

Machine Learning Approach For Employee Performance Prediction

1. INTRODUCTION

1.1 Overview

In this project we are going to analyse and predict the performance of employees in an organization on the basis of various factors, including, but not limited to, individual and domain specific characteristics, nature and level of schooling, socioeconomic status and different psychological factors.

1.2 Purpose

The purpose of this project is to predict the performance of employee.

2. PROJECT INITIALIZATION AND PLANNING PHASE

2.1 Define Problem Statement

Please refer to our Define Problem Statement Document for a comprehensive overview of our project's problem statements.

Link: [click here](#)

2.2 Project proposal (Proposed Solution)

Please refer to our Project Proposal (Proposed Solution) Document for a comprehensive overview of our Project Proposal.

Link: [click here](#)

2.3 Initial Project Planning Report

Please refer to our Initial Project Planning Report Document for a comprehensive overview of our Initial Project Planning.

Link: [click here](#)

3. DATA COLLECTION AND PREPROCESSING PHASE

3.1 Data Collection Plan & Raw Data Sources Identification Report

Please refer to our Data Collection Plan & Raw Data Sources Identification Report Document for a comprehensive overview of our Data Collection Plan & Raw Data Sources Identification

Link: [click here](#)

3.2 Data Quality Report

Please refer to our Data Quality Report Document for a comprehensive overview of our Data Quality.

Link: [click here](#)

3.3 Data Exploration & Preprocessing Report

Please refer to Preprocessing Report Document for a comprehensive overview of our Data Exploration And Preprocessing.

Link: [click here](#)

4. MODEL DEVELOPMENT PHASE

4.1 Feature Selection Report

Please refer to Feature Selection Report Document for a comprehensive overview of our Feature Selection.

Link: [click here](#)

4.2 Model Selection Report

Please refer to Model Selection Report Document for a comprehensive overview of our Model Selection.

Link: [Click Here](#)

4.3 Initial Model Training Code, Model Validation And Evaluation Report

Please refer Initial Model Training Code, Model Validation And Evaluation Report Document for a comprehensive overview of our Initial Model Training Code, Model Validation And Evaluation.

Link: [click here](#)

5. MODEL OPTIMIZATION AND TUNING PHASE

5.1 Hyperparameter Tuning documentation

Please refer Model Optimization and Tuning Report Document for a comprehensive overview of our Hyperparameter Tuning.

Link: [click here](#)

5.2 Performance Metrics Classification Report

Please refer Performance Metrics Classification Report Document for a comprehensive overview of our Performance Metrics Classification.

Link: [click here](#)

5.3 Final Model Selection Justification

Please refer Final Model Selection Justification Report Document for a comprehensive overview of our Final Model Selection Justification.

Link: [click here](#)

6. RESULT

5.1 Output Screenshots

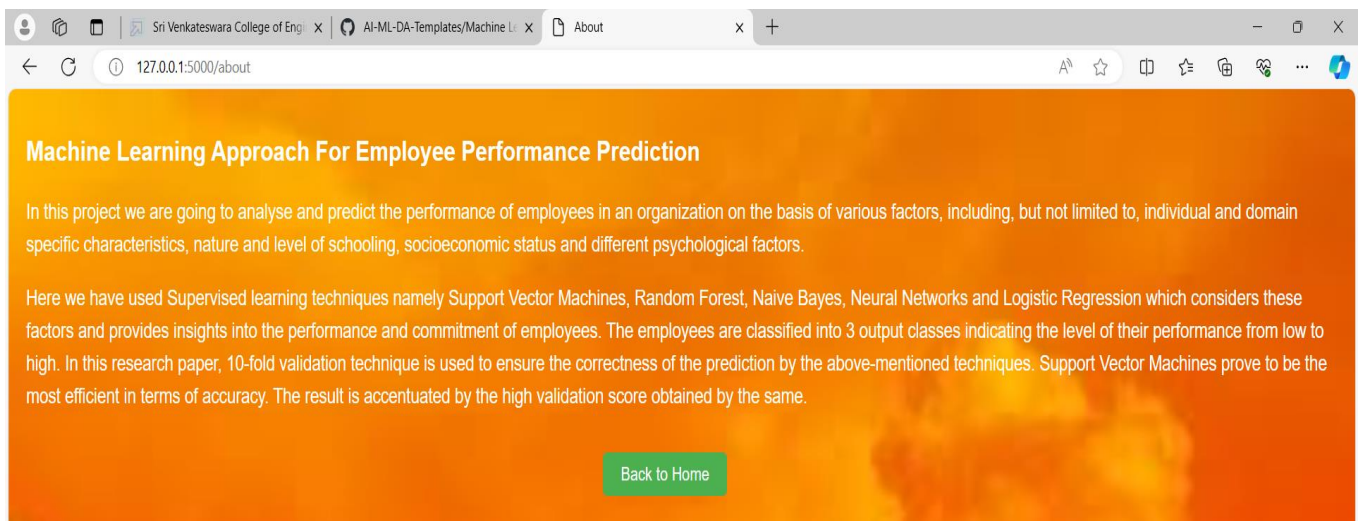
Home Page:



→When we click on the "Predict" button which is on the top right of my web page it will redirects to the another page where we can give inputs to our model.

