Model Deployment on Flask

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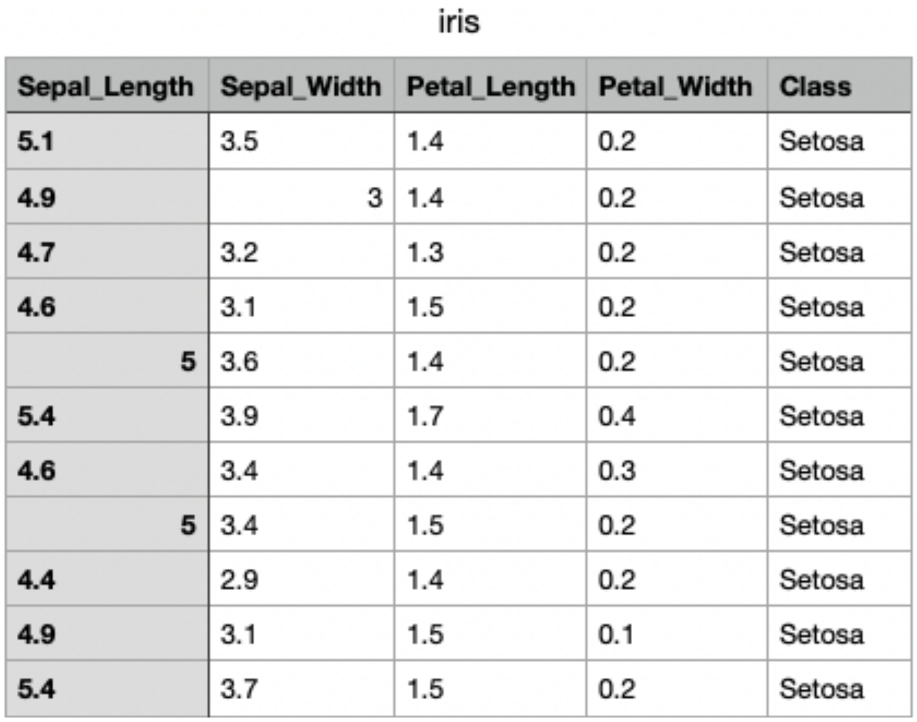
Methods

The description below contains the detailed approach, including a snapshot of each step of the deployment process.

1. Select data

The Iris data was chosen for this implementation due to this particular dataset's simplicity and low resource cost. The Iris flower data set, often known as Fisher's Iris data set, is a multivariate data set first published in 1936 by British statistician, eugenicist, and biologist Ronald Fisher as an example of linear discriminant analysis in his paper The use of numerous measurements in taxonomic issues. Sepal length, sepal width, petal length, and petal width are the four independent aspects of sizes. The output is the flower's class.



