

## Document

### Week 5 - Cloud and API deployment

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Submitted to: [Data Glacier](#).

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This document contains a snapshot of each step  
of the deployment

**(Machine Learning Model Deployment  
on Heroku Using Flask)**

## Steps for deployment on Heroku using Flask

1. Create ML Model and save (pickle) it.
2. Create Flask files for UI and python main file (app.py) that can unpickle the machine learning model from step 1 and do predictions.
3. Create requirements.txt to setup the Flask web app with all python dependencies
4. Commit files from Steps 1, 2 & 3 in the GitHub repo.
5. Create an account/Login on Heroku, create an app, connect with the GitHub repo, and select the branch
6. Select manual deployment (or enable Automatics deploys) on Heroku

I Will use the same files that I worked on it in week 4

## Files to be created

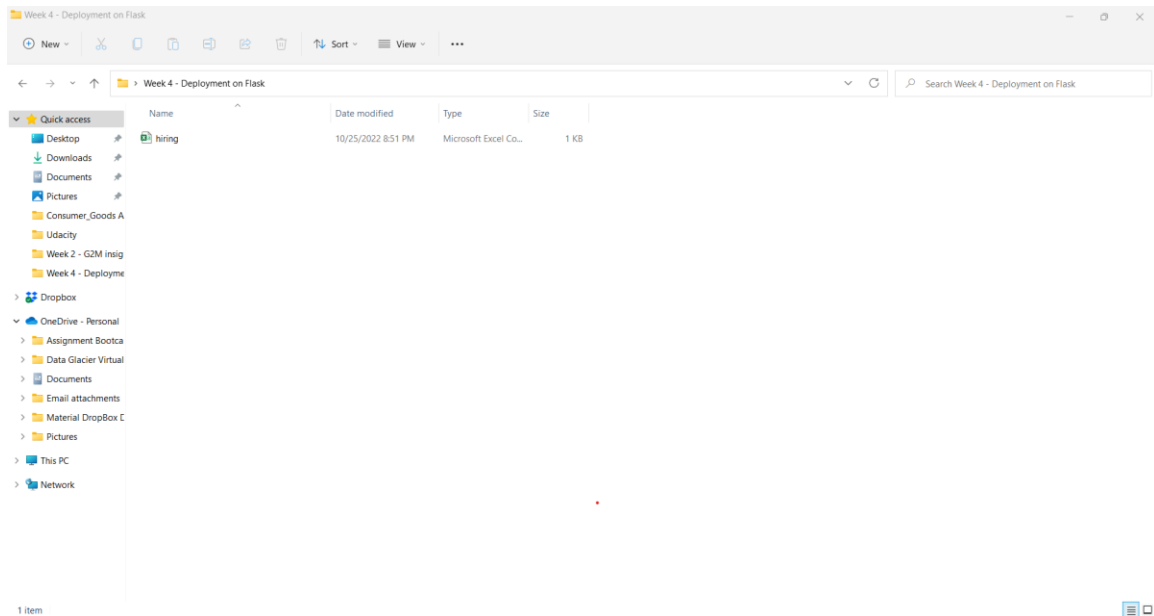
1. model.py (ML model)
2. model.pkl (Pickle file of ML model)
3. app.py (Flask Application)
4. Create requirements.txt
5. index.html (inside the folder templates)
6. hiring dataset (data to build ML model)

### 1. Choose a toy dataset.

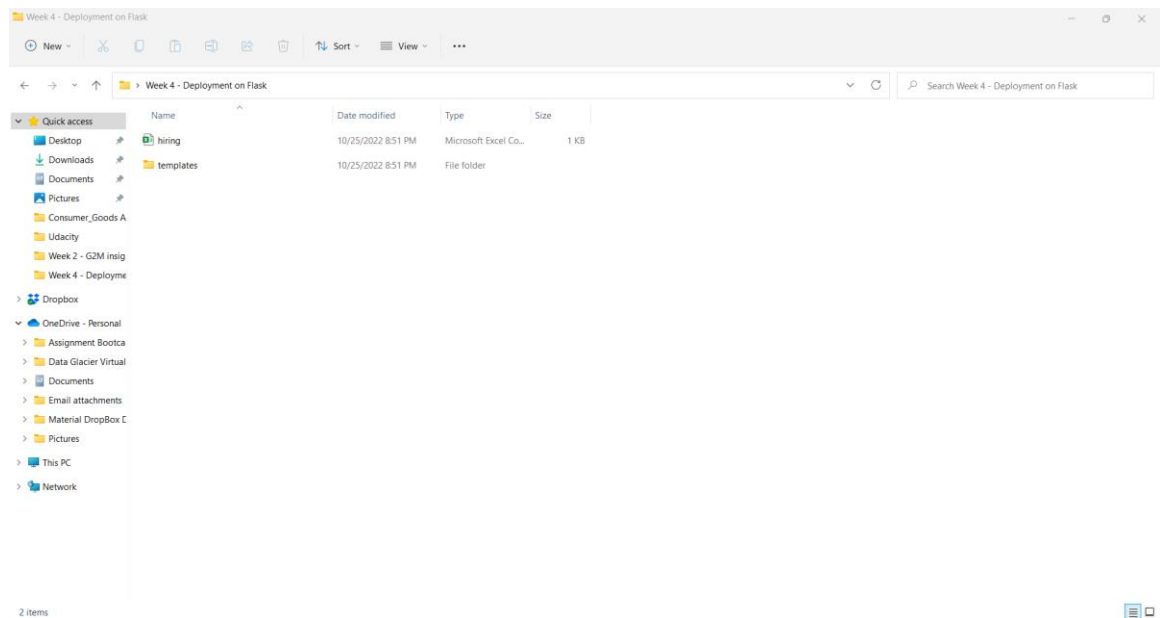
Select the hiring dataset.

