

# **Machine Learning Approach For Employee Performance Prediction With IBM**

# 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. LITERATURE SURVEY

## 2.1 Existing problem

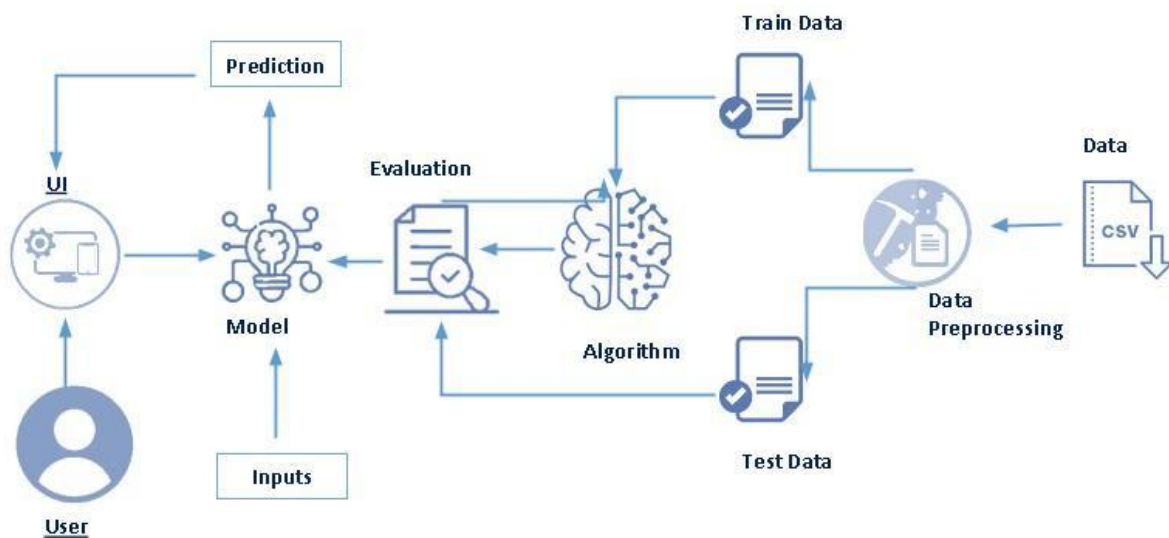
On previous system employee performance is calculated using paper works by evaluating the performance of the employee by hand.

## 2.2 Proposed solution

As an alternative to the existing problem this project is made to automate the performance of the employee.

# 3. THEORITICAL ANALYSIS

## 3.1 Block diagram



### **3.2 Hardware Minimum Requirement**

1. CPU : PENTIUM III Processor
2. Memory : 128 MB
3. Cache : 512KB
4. Floppy Disk : 1.44MB
5. Hard Disk :4.3GB
6. Display : 15” Monitor
7. Key Board :Standard 108 keys Enhanced Key Board
8. Mouse :MS Serial Mouse