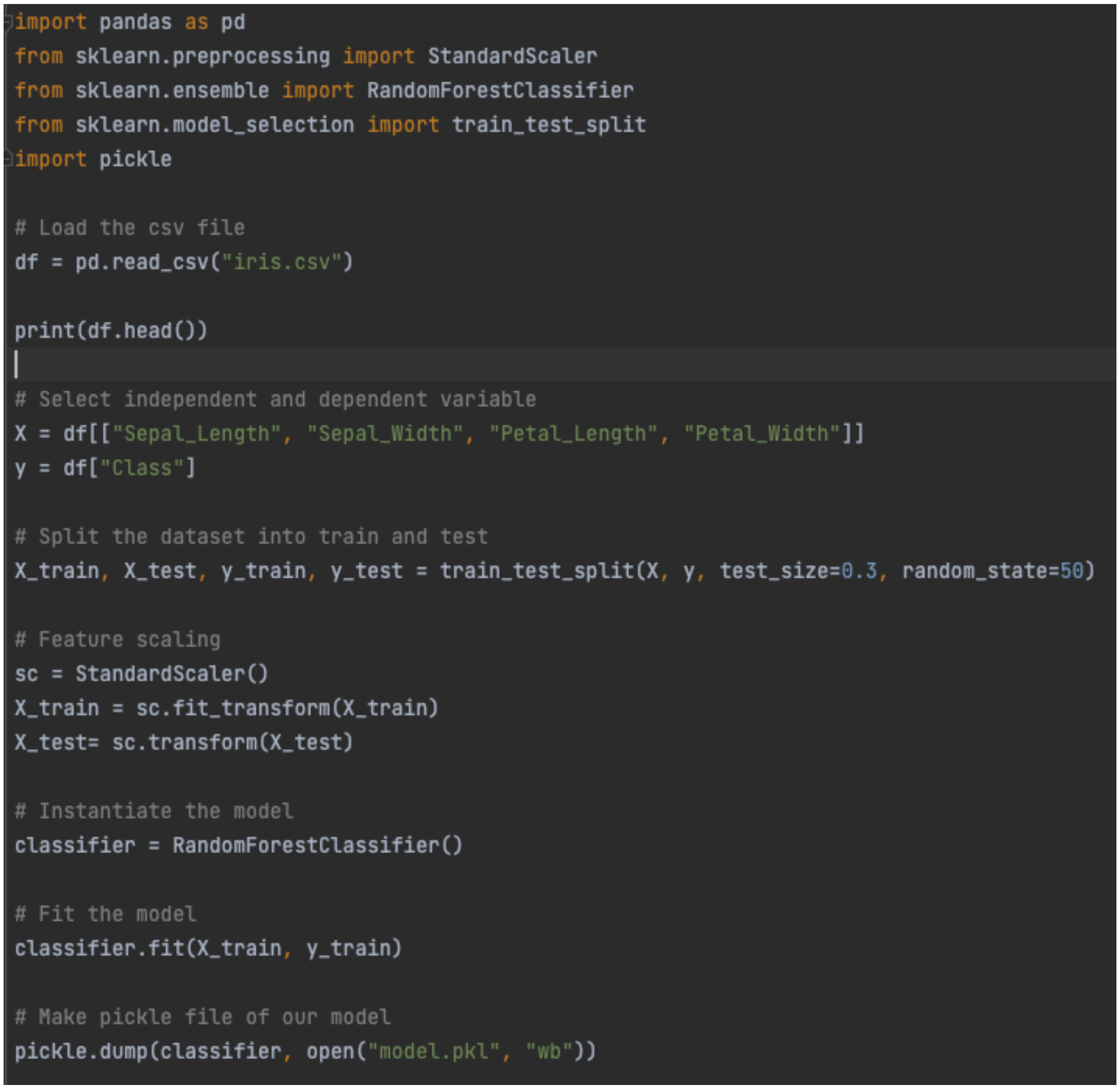
iris

Sepal_Length	Sepal_Width	Petal_Length	Petal_Width	Class
5.1	3.5	1.4	0.2	Setosa
4.9	3	1.4	0.2	Setosa
4.7	3.2	1.3	0.2	Setosa
4.6	3.1	1.5	0.2	Setosa
5	3.6	1.4	0.2	Setosa
5.4	3.9	1.7	0.4	Setosa
4.6	3.4	1.4	0.3	Setosa
5	3.4	1.5	0.2	Setosa
4.4	2.9	1.4	0.2	Setosa
4.9	3.1	1.5	0.1	Setosa
5.4	3.7	1.5	0.2	Setosa

Figure 1: Iris dataset features

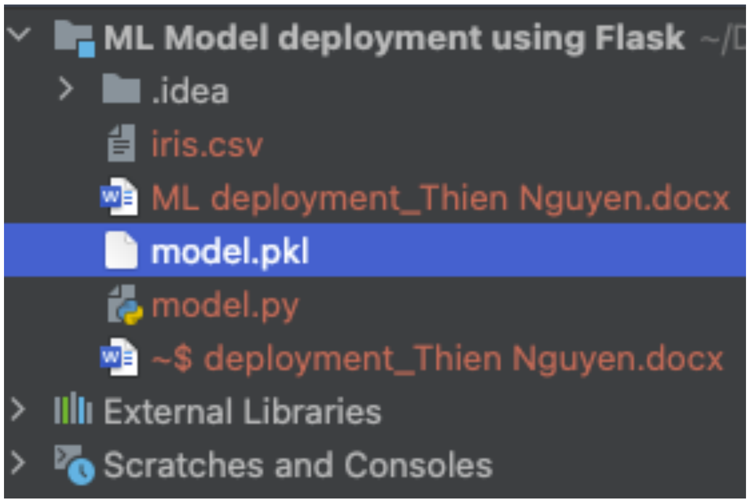
2. Save the model

The model was coded using IntelliJ IDE. It read the input file and the Iris dataset, performed the feature engineering with the Standard Scaler library, and then applied the Random Forest model with the split train and test data. After running the python code, a package file was created and ready to be deployed.



```python
import pandas as pd
from sklearn.preprocessing import StandardScaler
from sklearn.ensemble import RandomForestClassifier
from sklearn.model_selection import train_test_split
import pickle

# Load the csv file
df = pd.read_csv("iris.csv")

print(df.head())

# Select independent and dependent variable
X = df[["Sepal_Length", "Sepal_Width", "Petal_Length", "Petal_Width"]]
y = df["Class"]

# Split the dataset into train and test
X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.3, random_state=50)

# Feature scaling
sc = StandardScaler()
X_train = sc.fit_transform(X_train)
X_test= sc.transform(X_test)

# Instantiate the model
classifier = RandomForestClassifier()

# Fit the model
classifier.fit(X_train, y_train)

# Make pickle file of our model
pickle.dump(classifier, open("model.pkl", "wb"))
```

