Week 5: Cloud and API deployment

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4/5/2025
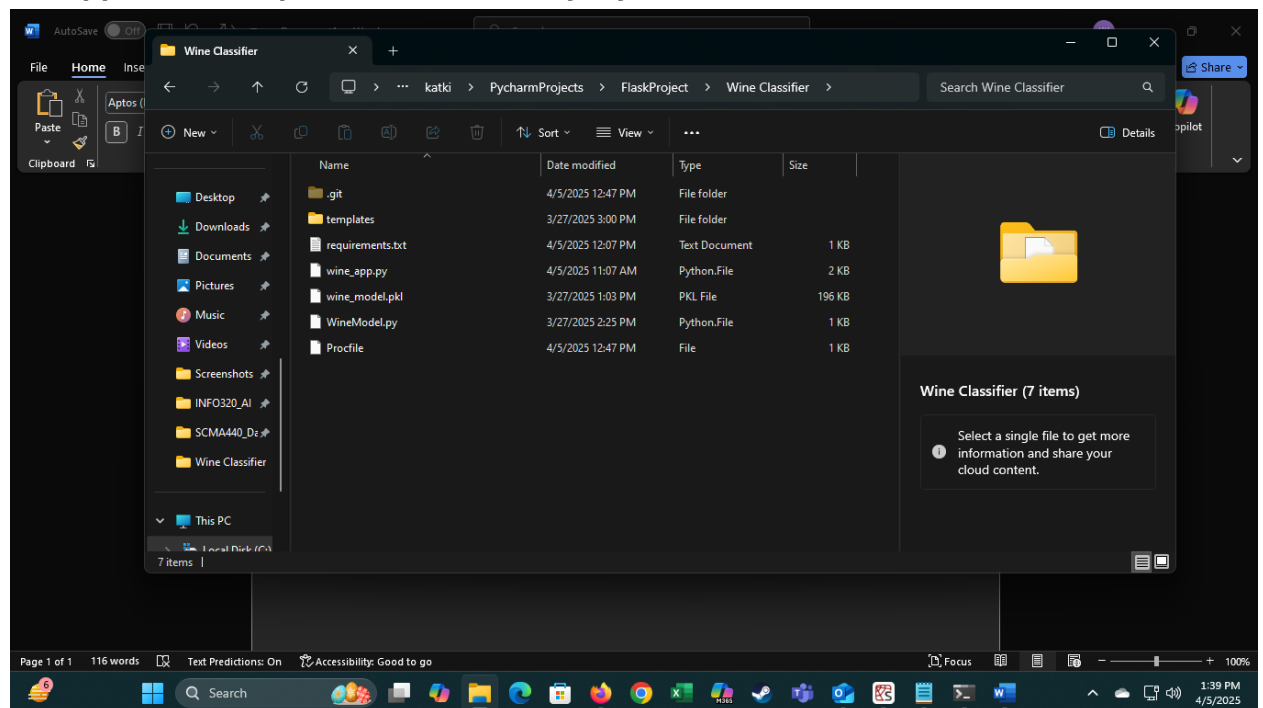
LISUM43

Task:

