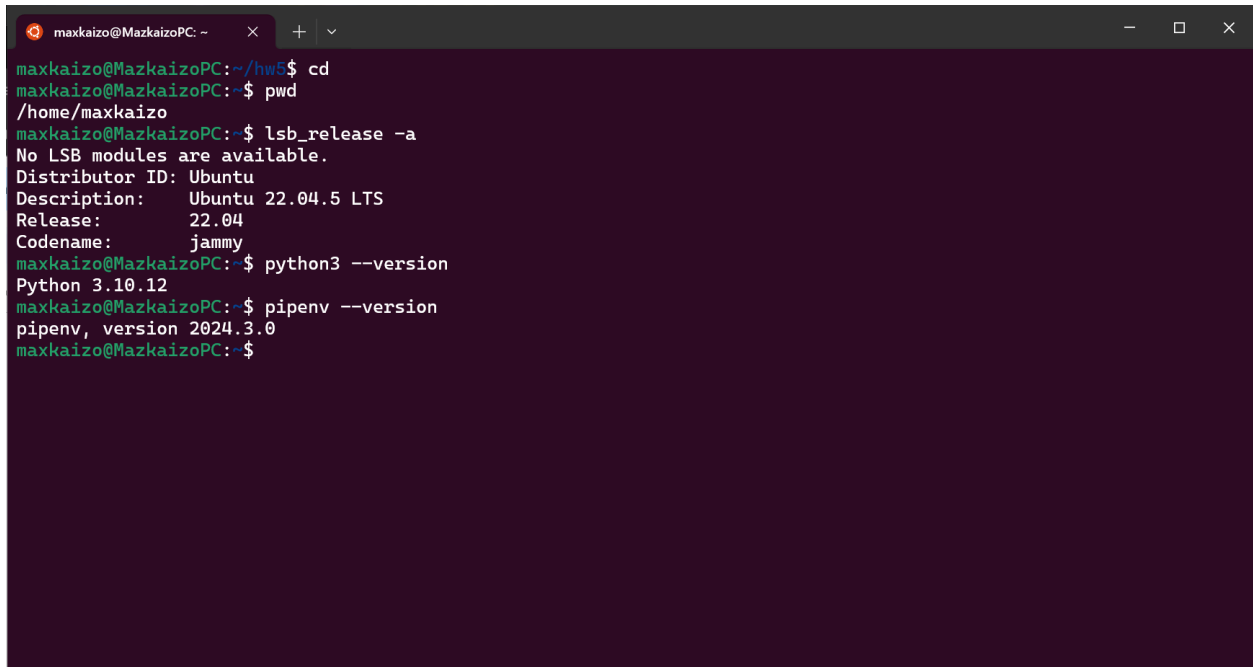


Question 1

Install Pipenv

What's the version of pipenv you installed?

Use --version to find out

A terminal window with a dark purple background. The prompt is 'maxkaizo@MazkaizoPC: ~'. The user enters 'cd ~/hw5', then 'pwd' which outputs '/home/maxkaizo'. Then 'lsb_release -a' outputs system information for Ubuntu 22.04.5 LTS (jammy). Finally, 'python3 --version' outputs 'Python 3.10.12' and 'pipenv --version' outputs 'pipenv, version 2024.3.0'.

```
maxkaizo@MazkaizoPC:~/hw5$ cd
maxkaizo@MazkaizoPC:~$ pwd
/home/maxkaizo
maxkaizo@MazkaizoPC:~$ lsb_release -a
No LSB modules are available.
Distributor ID: Ubuntu
Description:    Ubuntu 22.04.5 LTS
Release:        22.04
Codename:       jammy
maxkaizo@MazkaizoPC:~$ python3 --version
Python 3.10.12
maxkaizo@MazkaizoPC:~$ pipenv --version
pipenv, version 2024.3.0
maxkaizo@MazkaizoPC:~$
```

Question 2

Use Pipenv to install Scikit-Learn version 1.5.2

What's the first hash for scikit-learn you get in Pipfile.lock?

Note: you should create an empty folder for homework and do it there.

