

Week5: ML prediction model Deployment on Heroku

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Step1: Select any toy data (simple data).

I found a toy data from Kaggle.

<https://www.kaggle.com/datasets/yasserh/housing-prices-dataset>

| | price | area | bedrooms | bathrooms | stories | mainroad | guestroom | basement | hotwaterheating | airconditioning | parking | prefarea | furnishingstatus |
|---|----------|------|----------|-----------|---------|----------|-----------|----------|-----------------|-----------------|---------|----------|------------------|
| 0 | 13300000 | 7420 | 4 | 2 | 3 | yes | no | no | no | yes | 2 | yes | furnished |
| 1 | 12250000 | 8960 | 4 | 4 | 4 | yes | no | no | no | yes | 3 | no | furnished |
| 2 | 12250000 | 9960 | 3 | 2 | 2 | yes | no | yes | no | no | 2 | yes | semi-furnished |
| 3 | 12215000 | 7500 | 4 | 2 | 2 | yes | no | yes | no | yes | 3 | yes | furnished |
| 4 | 11410000 | 7420 | 4 | 1 | 2 | yes | yes | yes | no | yes | 2 | no | furnished |

Originally, there are 13 variables.

```
# Separate the dependent variable and independent variables
Y = df['price']

X = df.drop(columns = {'price', 'mainroad', 'guestroom', 'airconditioning', 'prefarea', 'furnishingstatus'})

X = pd.get_dummies(X, drop_first = True)

X.head()
```

| | area | bedrooms | bathrooms | stories | parking | basement_yes | hotwaterheating_yes |
|---|------|----------|-----------|---------|---------|--------------|---------------------|
| 0 | 7420 | 4 | 2 | 3 | 2 | 0 | 0 |
| 1 | 8960 | 4 | 4 | 4 | 3 | 0 | 0 |
| 2 | 9960 | 3 | 2 | 2 | 2 | 1 | 0 |
| 3 | 7500 | 4 | 2 | 2 | 3 | 1 | 0 |
| 4 | 7420 | 4 | 1 | 2 | 2 | 1 | 0 |

But I dropped price and several variables from X. This is because price is dependent variable. And other several variables are dummy variables with Yes or No. In order to fit the flask deploying page, they were dropped. (That is not good idea to have so many variables in web to people fill out.)

I kept 7 independent variables to predict housing price.

Step2: Save the model

```
import pickle
```

```
# Saving model to disk  
pickle.dump(gradient_reg, open('model.pkl', 'wb'))
```

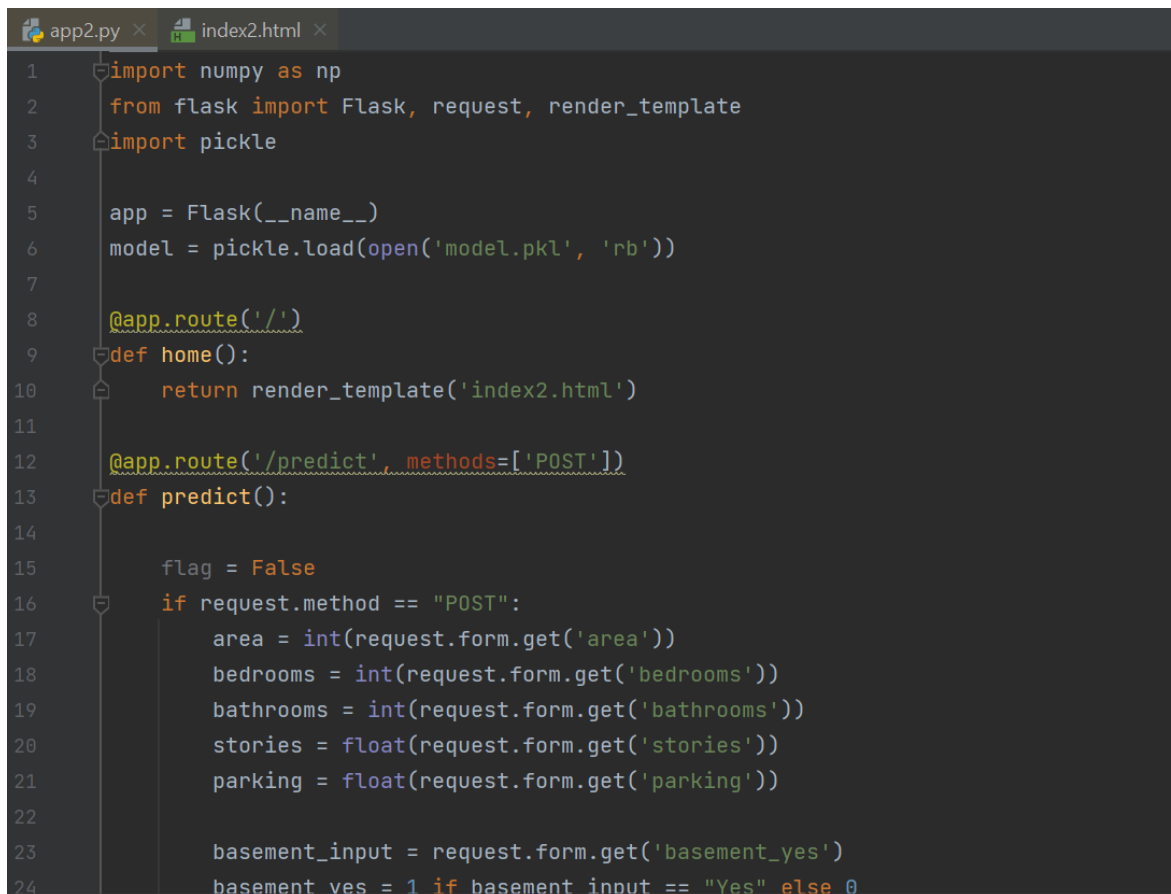
```
# Loading model to compare the results  
model = pickle.load(open('model.pkl', 'rb'))  
print(model.predict([[8000, 3, 2, 3, 2, 1, 1]]))  
  
[8357433.19312691]
```