1. Select any toy data
   I used my toy data from Week 4 of the wine dataset.
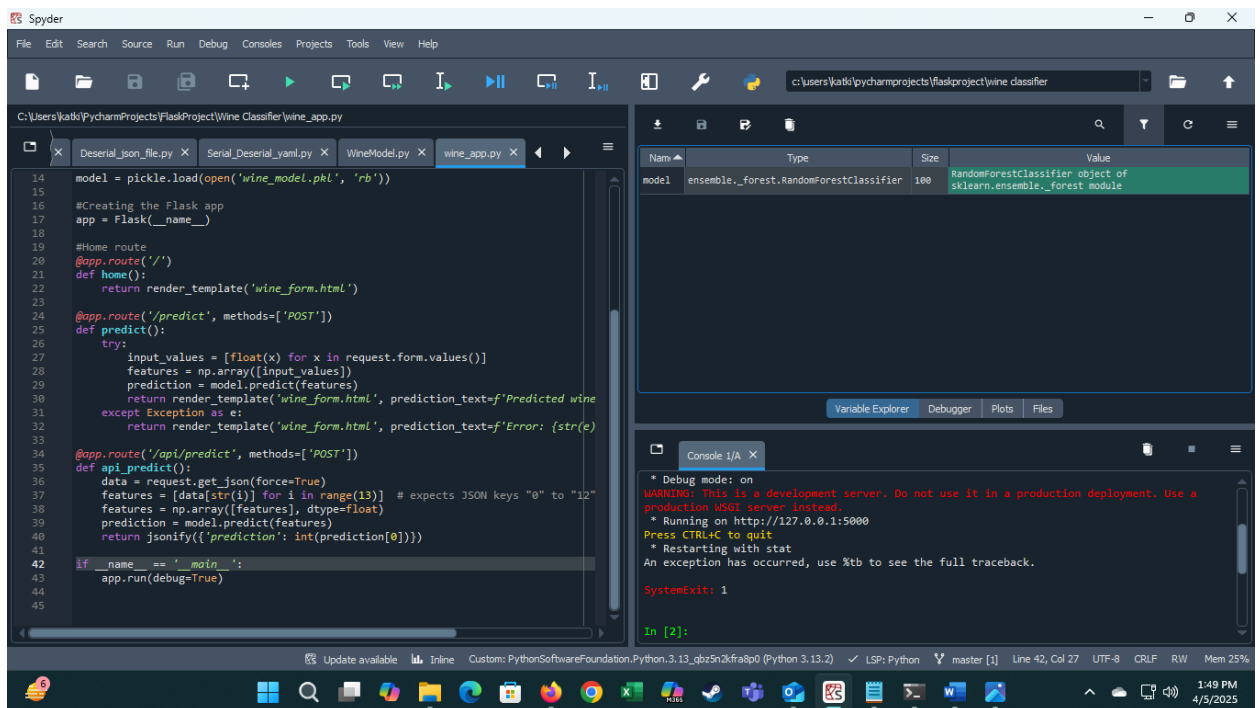
2. Save the model
   Saved the model from the previous week

3. Deploy the model on any cloud: **I used Heroku**
   To prepare all of this correctly I had to make sure steps were taken properly and carefully. First, I needed to make sure my folder had the requirements I needed for this assignment. I named my folder Wine Classifier which holds my flask app, saved model, python dependencies, the Procfile to tell Heroku how to run the app, and a templates folder with my styled HTML form.

When I first started I had all the files from Week 4, however I needed to create the requirements file and the Procfile. I ran "pip freeze > requirements.txt" and then had to go into that file manually to clean up what exactly we needed for this deployment. I kept Flask, scikit-learn, numpy, pandas, and gunicorn inside the requirements.txt file. Next, I created a Procfile which also had to be cleaned up because of Heroku's strict policies making sure it was a single line, no extra spaces or hidden characters. I had to create this multiple times because I was struggling to get it to work properly. Before I show the screenshots of how I fixed the Procfile and got it working properly, I had to modify my wine app file for API route. Below shows the coding I added.

Once, I modified my coding, I went back to finish the commands of this process. This screenshot below shows what I did in the terminal after fixing the Procfile and getting it to run properly.

