Deployment using Flask onto Heroku

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Selecting Toy Data

7.1.2. Iris plants dataset

Data Set Characteristics:

Number of Instances:	150 (50 in each of three classes)
Number of Attributes:	4 numeric, predictive attributes and the class

Attribute Information:	• sepal length in cm
	• sepal width in cm
	• petal length in cm
	• petal width in cm
	• **class:**
	  ◦ Iris-Setosa
	  ◦ Iris-Versicolour
	  ◦ Iris-Virginica

The toy data I'm going to use is dataset of Iris plants from scikit-learn. The dataset have 150 instances and 4 attributes (sepal length, sepal width, petal length, and petal width).

	sepal length (cm)	sepal width (cm)	petal length (cm)	petal width (cm)
0	5.1	3.5	1.4	0.2
1	4.9	3.0	1.4	0.2
2	4.7	3.2	1.3	0.2
3	4.6	3.1	1.5	0.2
4	5.0	3.6	1.4	0.2
...	...	...	...	...
145	6.7	3.0	5.2	2.3
146	6.3	2.5	5.0	1.9
147	6.5	3.0	5.2	2.0
148	6.2	3.4	5.4	2.3
149	5.9	3.0	5.1	1.8

Model Development

Im going to create a model that uses sepal length, sepal width and petal width to predict the petal length.

First I'm using Jupyter notebook to create the model

In [4]:
```
# sepal length, sepal width and petal width
X = df.iloc[:, [0,1,3]]
# petal length
Y = df.iloc[:, [2]]
# spliting the data
xtrain, xtest, ytrain, ytest = train_test_split(X, Y, test_size = 0.2, random_state = 0)
```

In [5]:
```
# building model
regressor = LinearRegression()
regressor.fit(xtrain, ytrain)
```

Out[5]:
```
LinearRegression()
```

In [6]:
```
print('The intercept is {} and the coef are {}'.format(regressor.intercept_, regressor.coef_))
```

```
The intercept is [-0.26533136] and the coef are [[ 0.7005897  -0.61042077  1.48167646]]
```

In [7]:
```
ypred = regressor.predict(xtest).tolist()
ypred_ = [val for sublist in ypred for val in sublist]


ytest['predicted'] = ypred_
ytest
```

Out[10]:

	petal length (cm)	predicted
114	5.1	5.644934
62	4.0	4.076958
33	1.4	1.320480
107	6.3	5.745771
7	1.5	1.458522
100	6.0	5.838186
40	1.3	1.545647
86	4.7	4.758830
76	4.8	4.863848
71	4.0	4.225267
134	5.6	4.495519
51	4.5	4.487611
73	4.7	4.077099
54	4.6	4.801838
63	4.7	4.312393
37	1.4	1.118211
78	4.5	4.390501
90	4.4	3.778830
45	1.4	1.710740
16	1.3	1.729883
121	4.9	4.912146
66	4.5	4.049223
24	1.9	1.318404
8	1.4	1.343378
126	4.8	5.036164
22	1.0	1.056202
44	1.9	1.580748
97	4.3	4.234284
93	3.3	3.315326
26	1.6	1.754857

I see the predicted petal length is pretty similar to the actual petal length, so I know the model is correct.

Then I'm going to pack the model with pickle

```
In [17]: # pack the model with pickle
         with open('model.pkl', 'wb') as files:
             pickle.dump(regressor, files)
```

Now there is a file with the model call model.pkl

.ipynb_checkpoints	2022-07-26 3:55 PM	File folder	
linear_reggression_model_of_petal_lengt...	2022-07-28 3:50 PM	Jupyter Source File	15 KB
model.pkl	2022-07-28 3:50 PM	PKL File	1 KB

Deployment on Flask

I'm using pycharm to code flask.