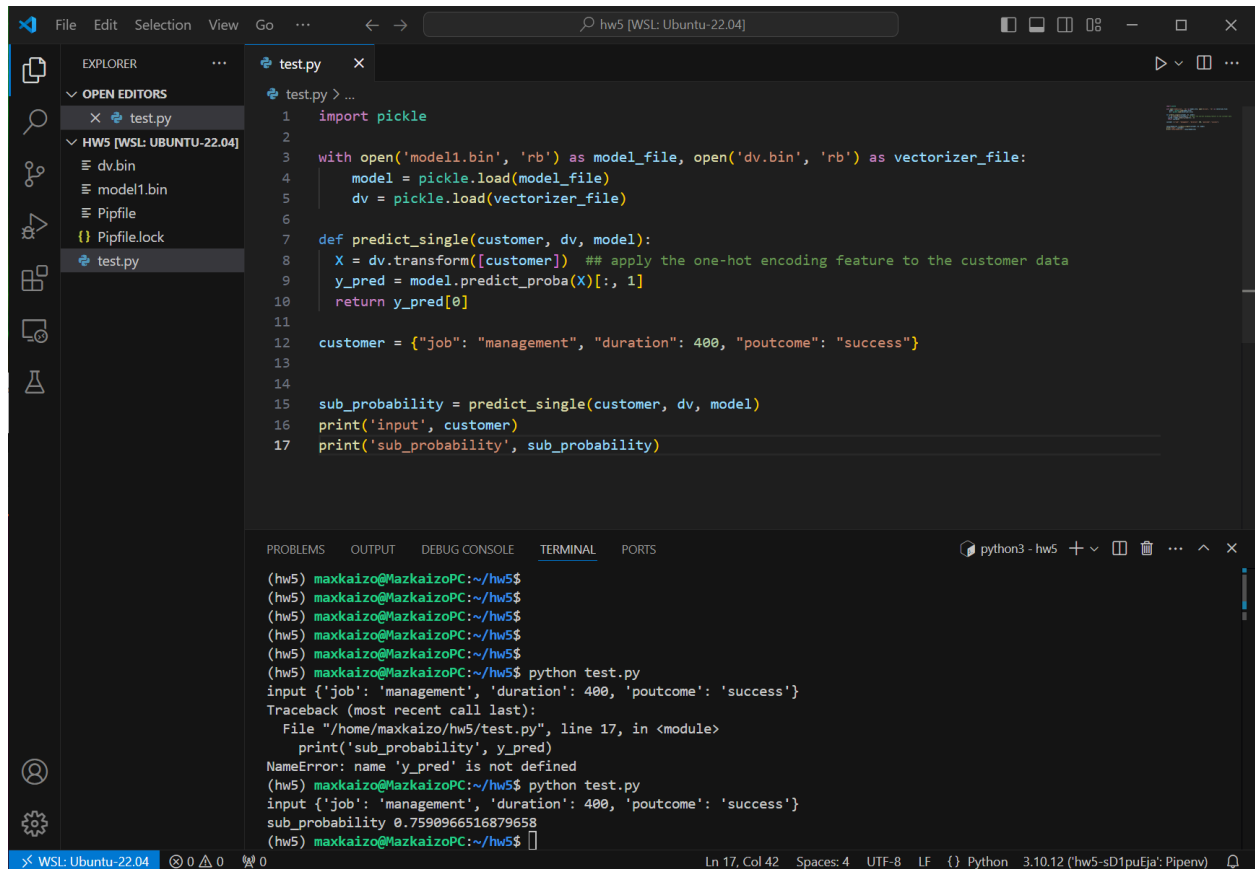
Sha256:03b6158efa3faaf1feea3faa884c840ebd61b6484167c711548fce208ea09445

```
maxkaizo@MazkaizoPC: ~/hw  ×  +  -  □  ×  
    ],  
    "markers": "python_version >= '3.10'",  
    "version": "==2.1.2"  
  },  
  "scikit-learn": {  
    "hashes": [  
      "sha256:03b6158efa3faaf1feea3faa884c840ebd61b6484167c711548fce208ea09445",  
      "sha256:178ddd0a5cb004464fc1bfc4cca5b1833bfc7bb022d70b05db8530da4bb3dd3",  
      "sha256:1ff45e26928d3b4eb767a8f14a9a6efbf1cbff7c05d1fb0f95f211a89fd4f5de",  
      "sha256:299406827fb9a4f86262d0fe6c122f5f87f8910b86fe5daa4c32dcd742139b6",  
      "sha256:2d4cad1119c77930b235579ad0dc25e65c917e756fe80cab96aa3b9428bd3fb0",  
      "sha256:394397841449853c2290a32050382edaec3da89e35b3e03d6cc966aebc6a8ae6",  
      "sha256:3a686885a4b3818d9e62904d91b57fa757fc2bed3e465c8b177be652f4dd37c8",  
      "sha256:3b923d119d65b7bd555c73be5423bf06c0105678ce7e1f558cb4b40b0a5502b1",  
      "sha256:3bed4909ba187aca80580fe2ef370d9180dcf18e621a27c4cf2ef10d279a7efe",  