After fixing everything, I initialized a Git repo by running git init, git add ., and then git commit -m "Initial Commit". Next, I logged into my Heroku account to make sure everything was set up properly and then ran "Heroku login" on my terminal from the folder. I set the remote Heroku Git repo and then after some tinkering I finally got it deployed to Heroku.

```
PS C:\Users\katki\PycharmProjects\FlaskProject\Wine Classifier> 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/3ebf30c6-9ddc-4ca8-bc25-008c661bfca1?requestor=SFMyNTY.g
2gDbQAAAAs3MS42Mi4xNC41N24GADimpgaWAWIAAVGA.Kt28L6HcBcTDZio-2M0SSa13UP_lOq54keG-GG201jM
Logging in... done
Logged in as katkirby9217@gmail.com
PS C:\Users\katki\PycharmProjects\FlaskProject\Wine Classifier> heroku create wine-classifier-kirby
Creating ● wine-classifier-kirby... done
https://wine-classifier-kirby-925e83bd6285.herokuapp.com/ | https://git.heroku.com/wine-classifier-kirby.git
PS C:\Users\katki\PycharmProjects\FlaskProject\Wine Classifier> git push heroku master
Enumerating objects: 9, done.
Counting objects: 100% (9/9), done.
Delta compression using up to 16 threads
Compressing objects: 100% (8/8), done.
Writing objects: 100% (9/9), 36.00 KiB | 6.00 MiB/s, done.
Total 9 (delta 0), reused 0 (delta 0), pack-reused 0 (from 0)
remote: Updated 6 paths from 8dc416c
remote: Compressing source files... done.
remote: Building source:
remote:
remote: -----> Building on the Heroku-24 stack
remote: -----> Determining which buildpack to use for this app
remote: -----> Python app detected
remote: -----> No Python version was specified. Using the buildpack default: Python 3.13
remote:         To use a different version, see: https://devcenter.heroku.com/articles/python-runtimes
```

```
PS C:\Users\katki\PycharmProjects\FlaskProject\Wine Classifier> git add Procfile
PS C:\Users\katki\PycharmProjects\FlaskProject\Wine Classifier> git commit -m "Fix Procfile formatting from Notepad"
[master 65777d1] Fix Procfile formatting from Notepad
 1 file changed, 0 insertions(+), 0 deletions(-)
PS C:\Users\katki\PycharmProjects\FlaskProject\Wine Classifier> git push heroku master
Enumerating objects: 24, done.
Counting objects: 100% (24/24), done.
Delta compression using up to 16 threads
Compressing objects: 100% (22/22), done.
Writing objects: 100% (24/24), 37.37 KiB | 4.15 MiB/s, done.
Total 24 (delta 7), reused 0 (delta 0), pack-reused 0 (from 0)
remote: Updated 6 paths from 9b1f3e8
remote: Compressing source files... done.
remote: Building source:
remote:
remote: -----> Building on the Heroku-24 stack
remote: -----> Determining which buildpack to use for this app
remote: -----> Python app detected
remote: -----> No Python version was specified. Using the buildpack default: Python 3.13
remote:         To use a different version, see: https://devcenter.heroku.com/articles/python-runtimes
remote: -----> Installing Python 3.13.2
remote: -----> Installing pip 24.3.1
remote: -----> Installing dependencies using 'pip install -r requirements.txt'
remote:         Collecting Flask==3.1.0 (from -r requirements.txt (line 1))
remote:           Downloading flask-3.1.0-py3-none-any.whl.metadata (2.7 kB)
```