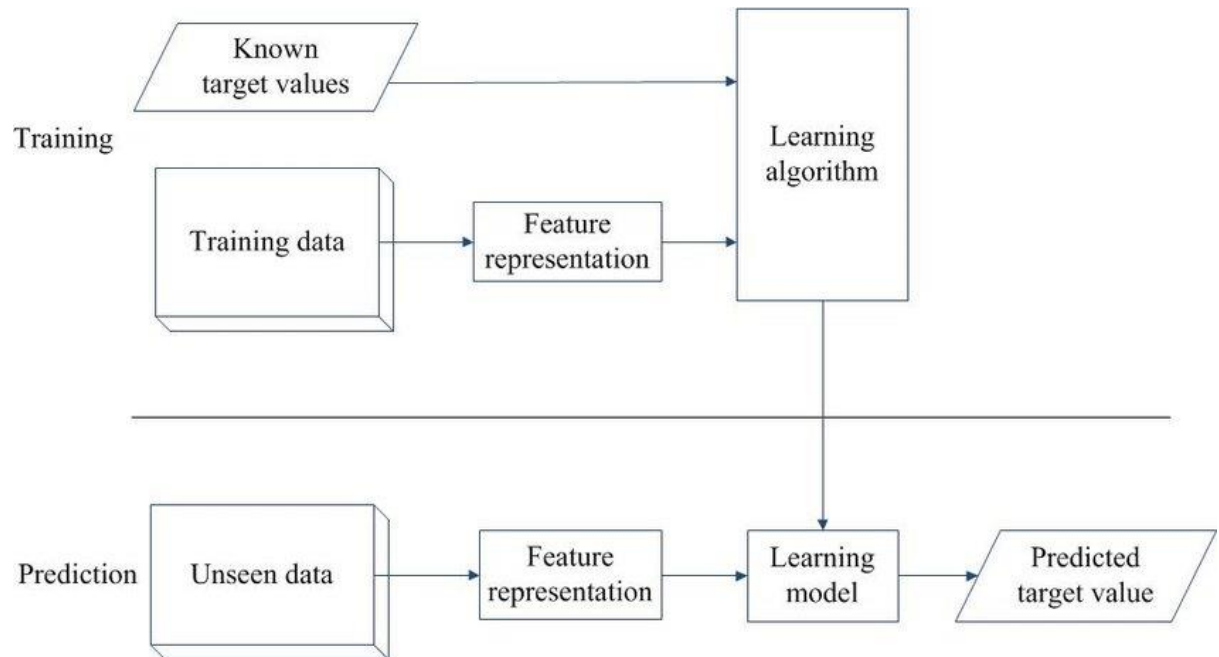
### **3.2 Software Minimum Requirement**

1. Operating System : Windows XP, 7, 8 or above
2. Front Tool : PHP
3. Back End Tool :HTML

## **4. EXPERIMENTAL INVESTIGATIONS**

Based on my analysis since the project is used with Supervised learning techniques namely Support Vector Machines, Random Forest, Naive Bayes, Neural Networks and Logistic Regression. The performance of the employee is analysed based on the number of days the employee works ,target productivity acquired, over time they worked, how many team members etc and the most accurate result is found out.