→When we click on "About" button which is on the top right of my web page it will redirects to the another page where we find some details about my web page.

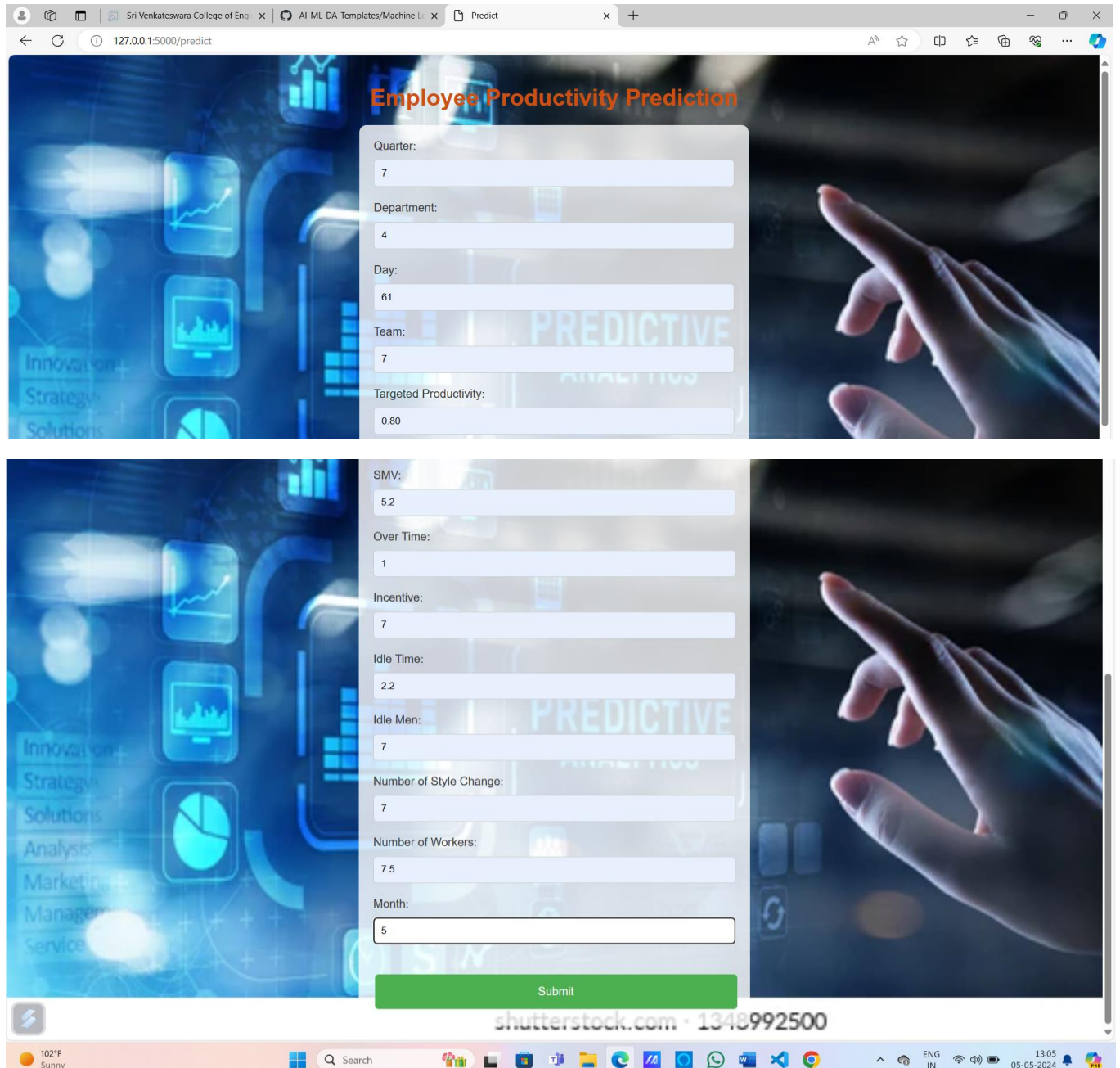
About page:



→When we click on “Back to Home” button which is on the bottom of the content of my web page it will redirects to the home page again.

→When we click on the “Predict” button which is on the top right of home page of my web page it will redirects to the another page where we can give inputs to our model.