First I need to build a website with html. It's just a very simple website with 3 text box and a submit button.

```
<!DOCTYPE html>
<html lang="en">
<head>
    <title>Web form</title>
</head>
<body>
    <form action="{{ url_for('predict') }}" method="POST">
        <p>Please enter your iris information below.</p>
        <TABLE BORDER="0">
            <TR>
                <TD>Sepal Length (cm) </TD>
                <TD>:<input type="text" placeholder="5.1" name="sl" required></TD>
            </TR>
            <TR>
                <TD>Sepal Width (cm) </TD>
                <TD>:<input type="text" placeholder="3.5" name="sw" required></TD>
            </TR>
            <TR>
                <TD>Petal Width (cm) </TD>
                <TD>:<input type="text" placeholder="0.2" name="pw" required></TD>
            </TR>
        </TABLE>
        <button type="submit">Submit</button>
    </form>
    <br>
    {{ prediction_text }}
</body>
</html>
```

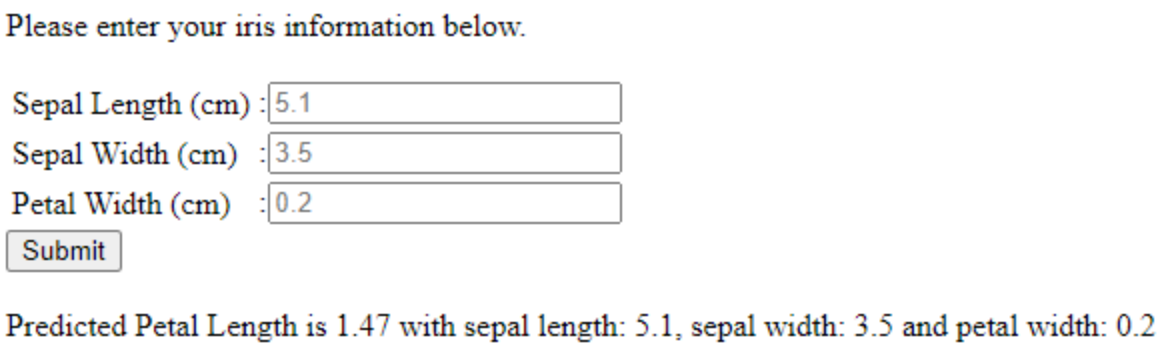
Please enter your iris information below.

Sepal Length (cm) : 5.1
Sepal Width (cm) : 3.5
Petal Width (cm) : 0.2
Submit

Now its time for flask.

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

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


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


@app.route('/predict', methods=['POST'])
def predict():
    sepal_length = request.form['sl']
    sepal_width = request.form['sw']
    petal_width = request.form['pw']

    prediction = model.predict(np.asarray([sepal_length, sepal_width, petal_width], dtype=float).reshape(-1,3))

    output = np.round(prediction[0, 0], 2)

