Model Deployment Using Flask

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Batch : 30

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Submitted to: DataGlacier Internship Program

In this project, child mortality rate is predicted based on several factors.

In [4]:
```
gm['Region'] = gm['Region'].map({'Europe & Central Asia':1,
                                 'Sub-Saharan Africa':2, 'America':3, 'East Asia & Pacific':4,
                                 'Middle East & North Africa':5, 'South Asia':6})
gm.head()
```

Out[4]:

	population	fertility	HIV	CO2	BMI_male	GDP	BMI_female	life	child_mortality	Region
0	34811059.0	2.73	0.1	3.328945	24.59620	12314.0	129.9049	75.3	29.5	5
1	19842251.0	6.43	2.0	1.474353	22.25083	7103.0	130.1247	58.3	192.0	2
2	40381860.0	2.24	0.5	4.785170	27.50170	14646.0	118.8915	75.5	15.4	3
3	2975029.0	1.40	0.1	1.804106	25.35542	7383.0	132.8108	72.5	20.0	1
4	21370348.0	1.96	0.1	18.016313	27.56373	41312.0	117.3755	81.5	5.2	4

In [5]:
```
gm.corr()
```

Out[5]:

	population	fertility	HIV	CO2	BMI_male	GDP	BMI_female	life	child_mortality	Region
population	1.000000	-0.061345	-0.065821	-0.010147	-0.134905	-0.045687	-0.135149	-0.005051	0.008058	0.270241
fertility	-0.061345	1.000000	0.292695	-0.439747	-0.715380	-0.502615	0.527314	-0.786921	0.901704	-0.012771
HIV	-0.065821	0.292695	1.000000	-0.165889	-0.308700	-0.208410	0.396680	-0.604749	0.394913	-0.113488
CO2	-0.010147	-0.439747	-0.165889	1.000000	0.581031	0.823099	-0.280813	0.476666	-0.458186	-0.041445
BMI_male	-0.134905	-0.715380	-0.308700	0.581031	1.000000	0.625126	-0.447049	0.731559	-0.749691	-0.221886
GDP	-0.045687	-0.502615	-0.208410	0.823099	0.625126	1.000000	-0.400740	0.628999	-0.543874	-0.143867
BMI_female	-0.135149	0.527314	0.396680	-0.280813	-0.447049	-0.400740	1.000000	-0.658718	0.582053	-0.299063
life	-0.005051	-0.786921	-0.604749	0.476666	0.731559	0.628999	-0.658718	1.000000	-0.874106	0.028280
child_mortality	0.008058	0.901704	0.394913	-0.458186	-0.749691	-0.543874	0.582053	-0.874106	1.000000	-0.014122
Region	0.270241	-0.012771	-0.113488	-0.041445	-0.221886	-0.143867	-0.299063	0.028280	-0.014122	1.000000

Linear Regression is applied to population, fertility, BMI male, GDP, BMI female and life expectancy to predict child mortality rate.

Spyder (Python 3.8)

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C:\Users\h\Flask_Deployment

C:\Users\h\Flask_Deployment\child_mortality.py

child_mortality.py | flask_mortality.py | index.html

```
# -*- coding: utf-8 -*-
"""
Created on Wed Aug 24 19:02:06 2022

@author: h
"""

from sklearn.linear_model import LinearRegression
import pickle
from sklearn.model_selection import train_test_split
import pandas as pd
import numpy as np
gm = pd.read_csv('gm_2008_region.csv')

gm.corr()
X = gm[['population','fertility','BMI_male','GDP','BMI_female','life']]
y = gm['child_mortality']
print(X.head())
X_train, X_test, y_train, y_test = train_test_split(X,y,test_size=0.3, random_state=101)
reg = LinearRegression()
reg.fit(X_train, y_train)
child_mort = float(np.round(reg.predict([[58372889, 2.0, 25, 8600, 125, 75]]), 2))
print("""\n\nChild mortality for a country with
      Population: 58372889
      Fertility: 2
      BMI Male: 25
      GDP: 8600
      BMI Female: 125
      Life Exp: 75 \nis {}""".format(child_mort))


pickle.dump(reg, open('model.pickle', 'wb'))
```

Source Console Object

Usage

Code to predict child mortality and prediction of a sample case

Variable explorer Help Plots Files

Console 1/A

```
      Fertility: 2
      BMI Male: 25
      GDP: 8600
      BMI Female: 125
      Life Exp: 75
is 17.99

In [23]: runcell(0, 'C:/Users/h/Flask_Deployment/child_mortality.py')
   population  fertility  BMI_male      GDP  BMI_female  life
0  34811059.0       2.73  24.59620  12314.0    129.9049  75.3
1  19842251.0       6.43  22.25083   7103.0    130.1247  58.3
2  40381860.0       2.24  27.50170  14646.0    118.8915  75.5
3   2975029.0       1.40  25.35542   7383.0    132.8108  72.5
4  21370348.0       1.96  27.56373  41312.0    117.3755  81.5


Child mortality for a country with
      Population: 58372889
      Fertility: 2
      BMI Male: 25
      GDP: 8600
      BMI Female: 125
      Life Exp: 75
is 17.99

In [24]:
```