Input 1:



Employee Productivity Prediction

Quarter:
7

Department:
4

Day:
61

Team:
7

Targeted Productivity:
0.80

SMV:
5.2

Over Time:
1

Incentive:
7

Idle Time:
2.2

Idle Men:
7

Number of Style Change:
7

Number of Workers:
7.5

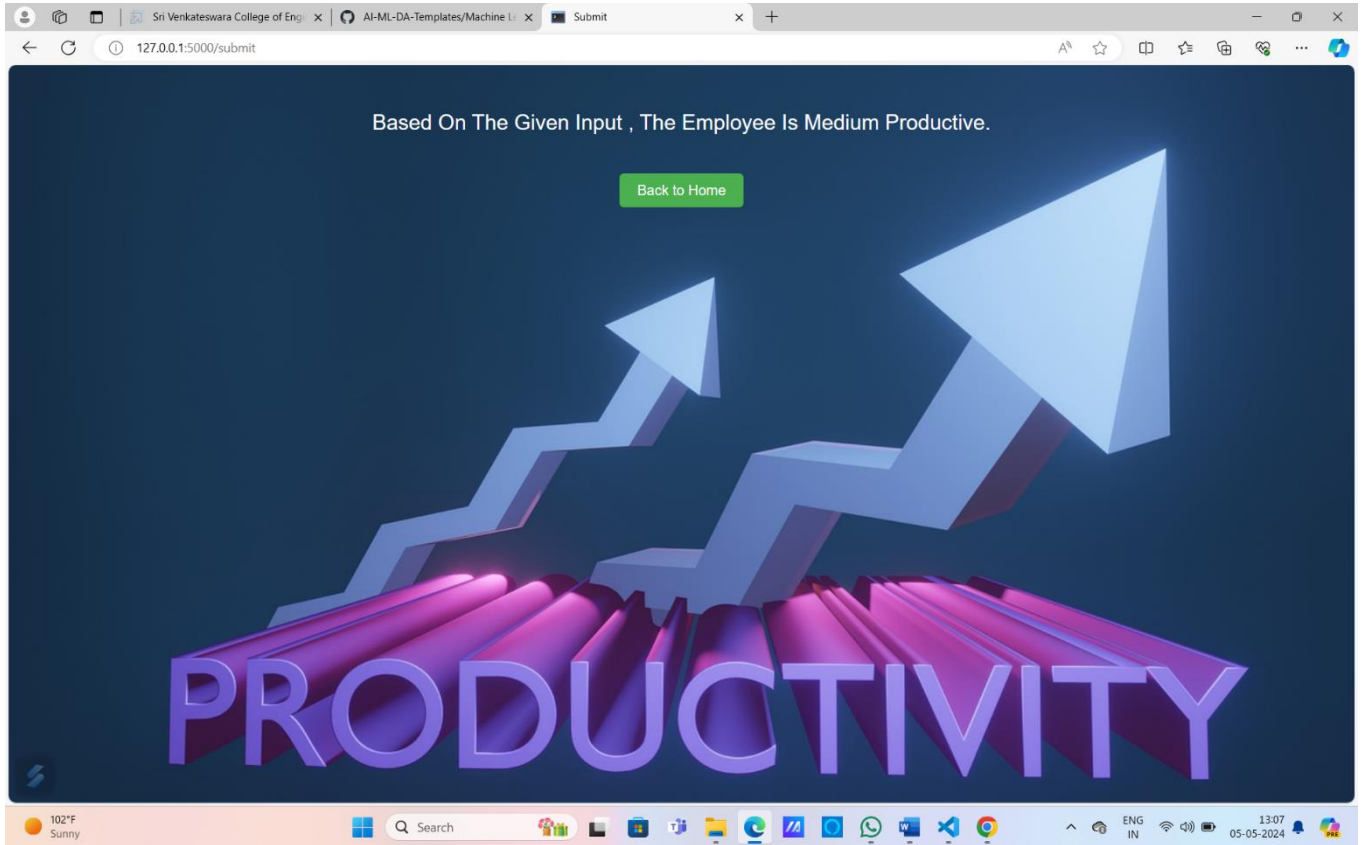
Month:
5

Submit

shutterstock.com · 1348992500

102°F Sunny Search 13:05 05-05-2024

Output 1:



Input 2:

Browser tabs: Sri Venkateswara College of Engi x AI-ML-DA-Templates/Machine L... x Predict x