    return render_template('index.html', prediction_text='Predicted Petal Length is {} with sepal length: {}, sepal'
                                                          ' width: {} and petal width: {}'.format(output,
                                                                                                  sepal_length,
                                                                                                  sepal_width,
                                                                                                  petal_width))
```

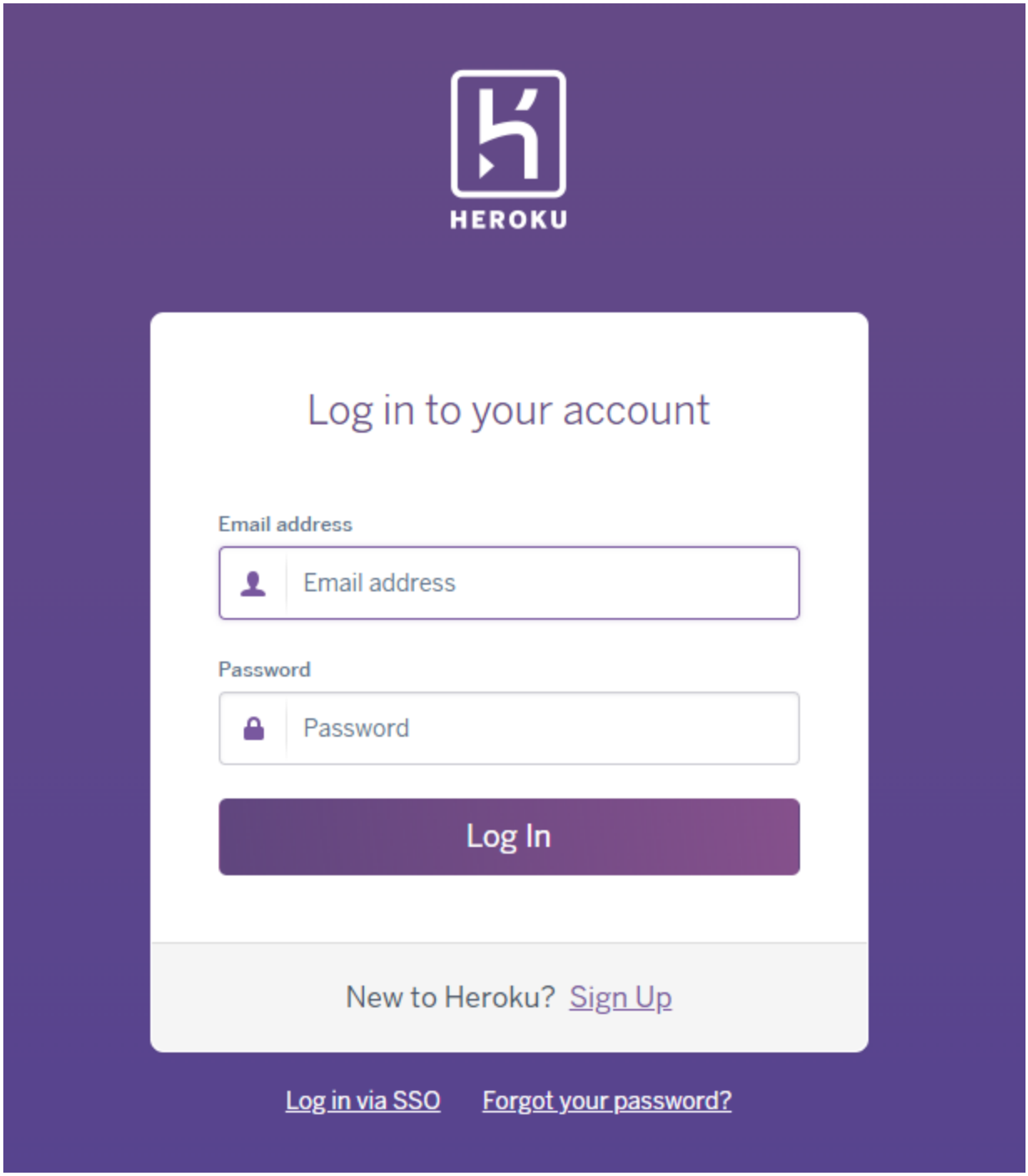
Here is a test run:



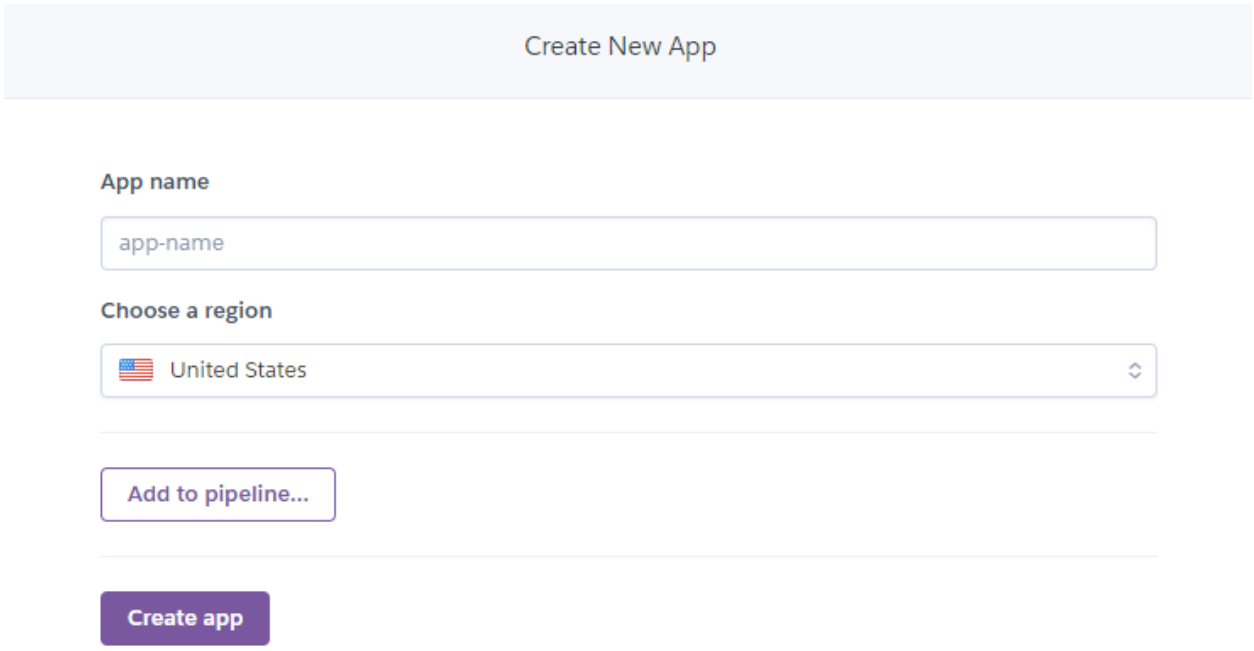
The flask server is up and can be access at http://127.0.0.1:5000/.

Deploy App onto Heroku

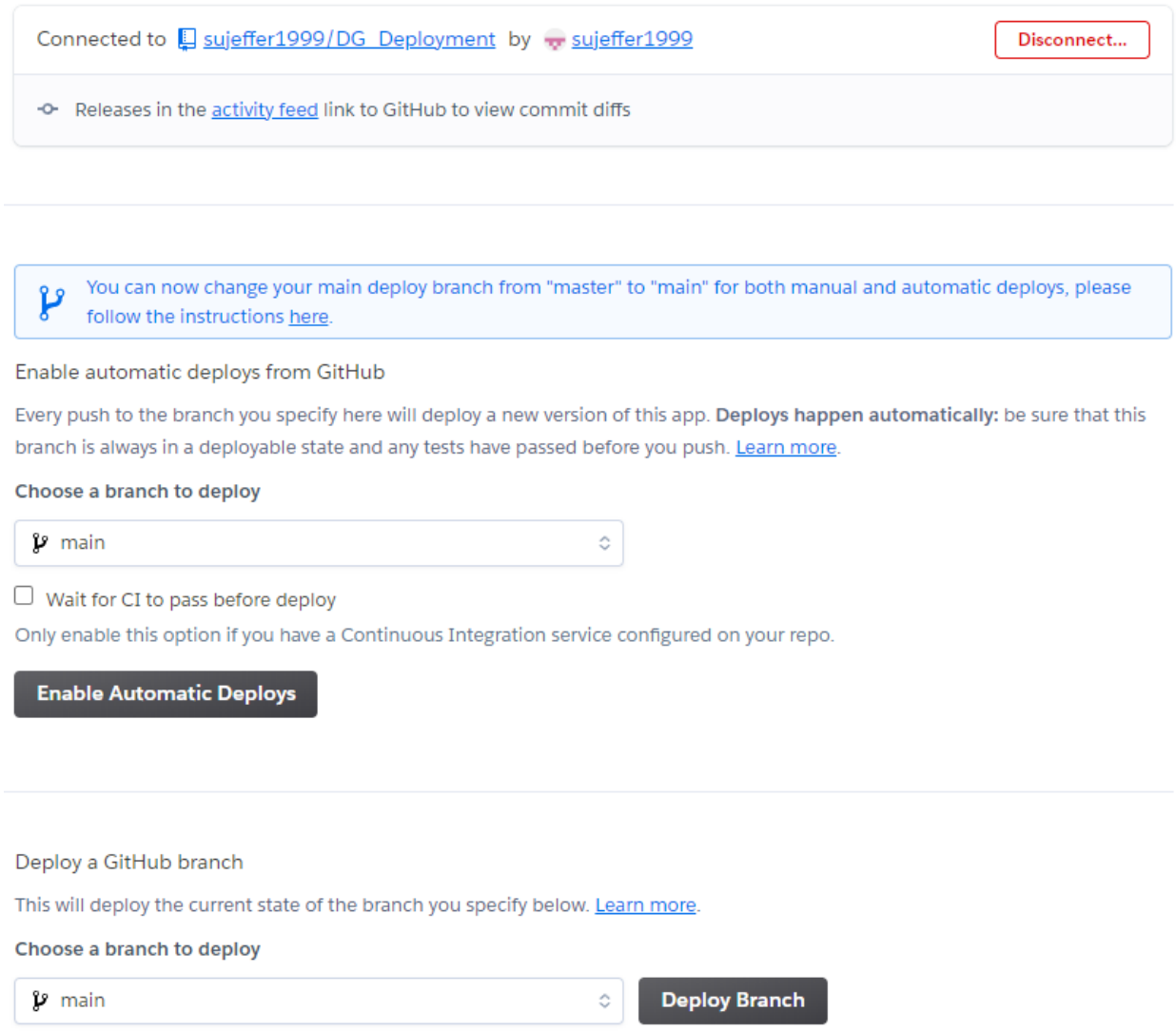
First, login onto Heroku or sign up for a account.



Then, create a new app



Now I need to connect the app to my GitHub



Before we deploy, I first need to add some required files into my GitHub repository.

I need to add a requirements.txt file that tells Heroku what version my python code is dependent on.

main DG_Deployment / requirements.txt Go to file ...

sujeffer1999 change req Latest commit 3a1423f 21 hours ago History

1 contributor

11 lines (11 sloc) 176 Bytes Raw Blame