      "sha256:52788f48b5d8bca5c0736c175fa6bdaab2ef00a8f536cda698db61bd89c551c1",  
      "sha256:57cc1786cfd6bd118220a92ede80270132aa353647684efa385a74244a41e3b1",  
      "sha256:643964678f4b5fbdc95cbf8aec638acc7aa70f5f79ee2cdad1eec3df4ba6ead8",  
      "sha256:6c16d84a0d45e4894832b3c4d0bf73050939e21b99b01b6fd59cbb0cf39163b6",  
      "sha256:757c7d514ddb00ae249832fe87100d9c73c6ea91423802872d9e74970a0e40b9",  
      "sha256:8c412ccc2ad9bf3755915e3908e677b367ebc8d010acbb3f182814524f2e5540",  
      "sha256:b0768ad641981f5d3a198430a1d31c3e044ed2e8a6f22166b4d546a5116d7908",  
      "sha256:b4237ed7b3fdd0a4882792e68ef2545d5baa50aca3bb45aa7df468138ad8f94d",  
      "sha256:b7b0f9a0b1040830d38c39b91b3a44e1b643f4b36e36567b80b7c6bd2202a27f",  
      "sha256:c15b1ca23d7c5f33cc2cb0a0d6aaacf893792271cddff0edbd6a40e8319bc113",  
      "sha256:ca64b3089a6d9b9363cd3546f8978229dccb737aceb2c12144ee3f70f95684b7",  
      "sha256:e9a702e2de732bbb20d3bad29ebd77fc05a6b427dc49964300340e4c9328b3f5",  
    ]  
  }  
}
```