Address bar: 127.0.0.1:5000/predict

Employee Productivity Prediction

Quarter: 5

Department: 7

Day: 61

Team: 12

Targeted Productivity: 0.80

SMV: 26.16

Over Time: 2626

Incentive: 50

Idle Time: 2.2

Idle Men: 7

Number of Style Change: 88

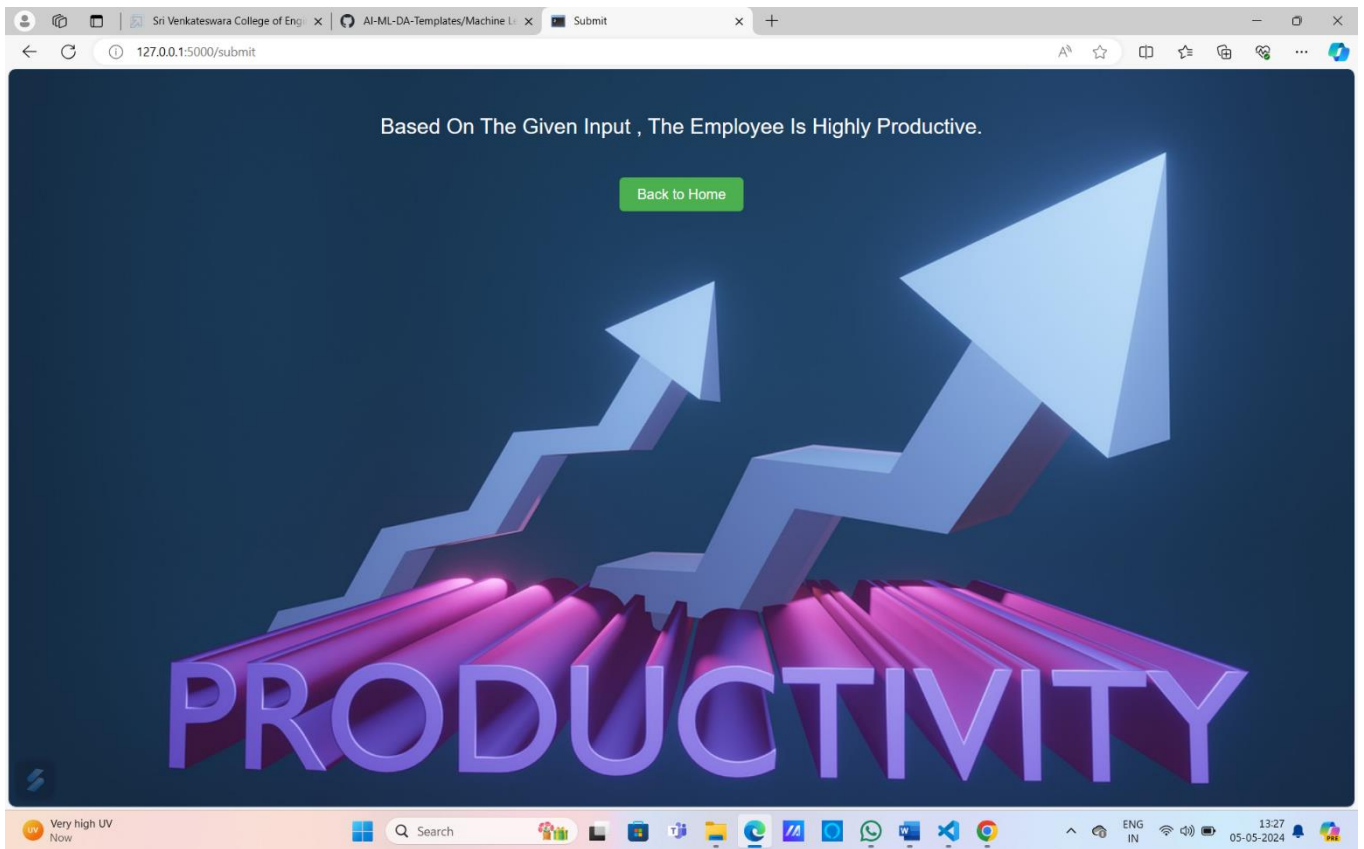
Number of Workers: 59.0

Month: 7

shutterstock.com · 1348992500

Windows Taskbar: 103°F Sunny Search ENG IN 13:25 05-05-2024

Output 2:



→When we click on “Back to Home” button which is on the bottom of the result of my web page it will redirects to the home page again.

7. ADVANTAGES & DISADVANTAGES

7.1 Advantages

1. Provides clarity
2. Enhances efficiency
3. Promotes job satisfaction
4. Increases motivation
5. Enables objective decision-making
6. Helps plan for training needs

7.2 Dis Advantages

1. The absence of goal setting and defined milestones
2. Using performance management solely as a measurement tool
3. Establishing trust

4. Untrained managers

5. It's an annual activity

8. CONCLUSION

This project analyse and predict the performance of employees in an organization on the basis of various factors, including, but not limited to, individual and domain specific characteristics, nature and level of schooling, socioeconomic status and different psychological factors. The performance is evaluated successfully.