IPython console History

LSP Python: ready | conda: base (Python 3.8.3) | new-branch [101] | Line 29, Col 22 | UTF-8 | CRLF | RW | Mem 89%

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Spyder (Python 3.8)

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C:\Users\h\Flask_Deployment

C:\Users\h\Flask_Deployment\flask_mortality.py

child_mortality.py | flask_mortality.py | index.html

```
# -*- coding: utf-8 -*-
"""
Created on Wed Aug 24 19:13:14 2022

@author: h
"""

from flask import Flask, render_template, request
import pickle
import numpy as np
import pandas as pd

app = Flask(__name__)
model = pickle.load(open('model.pickle', 'rb'))

@app.route('/')
def home():
    return render_template('index.html')

@app.route('/predict', methods=['POST'])
def predict():
    int_features = [int(x) for x in request.form.values()]
    final = [np.array(int_features)]
    prediction = model.predict(final)
    output = round(prediction[0], 2)
    return render_template('index.html',prediction_text='Child mortality rate is {}'.format(output))

if __name__ =='__main__':
    app.run(port=5000,debug=True)
```

Source Console Object

Usage

Here you can get help of any object by pressing **Ctrl+I** in front of it, either on the Editor or the Console.

Code for Flask Deployment

New to Spyder? Read our tutorial

Variable explorer Help Plots Files

Console 1/A

```
is 17.99

In [24]: gm.head(10)
Out[24]:
   population  fertility  ...  child_mortality                    Region
0  34811059.0       2.73  ...             29.5  Middle East & North Africa
1  19842251.0       6.43  ...            192.0          Sub-Saharan Africa
2  40381860.0       2.24  ...             15.4                     America
3   2975029.0       1.40  ...             20.0       Europe & Central Asia
4  21370348.0       1.96  ...              5.2        East Asia & Pacific
5   8331465.0       1.41  ...              4.6       Europe & Central Asia
6   8868713.0       1.99  ...             43.3       Europe & Central Asia
7    348587.0       1.89  ...             14.5                     America
8  148252473.0       2.38  ...             55.9                  South Asia
9    277315.0       1.83  ...             15.4                     America

[10 rows x 10 columns]

In [25]: runfile('C:/Users/h/Flask_Deployment/flask_mortality.py', wdir='C:/Users/h/Flask_Deployment')
 * Serving Flask app "flask_mortality" (lazy loading)
 * Environment: production
   WARNING: This is a development server. Do not use it in a production deployment.
   Use a production WSGI server instead.
 * Debug mode: on
 * Restarting with windowsapi reloader
```

IPython console History

LSP Python: ready | conda: base (Python 3.8.3) | new-branch [101] | Line 30, Col 1 | UTF-8 | CRLF | RW | Mem 88%

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Spyder (Python 3.8)

File Edit Search Source Run Debug Consoles Projects Tools View Help

C:\Users\h\Flask_Deployment\templates\index.html

child_mortality.py | flask_mortality.py | index.html

```
# -*- coding: utf-8 -*-
"""
Created on Thu Aug 25 12:37:49 2022

@author: h
"""

<!DOCTYPE html>
<html >
<head>
  <meta charset="UTF-8">
  <title>ML API</title>
  <link href='https://fonts.googleapis.com/css?family=Pacifico' rel='stylesheet' type='text/css'>
<link href='https://fonts.googleapis.com/css?family=Arimo' rel='stylesheet' type='text/css'>
<link href='https://fonts.googleapis.com/css?family=Hind:300' rel='stylesheet' type='text/css'>
<link href='https://fonts.googleapis.com/css?family=Open+Sans+Condensed:300' rel='stylesheet' type='text
<link rel="stylesheet" href="{{ url_for('static', filename='css/style.css') }}">

</head>

<body>
 <div class="login">
    <h1>Predict Child Mortality</h1>


    <!-- Main Input For Receiving Query to our ML -->
    <form action="{{ url_for('predict')}}"method="post">
        <input type="text" name="Population" placeholder="Population" required="required" />
        <input type="text" name="Fertility" placeholder="Fertility" required="required" />
        <input type="text" name="BMI male" placeholder="BMI Male" required="required" />
        <input type="text" name="GDP" placeholder="GDP" required="required" />
        <input type="text" name="BMI female" placeholder="BMI Female" required="required" />
        <input type="text" name="Life Expectancy" placeholder="Life Exp." required="required" />


        <button type="submit" class="btn btn-primary btn-block btn-large">Predict</button>
    </form>

   <br>
   <br>
   {{ prediction_text }}

 </div>
 <img src="/static/images/Original.svg" style="width: 400px;position: absolute;bottom: 10px;left: 10px;'

</body>
</html>
```

Source Console Object

Usage

Here you can get help of any object by pressing **Ctrl+I** in front of it, either on the Editor or the Console.

Help can also be shown automatically after writing a left parenthesis next to an object. You can activate this behavior in *Preferences > Help*.