Figure 2: Model creation using IntelliJ IDE

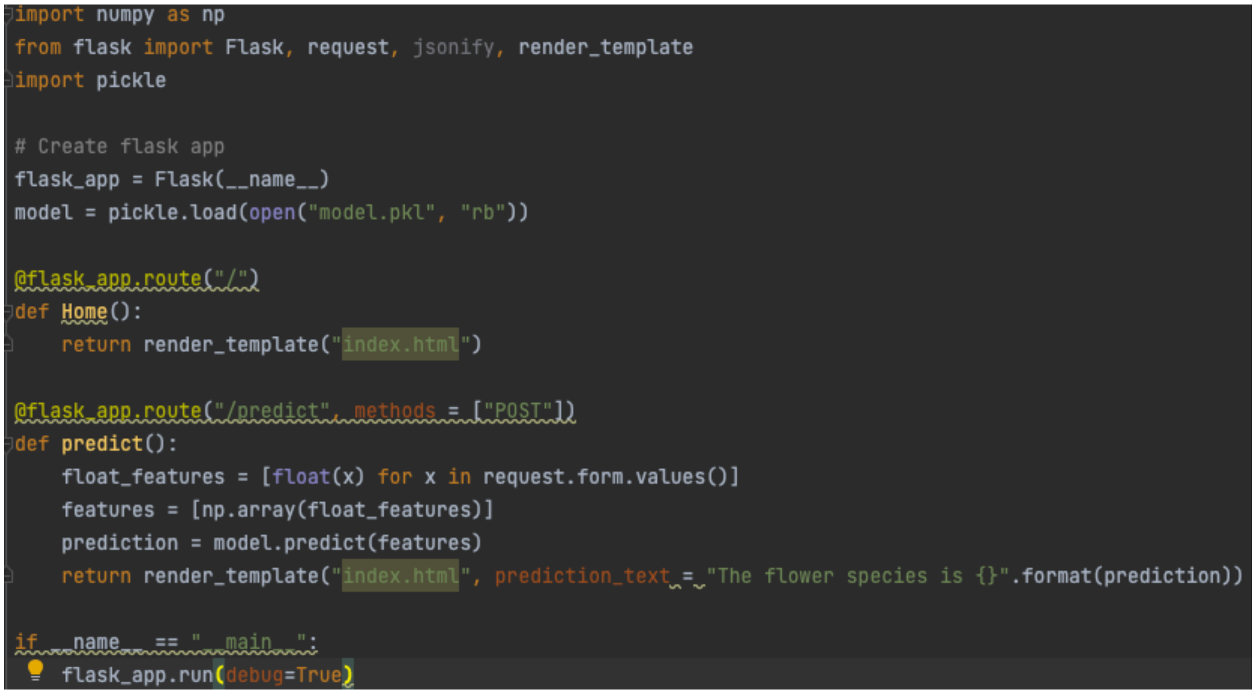


ML Model deployment using Flask ~/D
.idea
iris.csv
ML deployment_Thien Nguyen.docx
model.pkl
model.py
~$ deployment_Thien Nguyen.docx
External Libraries
Scratches and Consoles

Figure 3: A package file was created

3. Prepare Flask application

The app.py contains the Flask code to build the application. Flask framework and code were included in the flask library. The homepage, route settings, and prediction are specified in each function.

