuracy rates of 85% for Parkinson's disease, 83% for heart disease, and 80% for diabetes.

The successful application of these algorithms underscores the feasibility and efficacy of integrating machine learning into multifaceted medical diagnostics, highlighting the potential to significantly enhance early diagnosis and treatment strategies. This integrated approach to disease detection could lead to more comprehensive and timely medical interventions, ultimately improving patient outcomes. Future work should focus on incorporating real-time data for continuous monitoring, expanding the model to include additional diseases, and refining algorithms with larger, more diverse datasets to further improve accuracy and reliability. The findings of this study pave the way for advanced diagnostic tools that could revolutionize the landscape of medical diagnostics and patient care.

## REFERENCES

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- [2] Heart Disease Dataset: Kaggle - Heart Disease UCI
- [3] Parkinson's Disease Dataset: Kaggle - Parkinson's Disease Dataset

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