Question 3

What's the probability that this client will get a subscription?

- 0.359
- 0.559
- 0.759
- 0.959



The screenshot shows a VS Code editor window with a file explorer on the left and a terminal at the bottom. The file explorer shows a project named 'hw5 [WSL: UBUNTU-22.04]' containing files 'dv.bin', 'model1.bin', 'Pipfile', 'Pipfile.lock', and 'test.py'. The 'test.py' file is open in the editor, showing the following code:

```
1 import pickle
2
3 with open('model1.bin', 'rb') as model_file, open('dv.bin', 'rb') as vectorizer_file:
4     model = pickle.load(model_file)
5     dv = pickle.load(vectorizer_file)
6
7 def predict_single(customer, dv, model):
8     X = dv.transform([customer]) ## apply the one-hot encoding feature to the customer data
9     y_pred = model.predict_proba(X)[0, 1]
10    return y_pred[0]
11
12 customer = {"job": "management", "duration": 400, "poutcome": "success"}
13
14
15 sub_probability = predict_single(customer, dv, model)
16 print('input', customer)
17 print('sub_probability', sub_probability)
```

The terminal at the bottom shows the execution of the script. It displays the input data and the resulting sub_probability value, along with a traceback for a NameError that occurred during the execution of the print statement on line 17.

```
(hw5) maxkaizo@MazkaizoPC:~/hw5$
(hw5) maxkaizo@MazkaizoPC:~/hw5$
(hw5) maxkaizo@MazkaizoPC:~/hw5$
(hw5) maxkaizo@MazkaizoPC:~/hw5$
(hw5) maxkaizo@MazkaizoPC:~/hw5$
(hw5) maxkaizo@MazkaizoPC:~/hw5$ python test.py
input {'job': 'management', 'duration': 400, 'poutcome': 'success'}
Traceback (most recent call last):
  File "/home/maxkaizo/hw5/test.py", line 17, in <module>
    print('sub_probability', y_pred)
NameError: name 'y_pred' is not defined
(hw5) maxkaizo@MazkaizoPC:~/hw5$ python test.py
input {'job': 'management', 'duration': 400, 'poutcome': 'success'}
sub_probability 0.7590966516879658
(hw5) maxkaizo@MazkaizoPC:~/hw5$
```

Question 4

Now let's serve this model as a web service

Install Flask and gunicorn (or waitress, if you're on Windows)

Write Flask code for serving the model

Now score this client using requests:

Direct

The screenshot shows a VS Code editor with the following components:

- EXPLORER:** Lists files including `test.py`, `sub_serving.py`, `predict.py`, `ping.py`, `__pycache__`, `dv.bin`, `model1.bin`, `Pipfile`, `Pipfile.lock`, `README.md`, `sub_serving.py`, and `test.py`.
- EDITOR:** Displays the `predict.py` file with the following code:

```
1 import requests
2
3 url = 'http://localhost:9696/predict'
4
5 customer = {"job": "student", "duration": 280, "outcome": "failure"}
6
7 response = requests.post(url, json=customer).json()
8
9 print(response)
```
- TERMINAL:** Shows the command `python3 predict.py` being executed, resulting in the output: `{'subscription': False, 'subscription probability': 0.33480703475511053}`.
- OUTPUT:** Displays the output of the `gunicorn` command, showing the server starting and listening on `http://0.0.0.0:9696`.

Question 5

Download the base image `svizor/zoomcamp-model:3.11.5-slim`. You can easily make it by using `docker pull` command.

So what's the size of this base image?

- 45 MB
- 130 MB
- 245 MB
- 330 MB

```
maxkaizo@MazkaizoPC: ~  
maxkaizo@MazkaizoPC:~$ docker images  
permission denied while trying to connect to the Docker daemon socket at unix:///var/run/docker.sock: Get "http://%2Fvar%2Frun%2Fdocker.sock/v1.24/images/json": dial unix /var/run/docker.sock: connect: permission denied  
maxkaizo@MazkaizoPC:~$ sudo docker images  
REPOSITORY      TAG              IMAGE ID         CREATED          SIZE  
hello-world      latest           d2c94e258dcb    18 months ago   13.3kB  
maxkaizo@MazkaizoPC:~$ sudo docker pull svizor/zoomcamp-model:3.11.5-slim  
3.11.5-slim: Pulling from svizor/zoomcamp-model  
a803e7c4b030: Pull complete  
bf3336e84c8e: Pull complete  
eb76b60fbb0c: Pull complete  
a2cee97f4fbd: Pull complete  
0358d4e17ae3: Pull complete  
fb37f8d7a667: Pull complete  
4e69cd59a5af: Pull complete  
Digest: sha256:15d61790363f892dfdef55f47b78feed751cb59704d47ea911df0ef3e9300c06  
Status: Downloaded newer image for svizor/zoomcamp-model:3.11.5-slim  
docker.io/svizor/zoomcamp-model:3.11.5-slim  
maxkaizo@MazkaizoPC:~$ sudo docker images  
REPOSITORY      TAG              IMAGE ID         CREATED          SIZE  
svizor/zoomcamp-model  3.11.5-slim     975e7bdca086    12 days ago     130MB  
hello-world      latest           d2c94e258dcb    18 months ago   13.3kB  
maxkaizo@MazkaizoPC:~$
```

Question 6

What's the probability that this client will get a subscription now?