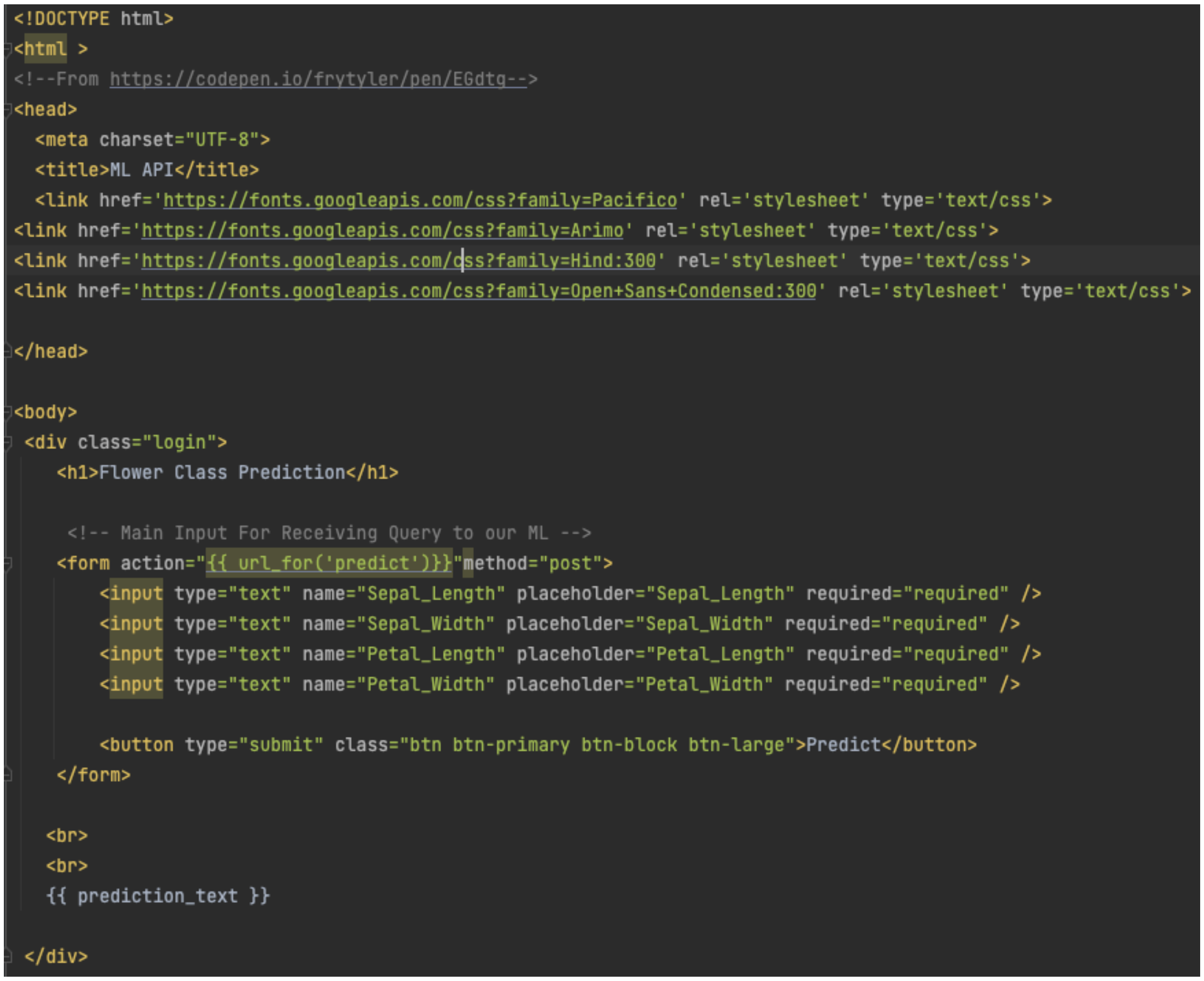


```python
import numpy as np
from flask import Flask, request, jsonify, render_template
import pickle

# Create flask app
flask_app = Flask(__name__)
model = pickle.load(open("model.pkl", "rb"))

@flask_app.route("/")
def Home():
    return render_template("index.html")

@flask_app.route("/predict", methods = ["POST"])
def predict():
    float_features = [float(x) for x in request.form.values()]
    features = [np.array(float_features)]
    prediction = model.predict(features)
    return render_template("index.html", prediction_text = "The flower species is {}".format(prediction))

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

Figure 4: Flask application deployment

4. Webpage setup

The front end of the homepage website was designed in the index.html file.

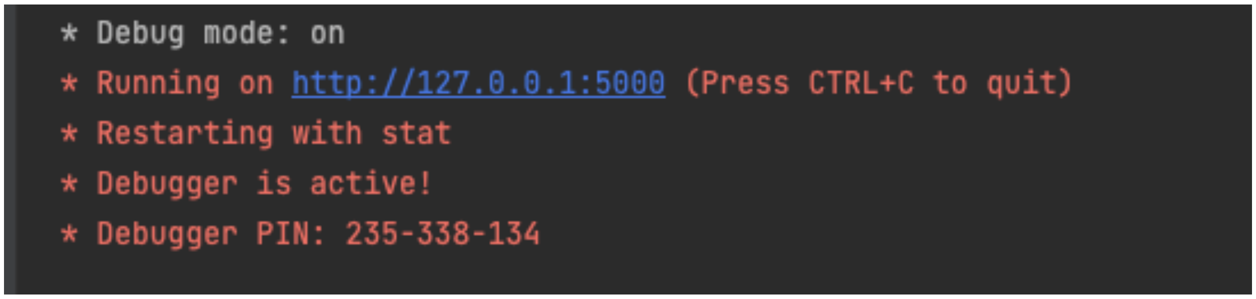