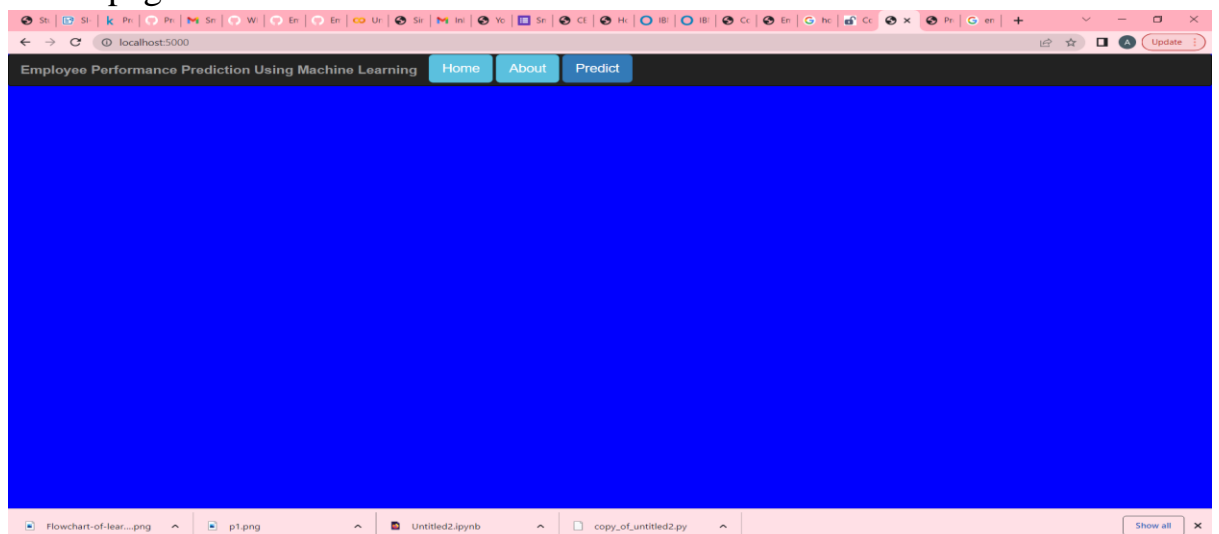
## 5. FLOWCHART



## 6. RESULT

### Output

#### Home page



# Input

Employee Performance Prediction Using Machine Learning

Home About Predict

quarter	7	department	4
day	61	team	5
targeted_productivity	0.80	smv	2.8
over_time	1	incentive	7
idle_time	2.2	idle_men	7
no_of_style_change	88	no_of_workers	7.5
month	5		

SUBMIT

Flowchart-of-lear...png p1.png Untitled2.ipynb copy\_of\_untitled2.py Show all

# Output

Employee Performance Prediction Using Machine Learning

Home About Predict

Based on the given input, The employee is medium productive.

Flowchart-of-lear...png p1.png Untitled2.ipynb copy\_of\_untitled2.py Show all

## **7. 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. DISADVANTAGES**

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. APPLICATIONS**

1. Attendance
2. Time management
3. Training
4. Initiative & innovation

## 9. 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.

## 10. FUTURE SCOPE

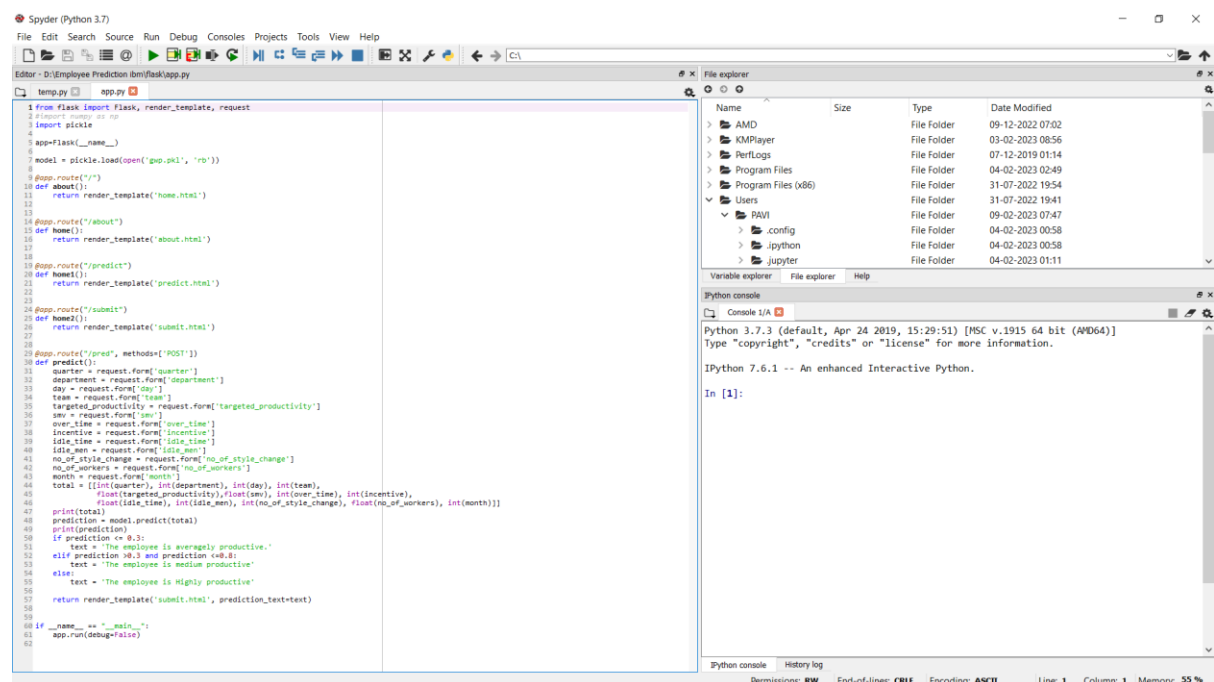
Provide employees with a better understanding of their role and responsibilities. Increase confidence through recognizing strengths while identifying training needs to improve weaknesses.