experience	test_score	interview	salary
8	9		50000
8	6		45000
five	6	7	60000
two	10	10	65000
seven	9	6	70000
three	7	10	62000
ten	7		72000
eleven	7	8	80000

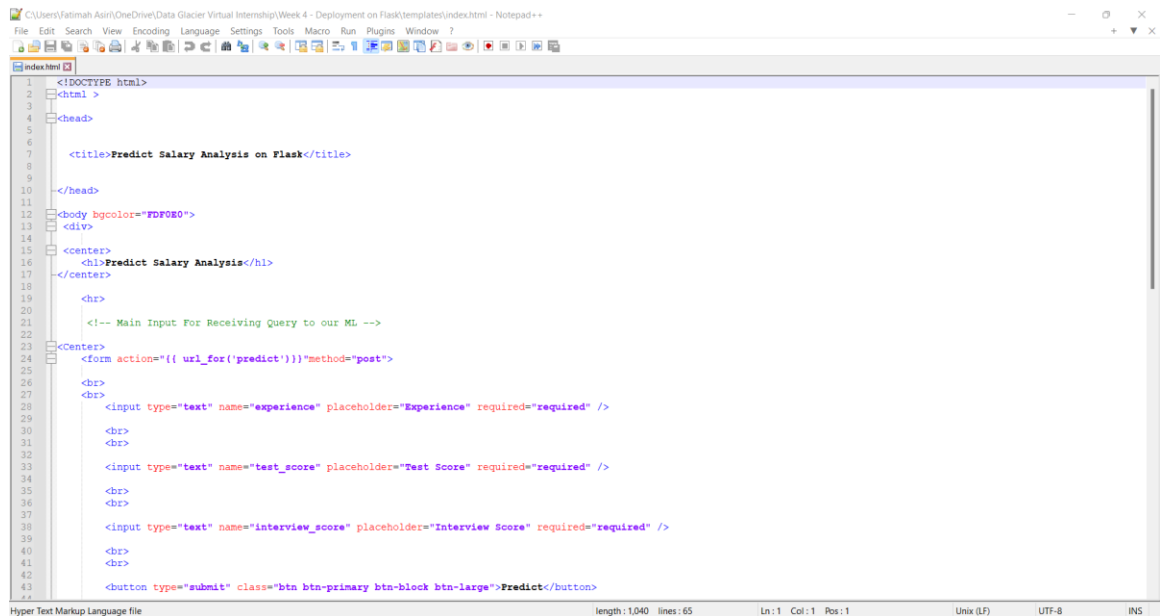
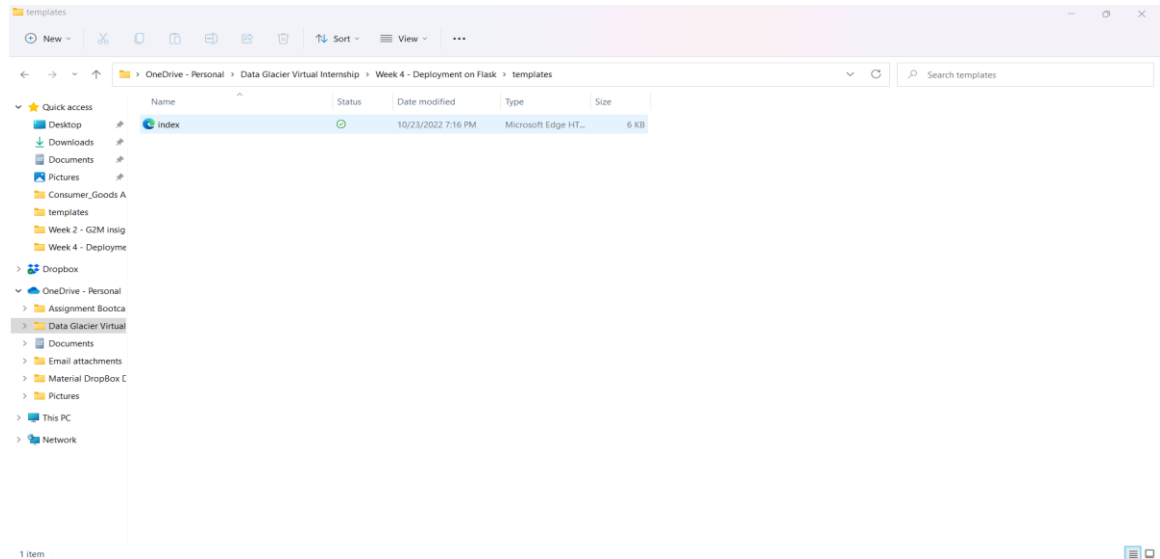
## 2. Download CSV file inside the folder