Total 24 (delta 7), reused 0 (delta 0), pack-reused 0 (from 0)
remote: Updated 6 paths from 9b1f3e8
remote: Compressing source files... done.
remote: Building source:
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remote: -----> Building on the Heroku-24 stack
remote: -----> Determining which buildpack to use for this app
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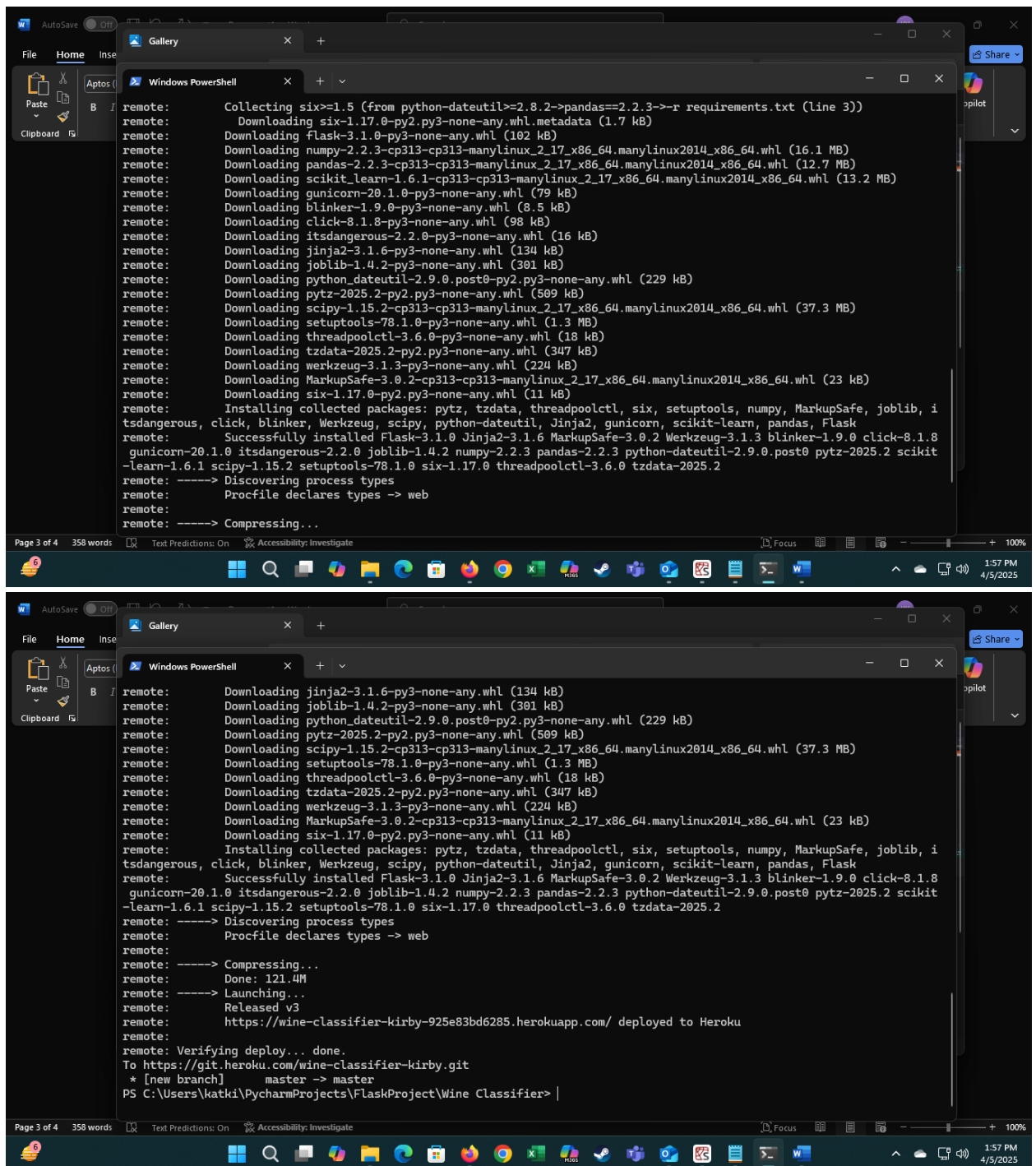remote: To use a different version, see: https://devcenter.heroku.com/articles/python-runtimes
remote: -----> Installing Python 3.13.2
remote: -----> Installing pip 24.3.1
remote: -----> Installing dependencies using 'pip install -r requirements.txt'
remote: Collecting Flask==3.1.0 (from -r requirements.txt (line 1))
remote: Downloading flask-3.1.0-py3-none-any.whl.metadata (2.7 kB)
remote: Collecting numpy==2.2.3 (from -r requirements.txt (line 2))
remote: Downloading numpy-2.2.3-cp313-cp313-manylinux_2_17_x86_64.manylinux2014_x86_64.whl.metadata (62 kB)
remote: Collecting pandas==2.2.3 (from -r requirements.txt (line 3))
remote: Downloading pandas-2.2.3-cp313-cp313-manylinux_2_17_x86_64.manylinux2014_x86_64.whl.metadata (89 kB)
remote: Collecting scikit-learn==1.6.1 (from -r requirements.txt (line 4))
remote: Downloading scikit_learn-1.6.1-cp313-cp313-manylinux_2_17_x86_64.manylinux2014_x86_64.whl.metadata (18 kB)
remote: Collecting gunicorn==20.1.0 (from -r requirements.txt (line 5))
remote: Downloading gunicorn-20.1.0-py3-none-any.whl.metadata (3.8 kB)
remote: Collecting Werkzeug>=3.1 (from Flask==3.1.0->-r requirements.txt (line 1))
remote: Downloading werkzeug-3.1.3-py3-none-any.whl.metadata (3.7 kB)
remote: Collecting Jinja2>=3.1.2 (from Flask==3.1.0->-r requirements.txt (line 1))
remote: Downloading jinja2-3.1.6-py3-none-any.whl.metadata (2.9 kB)
remote: Collecting itsdangerous>=2.2 (from Flask==3.1.0->-r requirements.txt (line 1))
remote: Downloading itsdangerous-2.2.0-py3-none-any.whl.metadata (1.9 kB)