Using pickle, saved the model to deploy on Flask.

Step3. Preparation of file to deploy

In PyCharm, created app2.py file.

Categorical items are Yes or No choice. Set the code if Yes=1 else 0 so that program works.



```
app2.py x index2.html x  
1 import numpy as np  
2 from flask import Flask, request, render_template  
3 import pickle  
4  
5 app = Flask(__name__)  
6 model = pickle.load(open('model.pkl', 'rb'))  
7  
8 @app.route('/')  
9 def home():  
10     return render_template('index2.html')  
11  
12 @app.route('/predict', methods=['POST'])  
13 def predict():  
14  
15     flag = False  
16     if request.method == "POST":  
17         area = int(request.form.get('area'))  
18         bedrooms = int(request.form.get('bedrooms'))  
19         bathrooms = int(request.form.get('bathrooms'))  
20         stories = float(request.form.get('stories'))  
21         parking = float(request.form.get('parking'))  
22  
23         basement_input = request.form.get('basement_yes')  
24         basement ves = 1 if basement input == "Yes" else 0
```

```

25
26     hotwaterheating_input = request.form.get('hotwaterheating_yes')
27     hotwaterheating_yes = 1 if basement_input == "Yes" else 0
28
29     final_features = [area, bedrooms, bathrooms, stories, parking, basement_yes, hotwaterheating_yes]
30     features = np.array(final_features)
31
32     prediction = model.predict(features)
33
34     output = round(prediction[0], 2)
35
36     return render_template('index2.html', flag=True, prediction_text=f'Housing price should be ${output}.')
37
38 if __name__ == "__main__":
39     app.run(debug=True)

```

Created index2.html file.

```

20
21     <label for="bedrooms">Bedrooms:</label>
22     <input type="text" name="bedrooms" id="bedrooms" placeholder="eg:5" required="required" />
23
24     <label for="bathrooms">Bathrooms:</label>
25     <input type="text" name="bathrooms" id="bathrooms" placeholder="eg:3" required="required" />
26
27     <label for="stories">Stories:</label>
28     <input type="text" name="stories" id="stories" placeholder="eg:2" required="required" />
29
30     <label for="parking">Parking:</label>
31     <input type="text" name="parking" id="parking" placeholder="eg:1" required="required" />
32
33     <label for="basement_yes">Basement:</label>
34     <select name="basement_yes" id="basement_yes">
35         <option value="Yes">Yes</option>
36         <option value="No">No</option>
37     </select>
38
39     <label for="hotwaterheating_yes">HotwaterHeating:</label>
40     <select name="hotwaterheating_yes" id="hotwaterheating_yes">
41         <option value="Yes">Yes</option>
42         <option value="No">No</option>
43     </select>

```

Under the templates folder, saved the index2.html file.