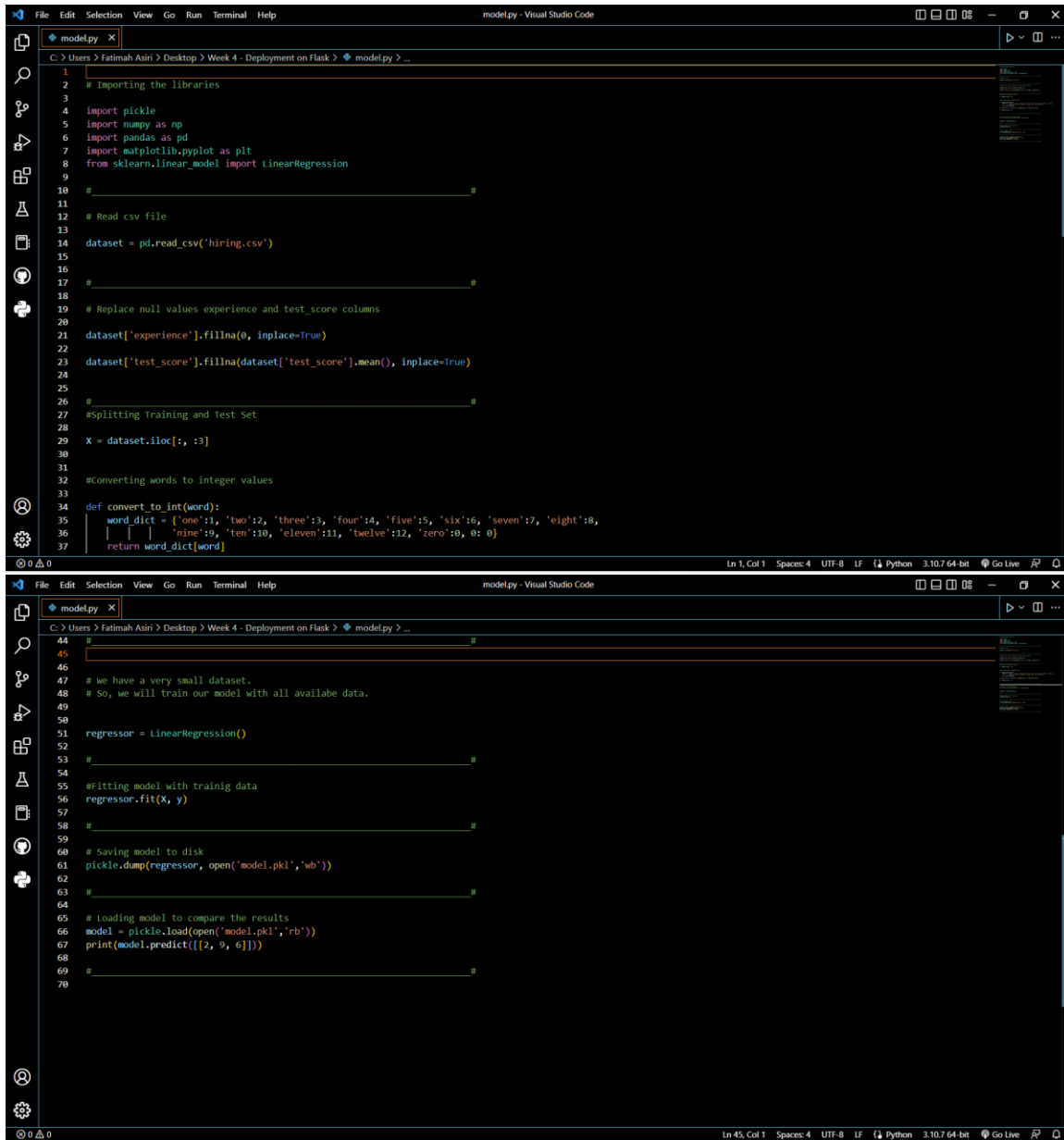
## 3. Create new folder (templates).