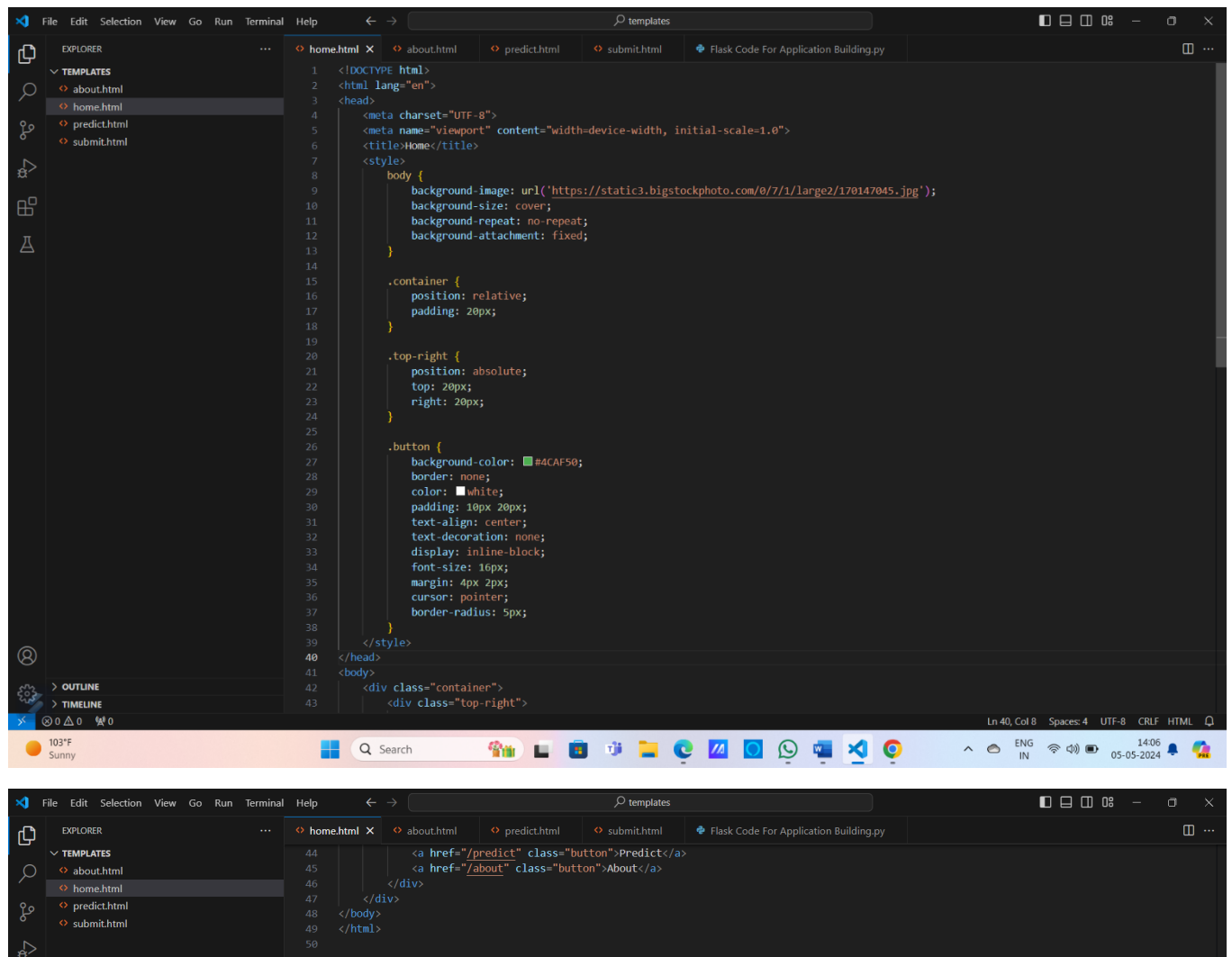
9. FUTURE SCOPE

Provide employees with a better understanding of their role and responsibilities. Increase confidence through recognizing strengths while identifying training needs to improve weaknesses.