remote: Downloading jinja2-3.1.6-py3-none-any.whl.metadata (2.9 kB)
remote: Collecting itsdangerous>=2.2 (from Flask==3.1.0->-r requirements.txt (line 1))
remote: Downloading itsdangerous-2.2.0-py3-none-any.whl.metadata (1.9 kB)
remote: Collecting click>=8.1.3 (from Flask==3.1.0->-r requirements.txt (line 1))
remote: Downloading click-8.1.8-py3-none-any.whl.metadata (2.3 kB)
remote: Collecting blinker>=1.9 (from Flask==3.1.0->-r requirements.txt (line 1))
remote: Downloading blinker-1.9.0-py3-none-any.whl.metadata (1.6 kB)
remote: Collecting python-dateutil>=2.8.2 (from pandas==2.2.3->-r requirements.txt (line 3))
remote: Downloading python_dateutil-2.9.0.post0-py2.py3-none-any.whl.metadata (8.4 kB)
remote: Collecting pytz>=2020.1 (from pandas==2.2.3->-r requirements.txt (line 3))
remote: Downloading pytz-2025.2-py2.py3-none-any.whl.metadata (22 kB)
remote: Collecting tzdata>=2022.7 (from pandas==2.2.3->-r requirements.txt (line 3))
remote: Downloading tzdata-2025.2-py2.py3-none-any.whl.metadata (1.4 kB)
remote: Collecting scipy>=1.6.0 (from scikit-learn==1.6.1->-r requirements.txt (line 4))
remote: Downloading scipy-1.15.2-cp313-cp313-manylinux_2_17_x86_64.manylinux2014_x86_64.whl.metadata (61 kB)
remote: Collecting joblib>=1.2.0 (from scikit-learn==1.6.1->-r requirements.txt (line 4))
remote: Downloading joblib-1.4.2-py3-none-any.whl.metadata (5.4 kB)
remote: Collecting threadpoolctl>=3.1.0 (from scikit-learn==1.6.1->-r requirements.txt (line 4))
remote: Downloading threadpoolctl-3.6.0-py3-none-any.whl.metadata (13 kB)
remote: Collecting setuptools>=3.0 (from gunicorn==20.1.0->-r requirements.txt (line 5))
remote: Downloading setuptools-78.1.0-py3-none-any.whl.metadata (6.6 kB)
remote: Collecting MarkupSafe>=2.0 (from Jinja2>=3.1.2->Flask==3.1.0->-r requirements.txt (line 1))
remote: Downloading MarkupSafe-3.0.2-cp313-cp313-manylinux_2_17_x86_64.manylinux2014_x86_64.whl.metadata (4.0 kB)
remote: Collecting six>=1.5 (from python-dateutil>=2.8.2->pandas==2.2.3->-r requirements.txt (line 3))
remote: Downloading six-1.17.0-py2.py3-none-any.whl.metadata (1.7 kB)
remote: Downloading flask-3.1.0-py3-none-any.whl (102 kB)
remote: Downloading numpy-2.2.3-cp313-cp313-manylinux_2_17_x86_64.manylinux2014_x86_64.whl (16.1 MB)
remote: Downloading pandas-2.2.3-cp313-cp313-manylinux_2_17_x86_64.manylinux2014_x86_64.whl (12.7 MB)
remote: Downloading scikit_learn-1.6.1-cp313-cp313-manylinux_2_17_x86_64.manylinux2014_x86_64.whl (13.2 MB)

Finally, we can go to the link that shows in the above screenshot and it loads perfectly!

Wine Class Predictor

Alcohol: **13.0**

Malic Acid: **2.5**

Ash: **2.4**

Alcalinity of Ash: **18.0**

Magnesium: **100**

Total Phenols: **2.5**

Flavanoids: **2.5**

Nonflavanoid Phenols: **0.3**

Total Phenols: **2.5**

Flavanoids: **2.5**

Nonflavanoid Phenols: **0.3**

Proanthocyanins: **1.5**

Color Intensity: **5.0**

Hue: **1.0**

OD280/OD315 of Diluted Wines: **3.0**

Proline: **1000**

Predict