```
<!DOCTYPE html>
<html >
<!--From https://codepen.io/frytyler/pen/EGdtg-->
<head>
  <meta charset="UTF-8">
  <title>ML API</title>
  <link href='https://fonts.googleapis.com/css?family=Pacifico' rel='stylesheet' type='text/css'>
<link href='https://fonts.googleapis.com/css?family=Arimo' rel='stylesheet' 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/css'>

</head>

<body>
 <div class="login">
    <h1>Flower Class Prediction</h1>

     <!-- Main Input For Receiving Query to our ML -->
    <form action="{{ url_for('predict')}}"method="post">
        <input type="text" name="Sepal_Length" placeholder="Sepal_Length" required="required" />
        <input type="text" name="Sepal_Width" placeholder="Sepal_Width" required="required" />
        <input type="text" name="Petal_Length" placeholder="Petal_Length" required="required" />
        <input type="text" name="Petal_Width" placeholder="Petal_Width" required="required" />

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

   <br>
   <br>
   {{ prediction_text }}

 </div>
```

Figure 5: Homepage in HTML code

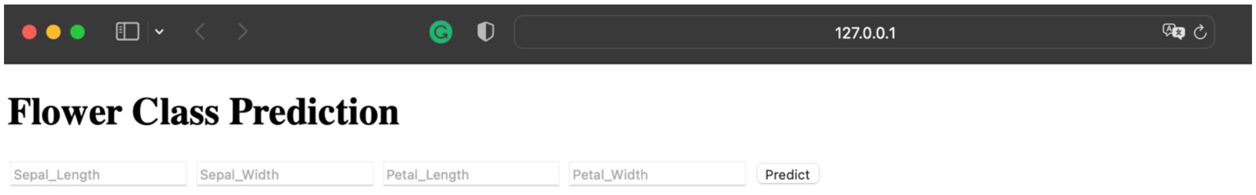
5. Deployment on web

In the final step, the app.py needed to run, and a link containing an HTML site appeared in the run tab.



```
 * Debug mode: on
 * Running on http://127.0.0.1:5000 (Press CTRL+C to quit)
 * Restarting with stat
 * Debugger is active!
 * Debugger PIN: 235-338-134
```

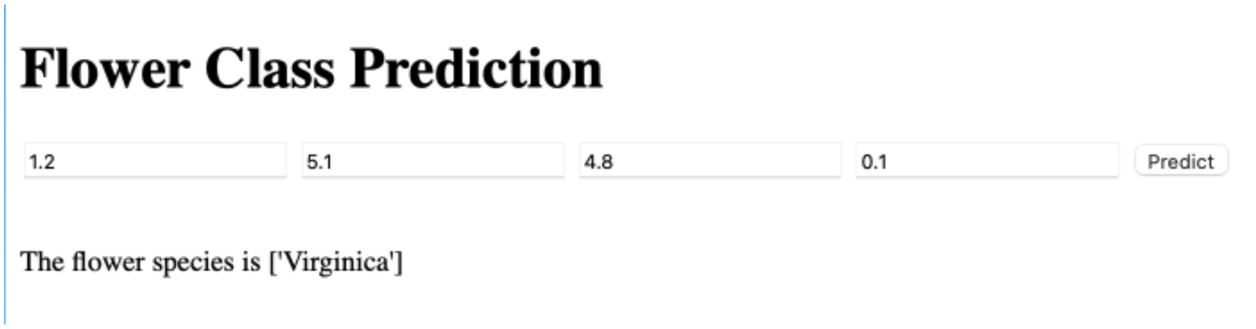
Figure 6: Link contains the Flask webpage



127.0.0.1

Flower Class Prediction

Figure 7: After clicking on the link, the website will appear



Flower Class Prediction

1.2	5.1	4.8	0.1	Predict

The flower species is ['Virginica']

Figure 8: Fill in the information, click predict, and the system will show the result