10. APPENDIX

10.1 Source Code

home.html

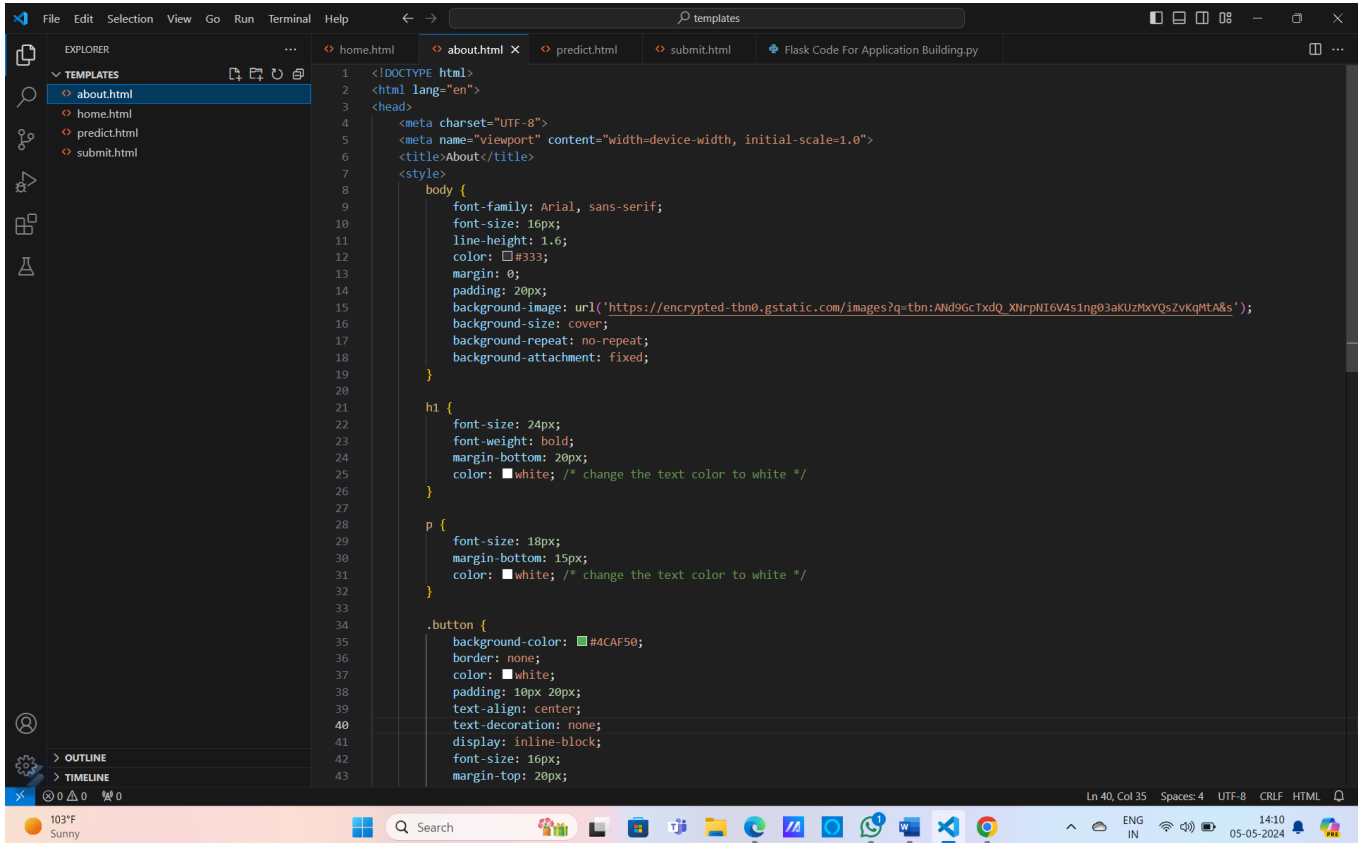


```

1  <!DOCTYPE html>
2  <html lang="en">
3  <head>
4    <meta charset="UTF-8">
5    <meta name="viewport" content="width=device-width, initial-scale=1.0">
6    <title>Home</title>
7    <style>
8      body {
9        background-image: url('https://static3.bigstockphoto.com/0/7/1/large2/170147045.jpg');
10       background-size: cover;
11       background-repeat: no-repeat;
12       background-attachment: fixed;
13     }
14
15     .container {
16       position: relative;
17       padding: 20px;
18     }
19
20     .top-right {
21       position: absolute;
22       top: 20px;
23       right: 20px;
24     }
25
26     .button {
27       background-color: #4CAF50;
28       border: none;
29       color: white;
30       padding: 10px 20px;
31       text-align: center;
32       text-decoration: none;
33       display: inline-block;
34       font-size: 16px;
35       margin: 4px 2px;
36       cursor: pointer;
37       border-radius: 5px;
38     }
39   </style>
40 </head>
41 <body>
42   <div class="container">
43     <div class="top-right">
44       <a href="/predict" class="button">Predict</a>
45       <a href="/about" class="button">About</a>
46     </div>
47   </body>
48 </html>