Madoka - Personal > Desktop > Data Glacier > Week4_2 > templates

| Name | Status |
|-------------|--------|
| index2.html | ✓ |

Added requirement.txt

```
1 Flask == 1.1.2
2 gunicorn == 20.1.0
3 itsdangerous==2.0.1
4 Jinja2==2.11.3
5 MarkupSafe==2.0.1
6 Werkzeug==2.0.3
7 numpy>=1.9.2
8 scipy>=0.15.1
9 scikit-learn>=0.18
10 matplotlib>=1.4.3
11 pandas>=0.19
```

Added Procfile.



web: gunicorn app2:app

Added MIT License.











Code

Blame

21 lines (17 loc) · 1.04 KB


```
1 MIT License
2
3 Copyright (c) 2023 Madoka Fujii
4
5 Permission is hereby granted, free of charge, to any person obtaining a c
6 of this software and associated documentation files (the "Software"), to
7 in the Software without restriction, including without limitation the rig
8 to use, copy, modify, merge, publish, distribute, sublicense, and/or sell
9 copies of the Software, and to permit persons to whom the Software is
10 furnished to do so, subject to the following conditions:
11
12 The above copyright notice and this permission notice shall be included i
13 copies or substantial portions of the Software.
14
15 THE SOFTWARE IS PROVIDED "AS IS", WITHOUT WARRANTY OF ANY KIND, EXPRESS C
16 IMPLIED, INCLUDING BUT NOT LIMITED TO THE WARRANTIES OF MERCHANTABILITY,
```

Step4.Upload to GitHub all of the files and folders.



| | |
|---|----------------------|
|  static/CSS | Add files via upload |
|  templates | Add files via upload |
|  LICENSE | Initial commit |
|  Procfile | Add files via upload |
|  README.md | Initial commit |
|  Week4_housing_price.ipynb | Add files via upload |
|  app2.py | Add files via upload |
|  housing.csv | Add files via upload |
|  model.pkl | Add files via upload |
|  requirements.txt | Add files via upload |

README.md


Step5.Create Heroku account and a new app.


HEROKU

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

 Personal >  week5-heroku-demo

☆ Open app



GitHub  kaedeaki / week5-heroku-demo

Overview Resources **Deploy** Metrics Activity Access Settings



Add this app to a pipeline

Create a new pipeline or choose an existing one and add this app to a stage in it.


Add this app to a stage in a pipeline to enable additional features

Pipelines let you connect multiple apps together and **promote code** between them. [Learn more.](#)






Pipelines connected to GitHub can enable **apps**, and create apps for new pull requests. [Learn more.](#)


 Choose a pipeline

Step6.Connect with a branch in GitHub

Deployment method



 Heroku Git
Use Heroku CLI

 GitHub
Connected


 Container Registry
Use Heroku CLI

App connected to GitHub

Code diffs, manual and auto deploys are available for this app.

Connected to  kaedeaki / Week5-heroku-demo by  kaedeaki

Disconnect...

 Releases in the [activity feed](#) link to GitHub to view commit diffs

Step7.Manual deploy

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

Deploy Branch

Step8.Install all requirements and build completion

```
To use a different version, see: https://devcenter.heroku.com/articles/python-runtimes
-----> No change in requirements detected, installing from cache
-----> Using cached install of python-3.11.4
-----> Installing pip 23.2.1, setuptools 68.0.0 and wheel 0.41.0
-----> Installing SQLite3
-----> Installing requirements with pip
-----> Discovering process types
Procfile declares types -> web
-----> Compressing...
Done: 149.8M
-----> Launching...
Released v7
https://week5-heroku-demo-9d06f4e8359e.herokuapp.com/ deployed to Heroku
```

Build finished

Step9.Generate the web link of the application

<https://week5-heroku-demo-9d06f4e8359e.herokuapp.com/>

Step10.Open the ML model in web

← → ↻ week5-heroku-demo-9d06f4e8359e.herokuapp.com

Gmail YouTube My Drive - Google... Welcome To Colab... Maps Kaggle: Your Home... Translate News Progate | プログラミン... Login Secured Login to y...

Housing Price

Area: Bedrooms: Bathrooms: Stories: Parking: Basement:

Yes ▾ HotwaterHeating: Yes ▾ Predict

Step11.Test the ML model in web

← → ↻ week5-heroku-demo-9d06f4e8359e.herokuapp.com/predict

Gmail YouTube My Drive - Google... Welcome To Colab... Maps Kaggle: Your Home... Translate News Progate | プログラミン... Login Secured Login to y...

Housing Price

Area: Bedrooms: Bathrooms: Stories: Parking: Basement:

Yes ▾ HotwaterHeating: Yes ▾ Predict

Housing price should be \$7204659.04.

Press the predict button. Then, the prediction result appears.