## 11. BIBILOGRAPHY

G. S. Thakur, A. Gupta, and S. Gupta, "Data Mining for Prediction of Human Performance Capability in the Software Industry," International Journal of Data Mining & Knowledge Management Process, vol. 5, no. 2, pp. 53--64, 2015.

## APPENDIX

### app.py

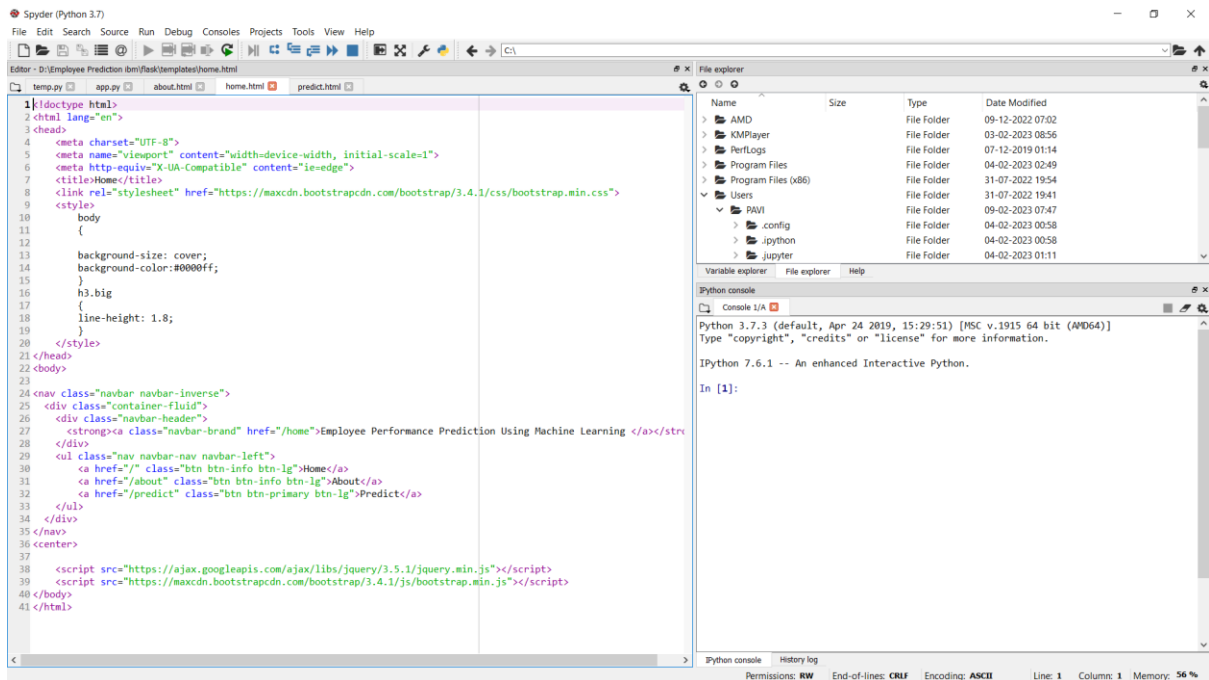


The screenshot displays the Spyder Python IDE interface. The main editor window shows the code for `app.py`, which is a Flask web application. The code includes imports for `Flask`, `render_template`, and `request`. It defines a `model` using `pickle.load` and sets up several routes: `about`, `home`, `predict`, `submit`, and `pred`. The `pred` route uses a `predict` function to calculate a performance score based on various input parameters like `quarter`, `department`, `day`, `team`, `targeted_productivity`, `over_time`, `incentive`, `idle_time`, `no_of_style_change`, `no_of_workers`, and `month`. The `submit` route renders a template with the prediction result. The `pred` route is a POST endpoint that calls the `predict` function and returns the result. The `main` function runs the application on `debug=True`.