Code for the HTML file

Variable explorer Help Plots Files

Console 1/A

```
is 17.99

In [24]: gm.head(10)
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   population  fertility  ...  child_mortality                      Region
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```

IPython console History

conda: base (Python 3.8.3) | new-branch [101] | Line 24, Col 2 | UTF-8 | CRLF | RW | Mem 89%

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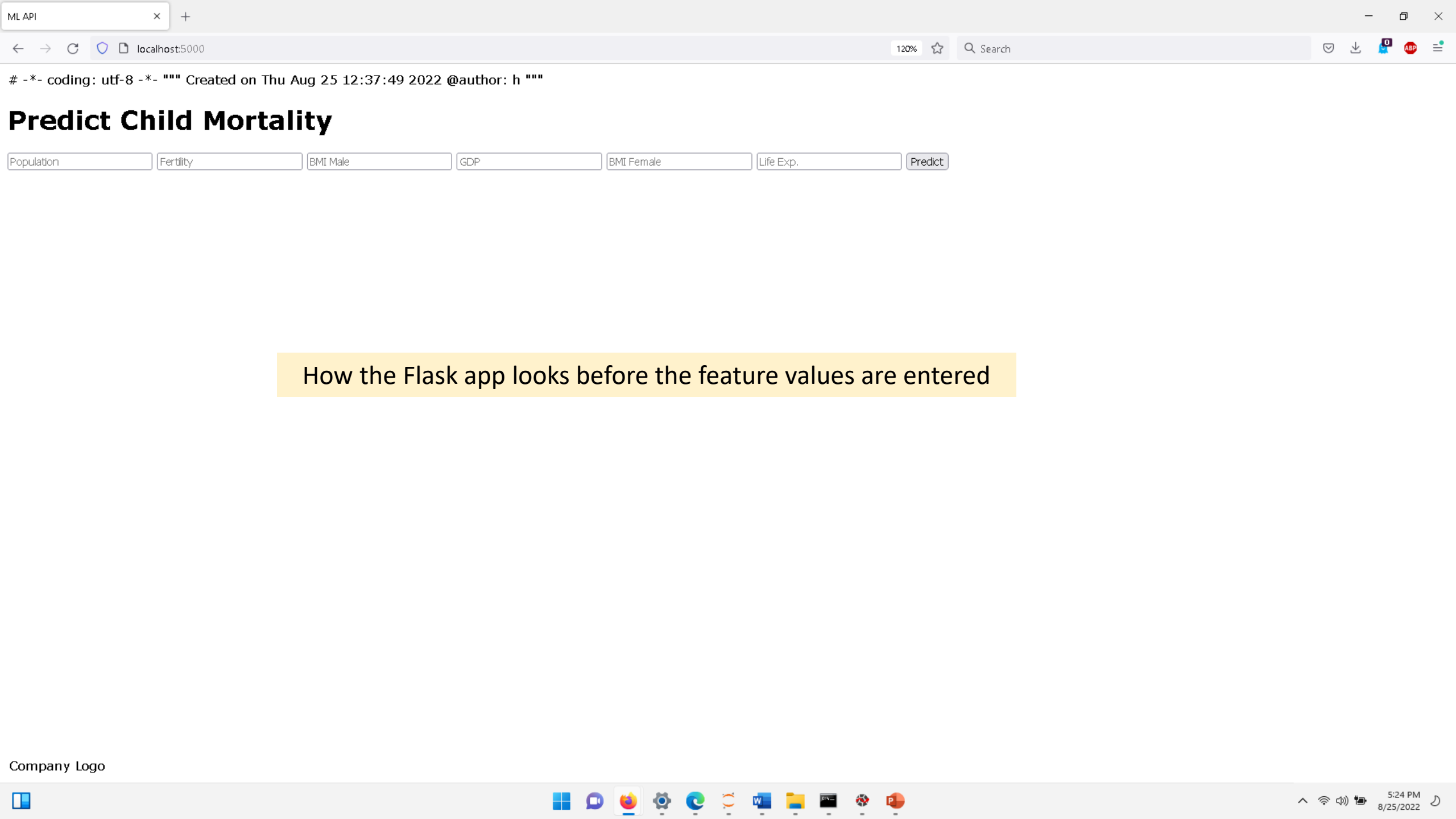
ML API
localhost:5000
120%
Search
-*- coding: utf-8 -*- """ Created on Thu Aug 25 12:37:49 2022 @author: h """
Predict Child Mortality
Population
Fertility
BMI Male
GDP
BMI Female
Life Exp.
Predict
How the Flask app looks before the feature values are entered
Company Logo
5:24 PM
8/25/2022

ML API

localhost:5000/predict

120%

Search

-*- coding: utf-8 -*- """ Created on Thu Aug 25 12:37:49 2022 @author: h """

Predict Child Mortality

58372889 | 2 | 25 | 8600 | 125 | 75 | Predict

Child mortality rate is 17.99

How the app looks after the feature values are entered

Company Logo

24 of 24 - Clipboard
Item not Collected: Delete items to increase available space

5:26 PM
8/25/2022

Thank You