```
Flask==1.1.1
gunicorn==19.9.0
itsdangerous==1.1.0
Jinja2==2.10.1
MarkupSafe==1.1.1
Werkzeug==0.15.5
numpy>=1.9.2
scipy>=0.15.1
scikit-learn>=0.18
matplotlib>=1.4.3
pandas>=0.19
```

And I need a Procfile to tell Heroku how to run my code with the Procfile file.

main DG_Deployment / Procfile Go to file ...

sujeffer1999 changed procfile Latest commit d67b6e2 21 hours ago History

1 contributor

1 lines (1 sloc) 22 Bytes Raw Blame

```
web: gunicorn app:app
```

Lastly I need to specify the python version my code can run in with the runtime.txt file.

main DG_Deployment / runtime.txt Go to file ...

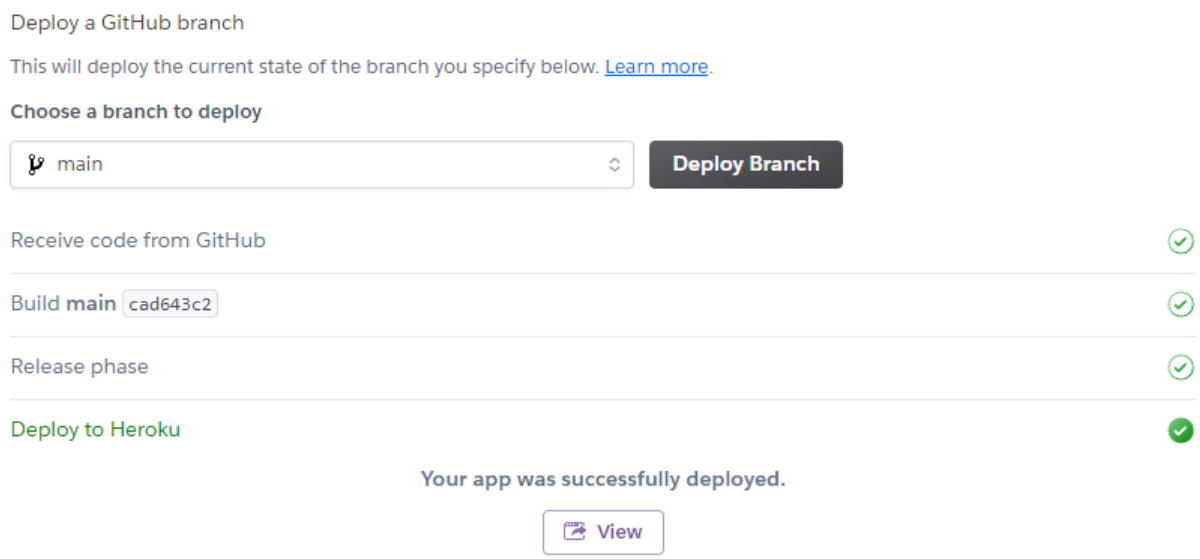
sujeffer1999 added runtime.txt Latest commit cad643c 21 hours ago History

1 contributor

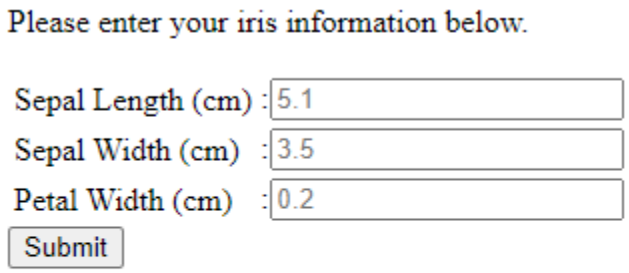
1 lines (1 sloc) 12 Bytes Raw Blame

```
python-3.9.0
```

Now, we can finally deploy my app on Heroku.



Click on “View” to view the app.



Fill in the sepal length, sepal width and petal width to predict the petal length.

The app can be viewed on https://dg-deployment-iris.herokuapp.com/