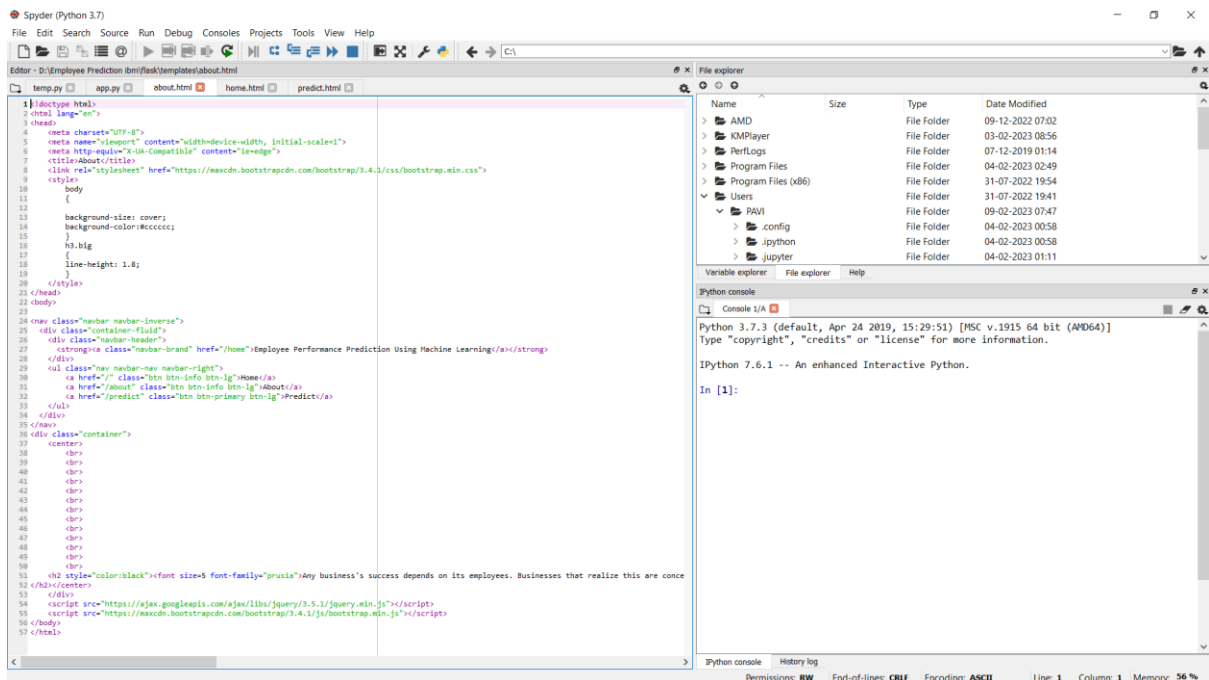
```
1 from flask import Flask, render_template, request
2 import pickle as np
3
4 app = Flask(__name__)
5
6 model = pickle.load(open('app.pkl', 'rb'))
7
8 @app.route("/")
9 def about():
10     return render_template("home.html")
11
12 @app.route("/about")
13 def home():
14     return render_template("about.html")
15
16 @app.route("/predict")
17 def predict():
18     return render_template("predict.html")
19
20 @app.route("/submit")
21 def submit():
22     return render_template("submit.html")
23
24 @app.route("/pred", methods=['POST'])
25 def pred():
26     quarter = request.form['quarter']
27     department = request.form['department']
28     day = request.form['day']
29     team = request.form['team']
30     targeted_productivity = request.form['targeted_productivity']
31     over_time = request.form['over_time']
32     incentive = request.form['incentive']
33     idle_time = request.form['idle_time']
34     no_of_style_change = request.form['no_of_style_change']
35     no_of_workers = request.form['no_of_workers']
36     month = request.form['month']
37     total = [(int(quarter), int(department), int(day), int(team),
38               float(targeted_productivity), float(over_time), int(incentive),
39               float(idle_time), int(no_of_style_change), float(no_of_workers), int(month))]
40     print(total)
41     prediction = model.predict(total)
42     print(prediction)
43     if prediction < 0.3:
44         text = 'The employee is averagely productive.'
45     elif prediction > 0.3 and prediction < 0.6:
46         text = 'The employee is medium productive'
47     else:
48         text = 'The employee is Highly productive'
49     return render_template("submit.html", prediction_text=text)
50
51 if __name__ == "__main__":
52     app.run(debug=True)
```