```

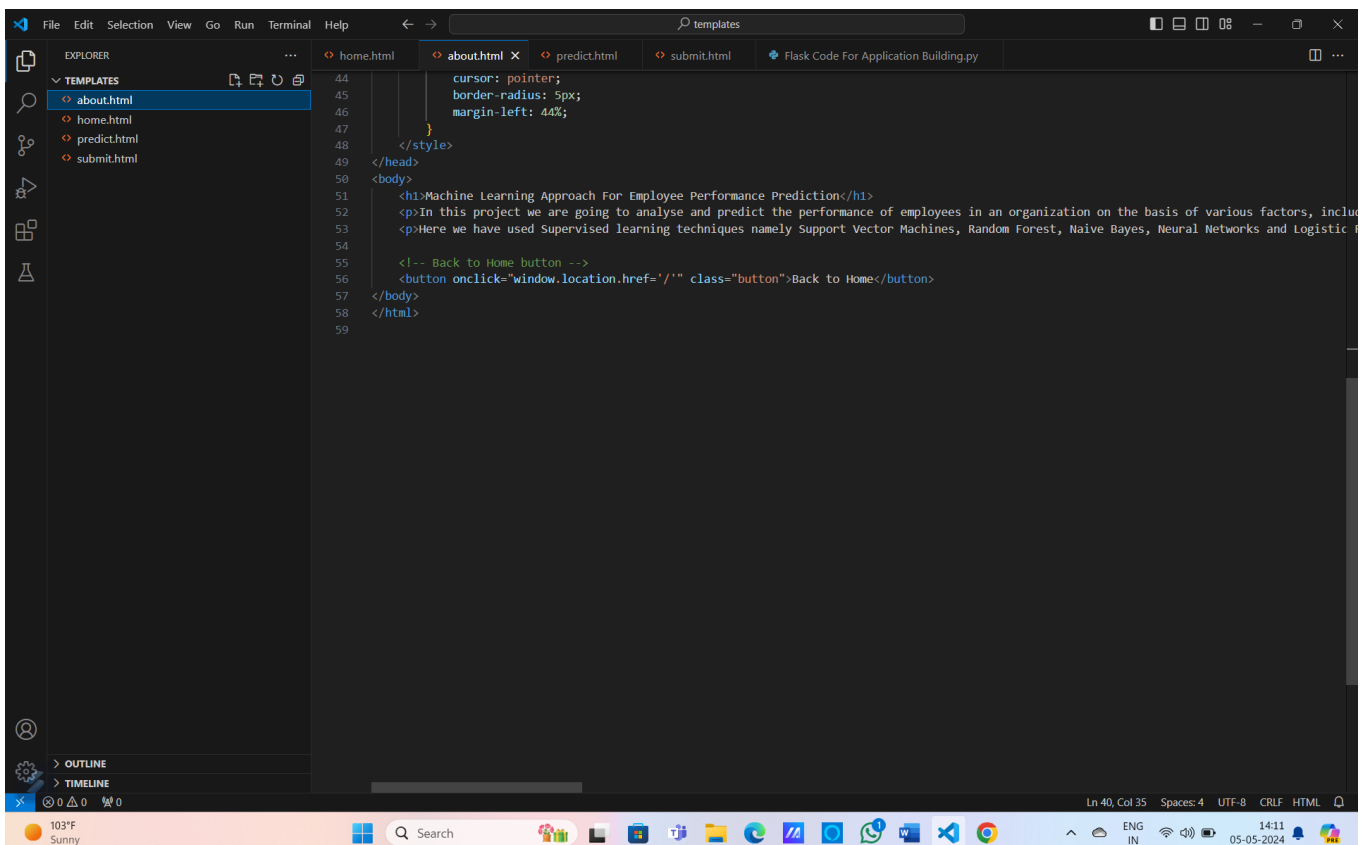
about.html



```

1  <!DOCTYPE html>
2  <html lang="en">
3  <head>
4      <meta charset="UTF-8">
5      <meta name="viewport" content="width=device-width, initial-scale=1.0">
6      <title>About</title>
7      <style>
8          body {
9              font-family: Arial, sans-serif;
10             font-size: 16px;
11             line-height: 1.6;
12             color: #333;
13             margin: 0;
14             padding: 20px;
15             background-image: url('https://encrypted-tbn0.gstatic.com/images?q=tbn:ANd9GcTxdQ_XNrpNI6V4s1ng03aKUZmXyQsZVKqMtA&s');
16             background-size: cover;
17             background-repeat: no-repeat;
18             background-attachment: fixed;
19         }
20
21         h1 {
22             font-size: 24px;
23             font-weight: bold;
24             margin-bottom: 20px;
25             color: white; /* change the text color to white */
26         }
27
28         p {
29             font-size: 18px;
30             margin-bottom: 15px;
31             color: white; /* change the text color to white */
32         }
33
34         .button {
35             background-color: #4CAF50;
36             border: none;
37             color: white;
38             padding: 10px 20px;
39             text-align: center;
40             text-decoration: none;
41             display: inline-block;
42             font-size: 16px;
43             margin-top: 20px;

```



```

44         cursor: pointer;
45         border-radius: 5px;
46         margin-left: 44%;
47     }
48 </style>
49 </head>
50 <body>
51     <h1>Machine Learning Approach For Employee Performance Prediction</h1>
52     <p>In this project we are going to analyse and predict the performance of employees in an organization on the basis of various factors, including their performance, experience, and skills. We will use Machine Learning techniques to build a model that can predict the performance of employees based on these factors.</p>
53     <p>Here we have used Supervised learning techniques namely Support Vector Machines, Random Forest, Naive Bayes, Neural Networks and Logistic Regression to build the model.</p>
54
55     <!-- Back to Home button -->
56     <button onclick="window.location.href='/'" class="button">Back to Home</button>
57 </body>
58 </html>
59

```

Predict.html

```

1  <!DOCTYPE html>
2  <html lang="en">
3  <head>
4    <meta charset="UTF-8">
5    <meta name="viewport" content="width=device-width, initial-scale=1.0">
6    <title>Predict</title>
7    <style>
8      body {
9        background-image: url('https://www.shutterstock.com/image-photo/predictive-analytics-big-data-analysis-260nw-1348992500.jpg');
10       background-size: cover;
11       background-repeat: no-repeat;
12       background-attachment: fixed;
13       font-family: Arial, sans-serif;
14       font-size: 16px;
15       color: #333;
16       margin: 0;
17       padding: 20px;
18     }
19     h1 {
20       text-align: center;
21       margin-bottom: 20px;
22     }
23     form {
24       max-width: 500px;
25       margin: 0 auto;
26       background: #255, 255, 255, 0.8;
27       padding: 20px;
28       border-radius: 10px;
29     }
30     label {
31       display: block;
32       margin-bottom: 10px;
33     }
34     input[type="text"] {
35       width: calc(100% - 22px);
36       padding: 10px;
37       margin-bottom: 20px;
38       border: 1px solid #ccc;
39       border-radius: 5px;
40     }
41     input[type="submit"] {
42       background-color: #4CAF50;
43       border: none;