# 1. Create index.html file in the templates folder.

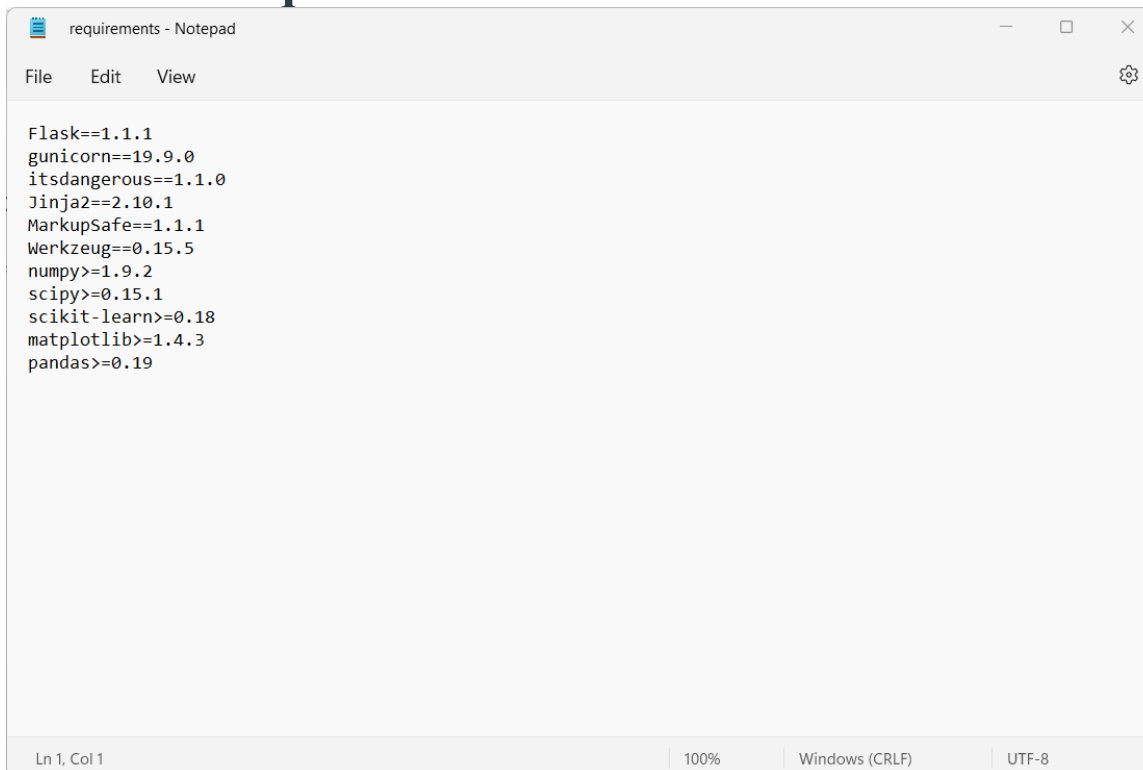


## 2. Create model.py file



```
1 # Importing the libraries
2 import pickle
3 import numpy as np
4 import pandas as pd
5 import matplotlib.pyplot as plt
6 from sklearn.linear_model import LinearRegression
7
8 # Read csv file
9 dataset = pd.read_csv('hiring.csv')
10
11 # Replace null values experience and test_score columns
12 dataset['experience'].fillna(0, inplace=True)
13 dataset['test_score'].fillna(dataset['test_score'].mean(), inplace=True)
14
15 # Splitting Training and Test Set
16 x = dataset.iloc[:, :3]
17
18 # Converting words to integer values
19 def convert_to_int(word):
20     word_dict = {'one':1, 'two':2, 'three':3, 'four':4, 'five':5, 'six':6, 'seven':7, 'eight':8,
21                 'nine':9, 'ten':10, 'eleven':11, 'twelve':12, 'zero':0, 0: 0}
22     return word_dict[word]
23
24 # we have a very small dataset.
25 # So, we will train our model with all available data.
26 regressor = LinearRegression()
27
28 # Fitting model with training data
29 regressor.fit(X, y)
30
31 # Saving model to disk
32 pickle.dump(regressor, open('model.pkl', 'wb'))
33
34 # Loading model to compare the results
35 model = pickle.load(open('model.pkl', 'rb'))
36 print(model.predict([[2, 9, 6]]))
```

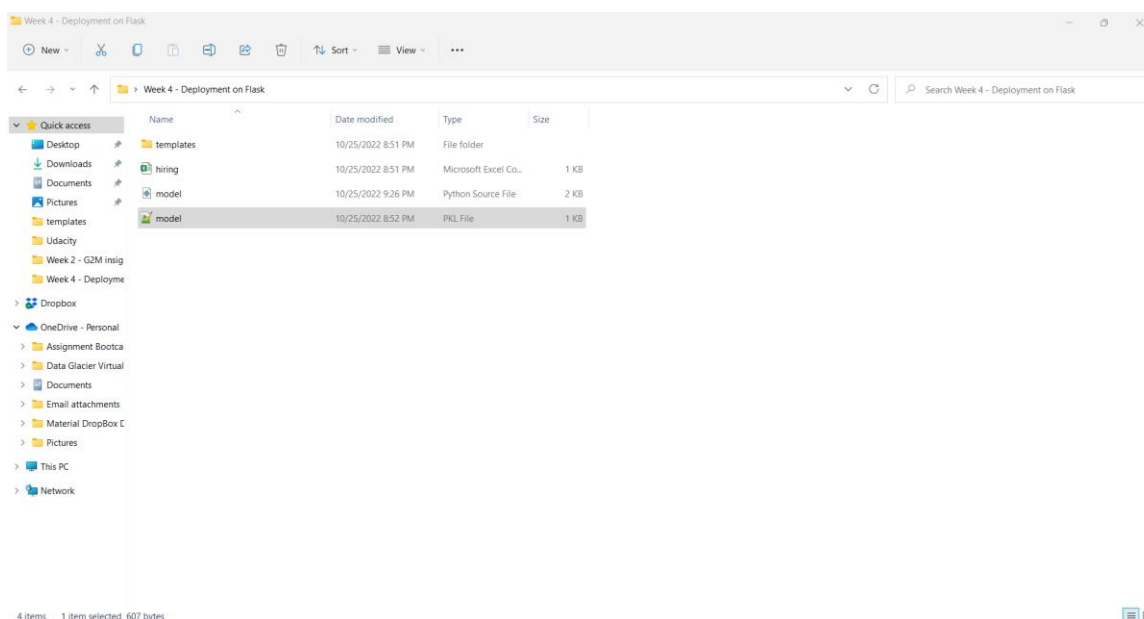
### 3. Create requirements.txt



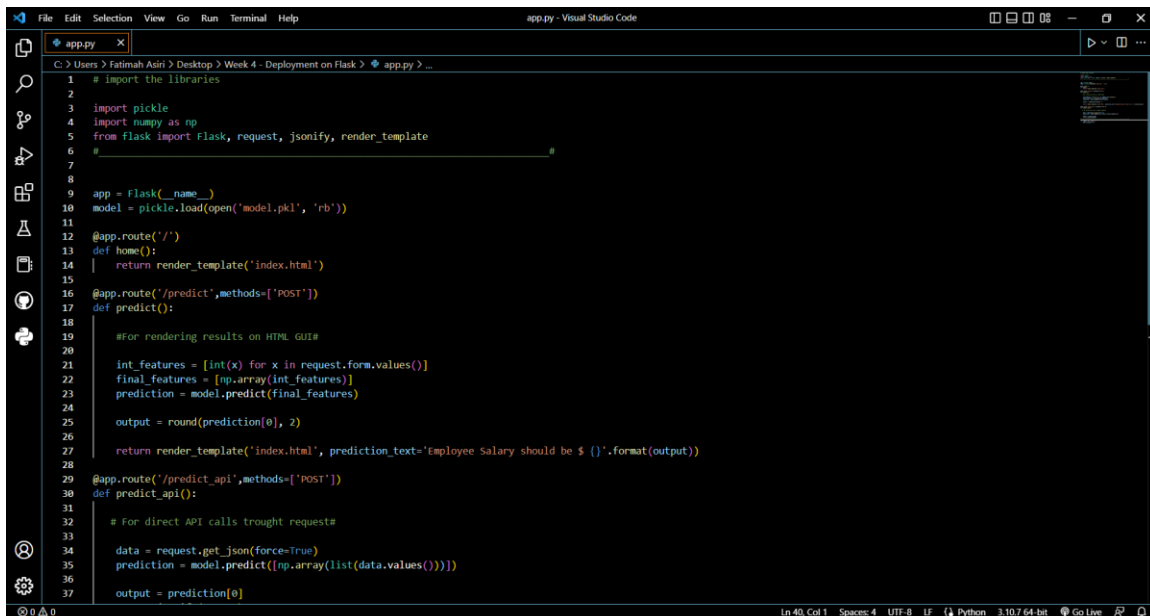
```
Flask==1.1.1
gunicorn==19.9.0
itsdangerous==1.1.0
Jinja2==2.10.1
MarkupSafe==1.1.1
Werkzeug==0.15.5
numpy>=1.9.2
scipy>=0.15.1
scikit-learn>=0.18
matplotlib>=1.4.3
pandas>=0.19
```