The right-hand side of the IDE shows the File explorer, Variable explorer, and Python console. The Python console displays the output of the application, including the version of Python (3.7.3) and the IPython version (7.6.1).

# home.html



about.html





# predict.html

```

Spyder (Python 3.7)
File Edit Search Source Run Debug Consoles Projects Tools View Help
temp.py app.py about.html home.html predict.html
44 <label for="f2">department</label>
45 <input class="form-control" id="f2" name="department" required="required" type="text">
46 </div>
47 </div>
48 <div class="form-group row">
49 <div class="col-xs-3">
50 <label for="f3">day</label>
51 <input class="form-control" id="f3" name="day" required="required" type="text">
52 </div>
53 <div class="col-xs-1">
54 </div>
55 <div class="col-xs-3">
56 <label for="f4">team</label>
57 <input class="form-control" id="f4" name="team" required="required" type="text">
58 </div>
59 </div>
60 <div class="form-group row">
61 <div class="col-xs-3">
62 <label for="f5">targeted productivity</label>
63 <input class="form-control" id="f5" name="targeted_productivity" required="required" type="text">
64 </div>
65 <div class="col-xs-1">
66 </div>
67 <div class="col-xs-3">
68 <label for="f6">smv</label>
69 <input class="form-control" id="f6" name="smv" required="required" type="text">
70 </div>
71 </div>
72 <div class="form-group row">
73 <div class="col-xs-3">
74 <label for="f7">over time</label>
75 <input class="form-control" id="f7" name="over_time" required="required" type="text">
76 </div>
77 <div class="col-xs-1">
78 </div>
79 <div class="col-xs-3">
80 <label for="f8">incentive</label>
81 <input class="form-control" id="f8" name="incentive" required="required" type="text">
82 </div>
83 </div>
84 <div class="form-group row">
85 <div class="col-xs-3">
86 <label for="f9">idle time</label>
87 <input class="form-control" id="f9" name="idle_time" required="required" type="text">
88 </div>
89 <div class="col-xs-1">
90 </div>
91 <div class="col-xs-3">
92 <label for="f10">idle men</label>
93 <input class="form-control" id="f10" name="idle_men" required="required" type="text">
94 </div>
95 </div>

```

```

Spyder (Python 3.7)
File Edit Search Source Run Debug Consoles Projects Tools View Help
temp.py app.py about.html home.html predict.html
1 <!DOCTYPE html>
2 <html lang="en">
3 <head>
4 <meta charset="UTF-8">
5 <title>Predict</title>
6 <link rel="stylesheet" href="https://maxcdn.bootstrapcdn.com/bootstrap/3.4.1/css/bootstrap.min.css">
7 <style>
8 body
9 {
10 background-size: cover;
11 background-color: #ffffff;
12 }
13 h3.big
14 {
15 line-height: 1.8;
16 }
17 </style>
18 </head>
19 <body>
20 <div class="navbar navbar-inverse">
21 <div class="container-fluid">
22 <div class="navbar-header">
23 <strong><a class="navbar-brand" href="/home">Employee Performance Prediction Using Machine Learning</a></strong>
24 </div>
25 <ul class="nav navbar-nav navbar-right">
26 <a href="/" class="btn btn-info btn-lg">Home</a>
27 <a href="/about" class="btn btn-info btn-lg">About</a>
28 <a href="/predict" class="btn btn-primary btn-lg">Predict</a>
29 </ul>
30 </div>
31 </div>
32 </div>
33 <div class="container">
34 <div>
35 <form action="/pred", method="post">
36 <div class="form-group row">
37 <div class="col-xs-3">
38 <label for="f1">quarter</label>
39 <input class="form-control" id="f1" name="quarter" required="required" type="text">
40 </div>
41 <div class="col-xs-1">
42 </div>
43 <div class="col-xs-3">
44 <label for="f2">department</label>
45 <input class="form-control" id="f2" name="department" required="required" type="text">
46 </div>
47 </div>
48 <div class="form-group row">
49 <div class="col-xs-3">

