Model Deployment on Flask

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The Dataset:

I used a dataset from kaggle.com, with the URL: Dataset

It gives us information regarding a person's brain weight given other features like gender, age and head size (in cm^3).

The Model:

Since this deliverable focussed more on the deployment of the model rather than the performance of the model, I have used a simple Linear Regression Model to predict the weight of the brain
given user-entered attributes.
Below is the code to train and serialize the model into a pickle file. Pickle was used as it is quite simple to use and understand.

model.py

```python
import pandas as pd
import numpy as np
from sklearn.linear_model import LinearRegression
from sklearn.model_selection import train_test_split
import pickle

data = pd.read_csv(r"C:\Users\Preeti\Desktop\Data Glacier Internship\Deployment on Flask\dataset.csv")
X = np.array(data.iloc[:,0:3])
y = np.array(data.iloc[:,3])
X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.3)

lm = LinearRegression()
lm.fit(X_train, y_train)

filename = 'model.pkl'
pickle.dump(lm, open(filename, 'wb'))
```

Model Deployment:

Once we have our model stored in the pickle file, we can now go on and deploy the model using Flask. In this step, we de-serialize the model back into a python object to send some unseen data into our model through our webpage and predict an output.

The python script for the deployment of our model is shown below.

app.py > predict

```python
from logging import debug
from flask import Flask, request, render_template, jsonify
import numpy as np
import pickle

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

@app.route('/', methods=['GET','POST'])
def index():
    # if request.method == 'GET':
    #     data = 'Hello World!'
    return render_template('index.html')
    # return jsonify({'data': data})

@app.route('/predict/', methods=['GET'])
def predict():
    gender = request.args.get('gender')
    age = int(request.args.get('age'))
    head_size = int(request.args.get('head_size'))

    temp_gender = gender
    temp_age = age

    if gender.strip().lower() == 'male':
        gender = 1
    else:
        gender = 2

    if age <= 18:
        age = 2
    else:
        age = 1

    test_in = np.array([gender,age,head_size]).reshape(1,-1)
    pred_weight = model.predict(test_in)
    output = round(pred_weight[0], 2)
    return render_template('result.html', gender="Gender: {}".format(temp_gender), age="Age: {}".format(temp_age),
     head_size="Head Size: {}".format(head_size), prediction_text="Brain Weight is {} grams".format(output))
    # return jsonify({'Brain Weight': output})

if __name__ == "__main__":
    app.run(debug=True)
```

Here, since our training data has classified ‘Male’ as 1 and ‘Female’ as 2, it isn’t intuitive that the user must enter these values. Instead, the webpage takes in the data as Male/Female and the script transforms it into the required form that our model needs to give an output. Similarly, for age, all ages > 18 are categorized as 1 while ages <= 18 are categorized as 2. A similar step was done to prepare the user-inputted data for our model.

HTML Webpage:

Now that our Flask app is ready, we needed an interface to interact with the user and get the data needed to perform predictions. For this, an HTML was used. Below is the HTML code written to generate the page.

Landing Page Source Code:

templates > index.html > html

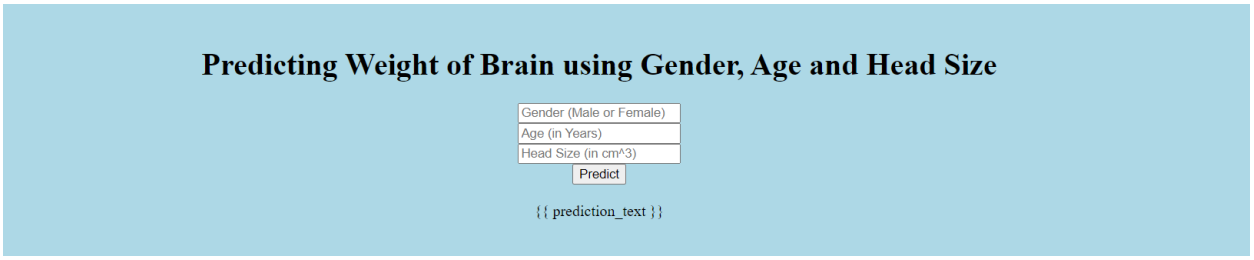
```
<html>
    <head>
        <meta charset="UTF-8">
        <title>
            Brain Weight Predictor
        </title>
        <style>
            .container{
                padding: 25px;
                background-color: lightblue;
                text-align: center;
            }
        </style>
    </head>
    <body>
        <center>
            <div class="container">
                <h1>
                    Predicting Weight of Brain using Gender, Age and Head Size
                </h1>
                <form action="{{url_for('predict')}}"method="get">
                    <input type="text" id="gender" name="gender" placeholder="Gender (Male or Female)" required="required" /><br>
                    <input type="text" id="age" name="age" placeholder="Age (in Years)" required="required" /><br>
                    <input type="text" id="head_size" name="head_size" placeholder="Head Size (in cm^3)" required="required" /><br>
                    <input type="submit" class="btn btn-primary btn-block btn-Large" value="Predict" />
                    <br>
                    <br>
                    {{ prediction_text }}
                </form>
            </div>
        </center>
    </body>
</html>
```

Result Page Source Code:

templates > result.html > html

```
<html>
    <head>
        <meta charset="UTF-8">
        <title>
            Brain Weight Predictor
        </title>
        <style>
            .container{
                padding: 25px;
                background-color: lightgreen;
                text-align: center;
            }
        </style>
    </head>
    <body>
        <center>
            <div class="container">
                <h1>
                    Prediction
                </h1>
                <form action="{{url_for('index')}}">
                    <br>
                    {{gender}}
                    <br>
                    {{age}}
                    <br>
                    {{head_size}}
                    <br>
                    <br>
                    <input type="submit" class="btn btn-primary btn-block btn-Large" value="Home" />
                    <br>
                    <br>
                    {{ prediction_text }}
                </form>
            </div>
        </center>
    </body>
</html>
```

Landing Page:



Output Page (with Sample Output):