Ln 1, Col 1 | 100% | Windows (CRLF) | UTF-8

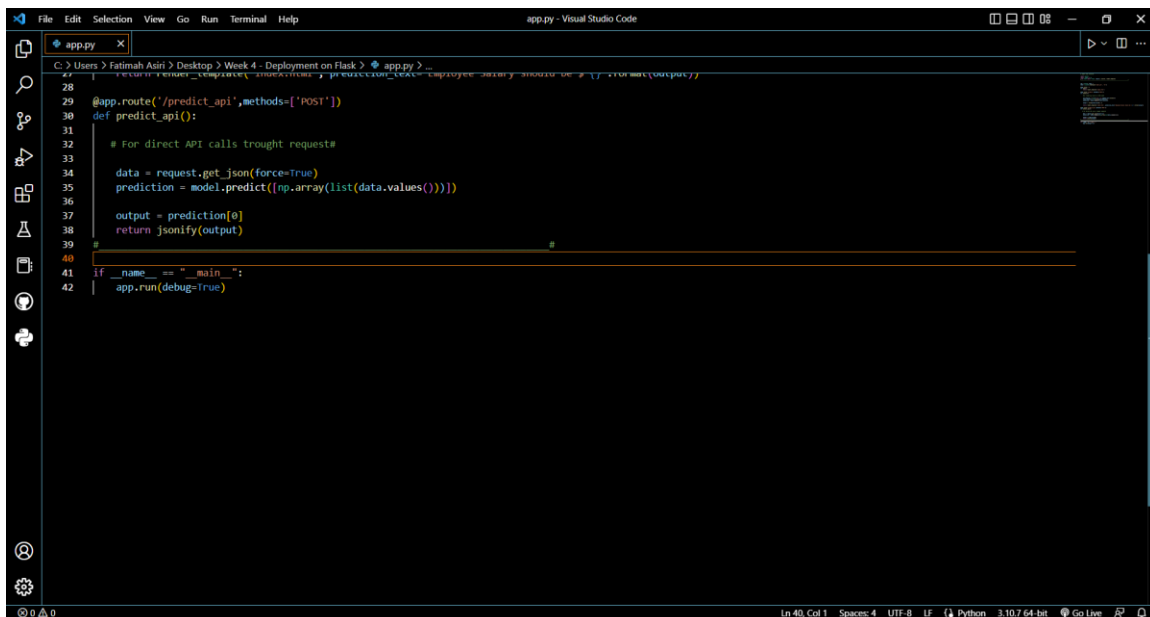
### 4. Create Pickle file of our model model.pkl



## 5. Create app.py files



```
1 # import the libraries
2
3 import pickle
4 import numpy as np
5 from flask import Flask, request, jsonify, render_template
6
7 #
8
9 app = Flask(__name__)
10 model = pickle.load(open('model.pkl', 'rb'))
11
12 @app.route('/')
13 def home():
14     return render_template('index.html')
15
16 @app.route('/predict', methods=['POST'])
17 def predict():
18     #For rendering results on HTML GUI#
19
20     int_features = [int(x) for x in request.form.values()]
21     final_features = [np.array(int_features)]
22     prediction = model.predict(final_features)
23
24     output = round(prediction[0], 2)
25
26     return render_template('index.html', prediction_text='Employee Salary should be {}'.format(output))
27
28 @app.route('/predict_api', methods=['POST'])
29 def predict_api():
30     # For direct API calls through request#
31
32     data = request.get_json(force=True)
33     prediction = model.predict([np.array(list(data.values()))])
34
35     output = prediction[0]
```



```
36
37     return jsonify(output)
38
39 #
40
41 if __name__ == '__main__':
42     app.run(debug=True)
```