```

Spyder (Python 3.7)

File Edit Search Source Run Debug Consoles Projects Tools View Help

Editor: D:\Employee Prediction\bin\test\templates\predict.html

temp.py app.py about.html home.html predict.html

```
79 <div class="col-xs-3">
80 <label for="f8">incentive</label>
81 <input class="form-control" id="f8" name="incentive" required="required" type="text">
82 </div>
83 </div>
84 <div class="form-group row">
85 <div class="col-xs-3">
86 <label for="f9">idle_time</label>
87 <input class="form-control" id="f9" name="idle_time" required="required" type="text">
88 </div>
89 <div class="col-xs-1">
90 </div>
91 <div class="col-xs-3">
92 <label for="f10">idle_men</label>
93 <input class="form-control" id="f10" name="idle_men" required="required" type="text">
94 </div>
95 </div>
96 <div class="form-group row">
97 <div class="col-xs-3">
98 <label for="f11">no_of_style_change</label>
99 <input class="form-control" id="f11" name="no_of_style_change" required="required" type="text">
100 </div>
101 <div class="col-xs-1">
102 </div>
103 <div class="col-xs-3">
104 <label for="f12">no_of_workers</label>
105 <input class="form-control" id="f12" name="no_of_workers" required="required" type="text">
106 </div>
107 </div>
108 <div class="form-group row">
109 <div class="col-xs-3">
110 <label for="f13">month</label>
111 <input class="form-control" id="f13" name="month" required="required" type="text">
112 </div>
113 </div>
114 </div>
115 <div class="col-xs-2">
116 </div>
117 </div>
118 <button type="submit" class="btn btn-success btn-lg">SUBMIT</button>
119 </form>
120 <br>
121 </hd>
122 </div>
123
124
125 <script src="https://ajax.googleapis.com/ajax/libs/jquery/3.5.1/jquery.min.js"></script>
126 <script src="https://maxcdn.bootstrapcdn.com/bootstrap/3.4.1/js/bootstrap.min.js"></script>
127 </body>
128 </html>
```

File explorer

Name	Size	Type	Date Modified
AMD		File Folder	09-12-2022 07:02
AMDPlayer		File Folder	03-02-2023 08:56
Perflogs		File Folder	07-12-2019 01:14
Program Files		File Folder	04-02-2023 02:49
Program Files (x86)		File Folder	31-07-2022 19:54
Users		File Folder	31-07-2022 19:41
PAWI		File Folder	09-02-2022 07:47
config		File Folder	04-02-2023 00:58
.ipython		File Folder	04-02-2023 00:58
.jupyter		File Folder	04-02-2023 01:11

Variable explorer

File explorer

Help

Python console

Console 1/A

Python 3.7.3 (default, Apr 24 2019, 15:29:51) [MSC v.1915 64 bit (AMD64)]  
Type "copyright", "credits" or "license()" for more information.

IPython 7.6.1 -- An enhanced Interactive Python.

In [1]:

Permissions: RW End-of-lines: CRLF Encoding: ASCII Line: 1 Column: 1 Memory: 56 %