- 0.287
- 0.530
- 0.757
- 0.960

```
maxkaizo@MazkaizoPC: ~/do x + v - □ x \wsl.localhost\Ubuntu-22.04\home\maxkaizo\docker_test\Dockefile - Sublime Text (UNREC)

^C[2024-10-31 03:40:37 +0000] [7] [INFO] Handling signal: int
[2024-10-31 03:40:37 +0000] [8] [INFO] Worker exiting (pid: 8)
[2024-10-31 03:40:37 +0000] [7] [INFO] Shutting down: Master
maxkaizo@MazkaizoPC: ~/docker_test$ sudo docker run -it --rm -p 96
96:9696 myimage
[2024-10-31 03:40:43 +0000] [7] [INFO] Starting gunicorn 23.0.0
[2024-10-31 03:40:43 +0000] [7] [INFO] Listening at: http://0.0.0
.0:9696 (7)
[2024-10-31 03:40:43 +0000] [7] [INFO] Using worker: sync
[2024-10-31 03:40:43 +0000] [8] [INFO] Booting worker with pid: 8
^C[2024-10-31 03:40:53 +0000] [7] [INFO] Handling signal: int
[2024-10-31 03:40:53 +0000] [8] [INFO] Worker exiting (pid: 8)
[2024-10-31 03:40:53 +0000] [7] [INFO] Shutting down: Master
maxkaizo@MazkaizoPC: ~/docker_test$
maxkaizo@MazkaizoPC: ~/docker_test$
maxkaizo@MazkaizoPC: ~/docker_test$
maxkaizo@MazkaizoPC: ~/docker_test$ sudo docker run -it --rm -p 96
96:9696 myimage
[2024-10-31 03:41:03 +0000] [7] [INFO] Starting gunicorn 23.0.0
[2024-10-31 03:41:03 +0000] [7] [INFO] Listening at: http://0.0.0
.0:9696 (7)
[2024-10-31 03:41:03 +0000] [7] [INFO] Using worker: sync
[2024-10-31 03:41:03 +0000] [8] [INFO] Booting worker with pid: 8

2 lines, 54 characters selected

Dockefile x
FROM svizor/zoomcamp-model:3.11.5-slim

# Actualiza repositorios
RUN apt update

# instala pipenv

RUN pip install pipenv
RUN apt install -y pipenv

# Copia los archivos de dependencias
WORKDIR /app
COPY Pipfile* /app/

# instala las dependencias pero a nivel sistema
RUN pipenv install --system --deploy --ignore-pipfile

# Copia los archivos del proyecto
COPY sub_serving.py /app/

# Exponer el puerto
EXPOSE 9696

# Especificar punto de entrada
ENTRYPOINT gunicorn --bind=0.0.0.0:9696 sub_serving:app

maxkaizo@MazkaizoPC: ~/hw x + v - □ x
Failed to establish a new connection: [Errno 111] Connection refused'))

During handling of the above exception, another exception occurred:

Traceback (most recent call last):
  File "/home/maxkaizo/hw5/predict.py", line 7, in <module>
    response = requests.post(url, json=customer).json()
  File "/usr/lib/python3/dist-packages/requests/api.py", line 119, in post
    return request('post', url, data=data, json=json, **kwargs)
  File "/usr/lib/python3/dist-packages/requests/api.py", line 61, in request
    return session.request(method=method, url=url, **kwargs)
  File "/usr/lib/python3/dist-packages/requests/sessions.py", line 544, in request
    resp = self.send(prepare, **send_kwargs)
  File "/usr/lib/python3/dist-packages/requests/sessions.py", line 657, in send
    r = adapter.send(request, **kwargs)
  File "/usr/lib/python3/dist-packages/requests/adapters.py", line 516, in send
    raise ConnectionError(e, request=request)
requests.exceptions.ConnectionError: HTTPConnectionPool(host='localhost', port=9696): Max retries exceeded w
ith url: /predict (Caused by NewConnectionError('<urllib3.connection.HTTPConnection object at 0x7f54d2549a20
>: Failed to establish a new connection: [Errno 111] Connection refused'))
maxkaizo@MazkaizoPC: ~/hw5$
maxkaizo@MazkaizoPC: ~/hw5$
maxkaizo@MazkaizoPC: ~/hw5$
maxkaizo@MazkaizoPC: ~/hw5$
maxkaizo@MazkaizoPC: ~/hw5$
maxkaizo@MazkaizoPC: ~/hw5$ python3 predict.py
{'subscription': False, 'subscription probability': 0.2812601987158518}
maxkaizo@MazkaizoPC: ~/hw5$
```