## 6. Read me file for GitHub

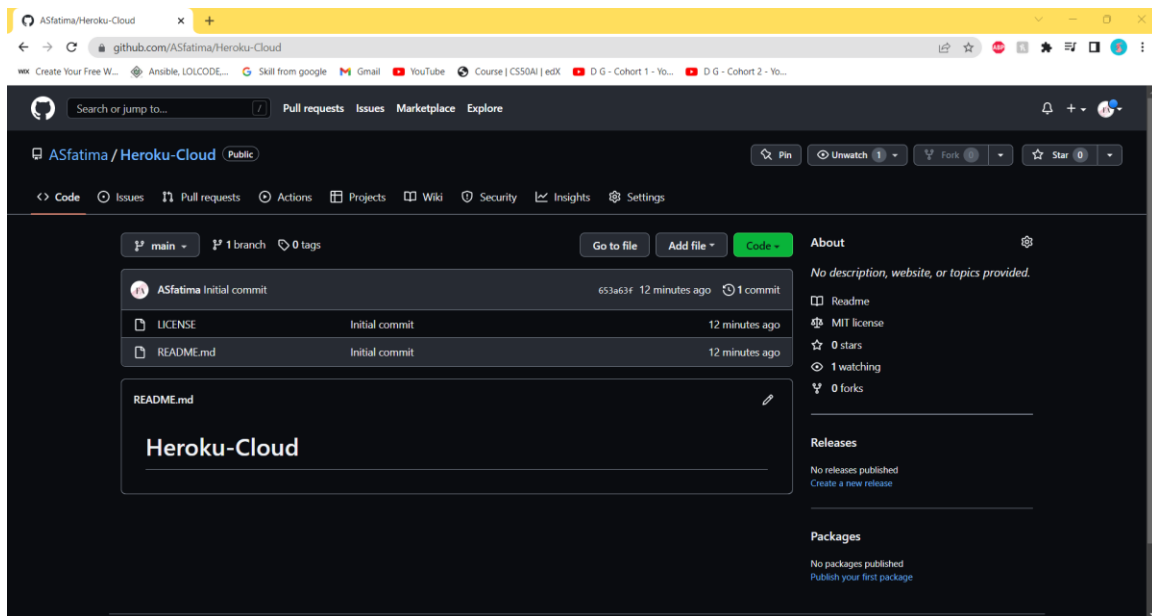
## 7. The Result of running app

The image displays two screenshots of a web application titled "Predict Salary Analysis". The application is hosted on a Heroku environment, as indicated by the browser tab "ML API using Flask on Heroku". The URL bar shows "127.0.0.1:5000".

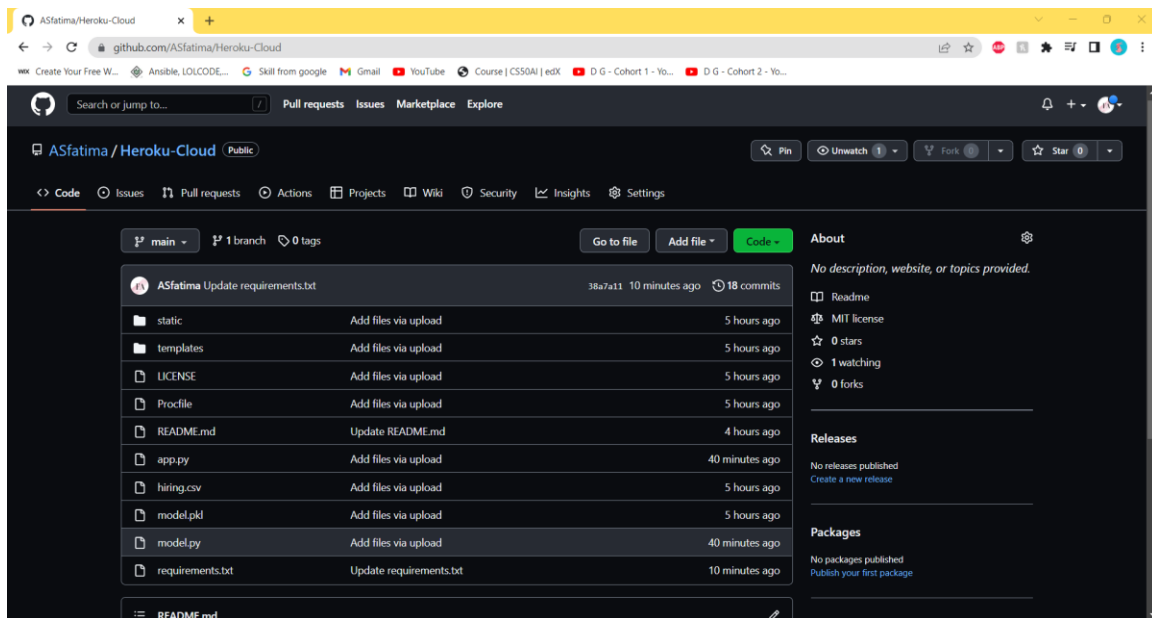
The top screenshot shows the initial form with three input fields: "Experience", "Test Score", and "Interview Score". A blue "Predict" button is located below the inputs. The Data Glacier logo and tagline "Your Deep Learning Partner" are visible in the bottom left corner.

The bottom screenshot shows the same form after a prediction. Below the "Predict" button, the text "Employee Salary should be \$ 56686.6" is displayed. The Data Glacier logo and tagline remain in the bottom left corner.