```

```

44       color: #fff;
45       padding: 15px 20px;
46       text-align: center;
47       text-decoration: none;
48       display: inline-block;
49       font-size: 16px;
50       margin: 4px 2px;
51       cursor: pointer;
52       border-radius: 5px;
53       width: 100%;
54     }
55   </style>
56 </head>
57 <body>
58   <h1 style="color: #255, 80, 15;">Employee Productivity Prediction</h1>
59   <form action="/submit" method="post">
60     <label for="quarter">Quarter:</label>
61     <input type="text" id="quarter" name="quarter"><br>
62     <label for="department">Department:</label>
63     <input type="text" id="department" name="department"><br>
64     <label for="day">Day:</label>
65     <input type="text" id="day" name="day"><br>
66     <label for="team">Team:</label>
67     <input type="text" id="team" name="team"><br>
68     <label for="targeted_productivity">Targeted Productivity:</label>
69     <input type="text" id="targeted_productivity" name="targeted_productivity"><br>
70     <label for="smv">SMV:</label>
71     <input type="text" id="smv" name="smv"><br>
72     <label for="over_time">Over Time:</label>
73     <input type="text" id="over_time" name="over_time"><br>
74     <label for="incentive">Incentive:</label>
75     <input type="text" id="incentive" name="incentive"><br>
76     <label for="idle_time">Idle Time:</label>
77     <input type="text" id="idle_time" name="idle_time"><br>
78     <label for="idle_men">Idle Men:</label>
79     <input type="text" id="idle_men" name="idle_men"><br>
80     <label for="no_of_style_change">Number of Style Change:</label>
81     <input type="text" id="no_of_style_change" name="no_of_style_change"><br>
82     <label for="no_of_workers">Number of Workers:</label>
83     <input type="text" id="no_of_workers" name="no_of_workers"><br>
84     <label for="month">Month:</label>
85     <input type="text" id="month" name="month"><br>
86   </form>

```

```

87     <input type="submit" value="Submit">
88   </form>
89 </body>
90 </html>

```

A screenshot of a web development environment, likely Visual Studio Code, with a dark theme. The interface is divided into several panels. On the left is the 'EXPLORER' sidebar showing a file tree with 'TEMPLATES' expanded, containing 'about.html', 'home.html', 'predict.html', and 'submit.html'. The 'submit.html' file is selected. The main editor area displays the HTML code for 'submit.html'. The code includes a DOCTYPE declaration, a meta charset of 'UTF-8', a meta viewport content, a title 'Submit', and a style block. The style block defines a 'body' with a background image from a Pixabay URL, a 'container' with padding and text alignment, an 'h1' with a margin-top, a 'p' with font-size, and a 'button' with a specific background color (#4CAF50), border, color, padding, text alignment, text-decoration, display, font-size, margin-top, cursor, and border-radius. The bottom status bar shows 'Ln 52, Col 1', 'Spaces: 4', 'UTF-8', 'CRLF', 'HTML', and a temperature indicator '103°F Sunny'.

The screenshot shows a VS Code editor window with the following details:

- Menu Bar:** File, Edit, Selection, View, Go, Run, Terminal, Help.
- Explorer Sidebar:**
 - EXPLORER
 - TEMPLATES
 - about.html
 - home.html
 - predict.html
 - submit.html (selected)
 - OUTLINE
 - TIMELINE
- Editor Tabs:** home.html, about.html, predict.html, submit.html (active), Flask Code For Application Building.py.
- Editor Content (submit.html):**

```

44 </head>
45 <body>
46     <div class="container">
47         <p>Based On The Given Input , The Employee Is {{ productivity_level }}.</p>
48         <button onClick="window.location.href='/'">Back to Home</button>
49     </div>
50 </body>
51 </html>
52

```
- Status Bar:** Ln 52, Col 1 | Spaces: 4 | UTF-8 | CRLF | HTML.
- Taskbar:** Shows system clock (103°F Sunny), search bar, and various application icons.

Flask Code For Application Building.py

```
File Edit Selection View Go Run Terminal Help templates
home.html about.html predict.html submit.html Flask Code For Application Building.py X

1 # Import the necessary libraries
2 from flask import Flask, render_template, request
3 import joblib
4 import numpy as np
5
6 # Load the saved model
7 final_model = joblib.load("c:/Users/akash/OneDrive/Documents/SmartBridge_Extenship/garments_model_Final.pkl")
8
9 # Function to predict productivity level
10 def predict_productivity(data):
11     prediction = final_model.predict(data)
12     if prediction >= 0.7:
13         result = "Highly Productive"
14     elif prediction >= 0.5:
15         result = "Medium Productive"
16     else:
17         result = "Low Productive"
18     return result
19
20 # Initialize the Flask application
21 app = Flask(__name__)
22
23 # Define routes to render HTML pages
24 @app.route("/")
25 def home():
26     return render_template('home.html')
27
28 @app.route('/predict')
29 def predict():
30     return render_template('predict.html')
31
32 @app.route('/submit', methods=['POST'])
33 def pred():
34     if request.method == 'POST':
35         # Retrieve the values entered by the user
36         features = [float(x) for x in request.form.values()]
37         # Reshape the data to match the model's input shape
38         data = np.array(features).reshape(1, -1)
39         # Get productivity prediction using the predictive system
40         productivity_level = predict_productivity(data)
41         # Render the submit.html page with the predicted productivity level
42         return render_template('submit.html', productivity_level=productivity_level)
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