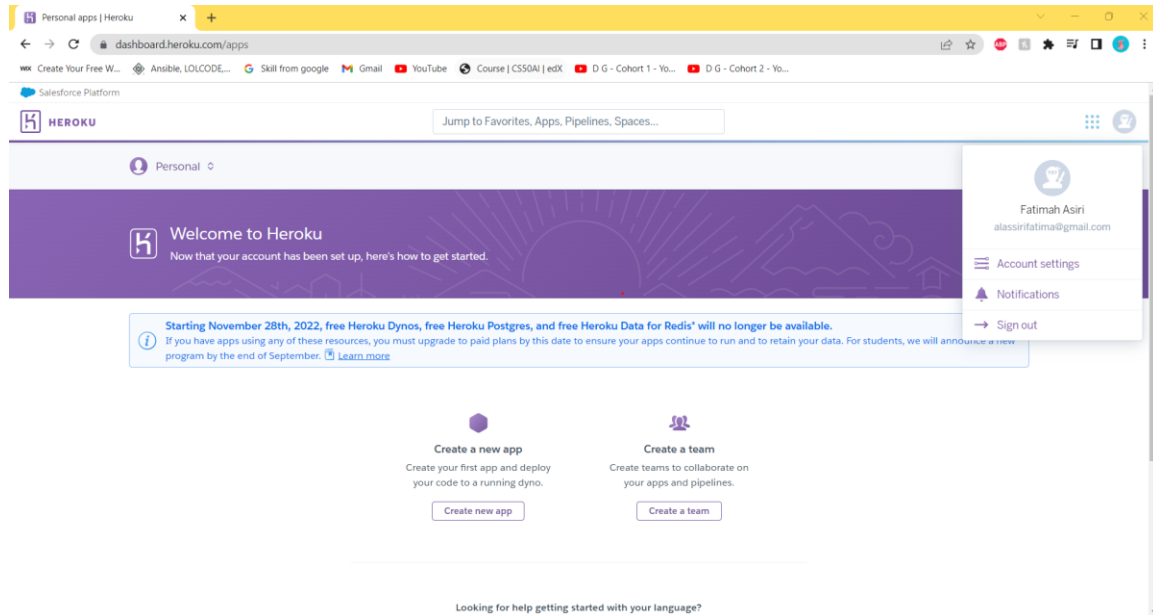
## 8. Create a new repo on GitHub (Heroku\_cloud)



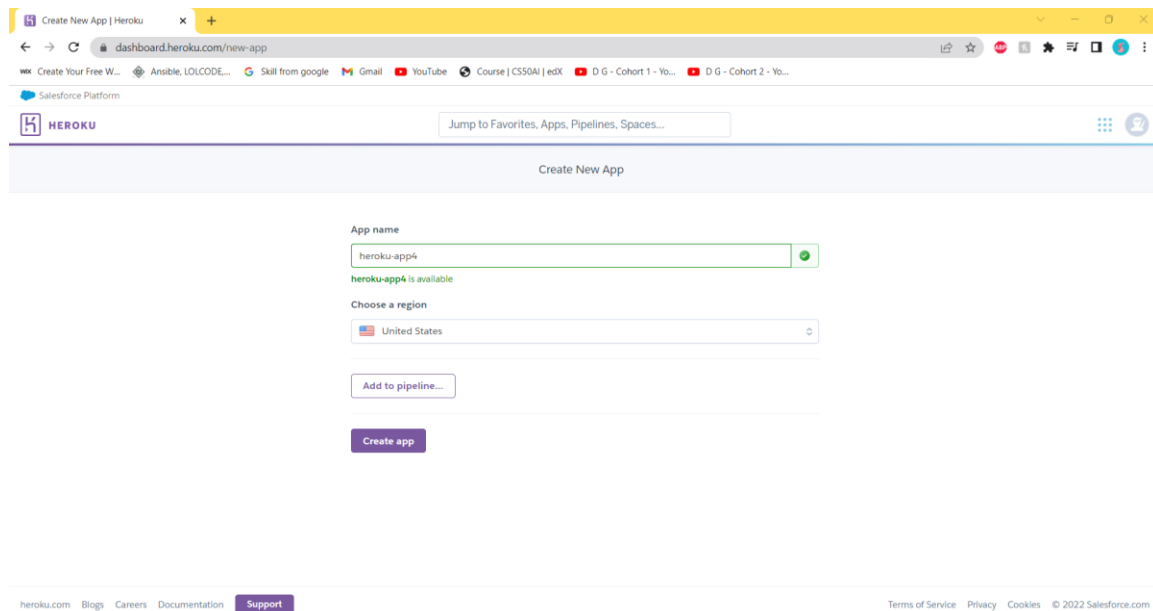
## 9. Commit files inside the repo

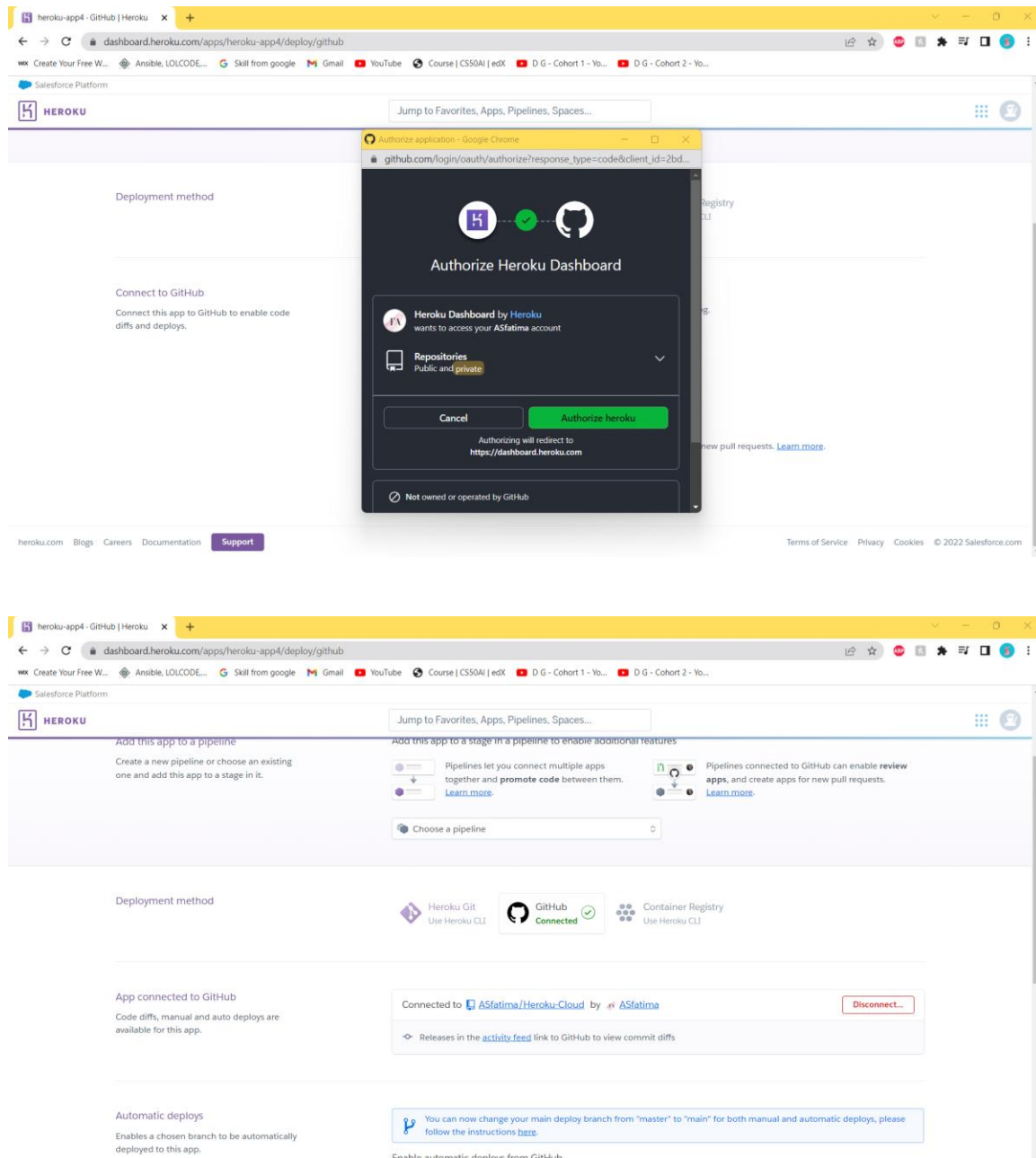


## 10. Create an account on Heroku



## 11. Linking the online repo to Heroku





## 12. Heroku\_Deployment of ML app

heroku-app4 · GitHub | Heroku

dashboard.heroku.com/apps/heroku-app4/deploy/github

Salesforce Platform

HEROKU

Jump to Favorites, Apps, Pipelines, Spaces...

Manual deploy  
Deploy the current state of a branch to this app.

Deploy a GitHub branch  
This will deploy the current state of the branch you specify below. [Learn more.](#)

Choose a branch to deploy  
main

Receive code from GitHub

Build main 5c8f33c6

```
-----
Downloaded six-1.16.0-py2.py3-none-any.whl (11 kB)
Installing collected packages: pytz, Werkzeug, threadpoolctl, six, pyParsing, pillow, numpy, MarkupSafe, kldisolver,
joblib, itsdangerous, gunicorn, fonttools, cyclical, click, scipy, python-dateutil, packaging, Jinja2, contourpy, scikit-learn,
pandas, matplotlib, flask
Successfully installed Flask-2.1.2 Jinja2-3.1.2 MarkupSafe-2.1.1 Werkzeug-2.1.2 click-8.1.3 contourpy-1.0.6 cyclical-
0.11.0 fonttools-4.38.0 gunicorn-20.1.0 itsdangerous-2.1.2 joblib-1.2.0 kldisolver-1.4.4 matplotlib-3.6.1 numpy-1.23.4
packaging-21.3 pandas-1.5.1 pillow-9.3.0 pyParsing-3.0.9 python-dateutil-2.8.2 pytz-2022.6 scikit-learn-1.1.3 scipy-1.9.3 six-
1.16.0 threadpoolctl-3.1.0
View build log
```

Autoscroll with output

Release phase

Deploy to Heroku

The app was successfully deployed.

heroku-app4 · GitHub | Heroku

dashboard.heroku.com/apps/heroku-app4/deploy/github

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Jump to Favorites, Apps, Pipelines, Spaces...

Enable Automatic Deploys

Manual deploy  
Deploy the current state of a branch to this app.

Deploy a GitHub branch  
This will deploy the current state of the branch you specify below. [Learn more.](#)

Choose a branch to deploy  
main

Receive code from GitHub

Build main 5c8f33c6

Release phase

Deploy to Heroku

Your app was successfully deployed.

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## 13. Heroku running on windows

```
Command Prompt
Microsoft Windows [Version 10.0.22000.1098]
(c) Microsoft Corporation. All rights reserved.

C:\Users\Fatimah Asiri>heroku version
» Warning: Our terms of service have changed: https://dashboard.heroku.com/terms-of-service
heroku/7.53.0 win32-x64 node-v12.21.0

C:\Users\Fatimah Asiri>heroku login
heroku: Press any key to open up the browser to login or q to exit:
Opening browser to https://cli-auth.heroku.com/auth/cli/browser/334efe26-fe0c-4f5e-b96b-d0e4ce104293?requestor=SFMyNTY.g
2gDbQAAAAw0Ni4xNTIuODcuNDVuBgCodgAzhAFiAAFRgA.UI70ksIGLMqb0jgqqvpMfSSgHxn1ScbeZQW5kK5g05o
Logging in... done
Logged in as alassirifatima@gmail.com

C:\Users\Fatimah Asiri>heroku apps
» Warning: heroku update available from 7.53.0 to 7.65.0.
=== alassirifatima@gmail.com Apps
heroku-app4

C:\Users\Fatimah Asiri>
```

## 14. Heroku Testing the web app

App Link:

<https://heroku-app4.herokuapp.com/>

