MachineLearning

exercise1.py .../WilliamsBenjamin_HW1/... U | exercise2.py .../WilliamsBenjamin_HW1/... U | image.png

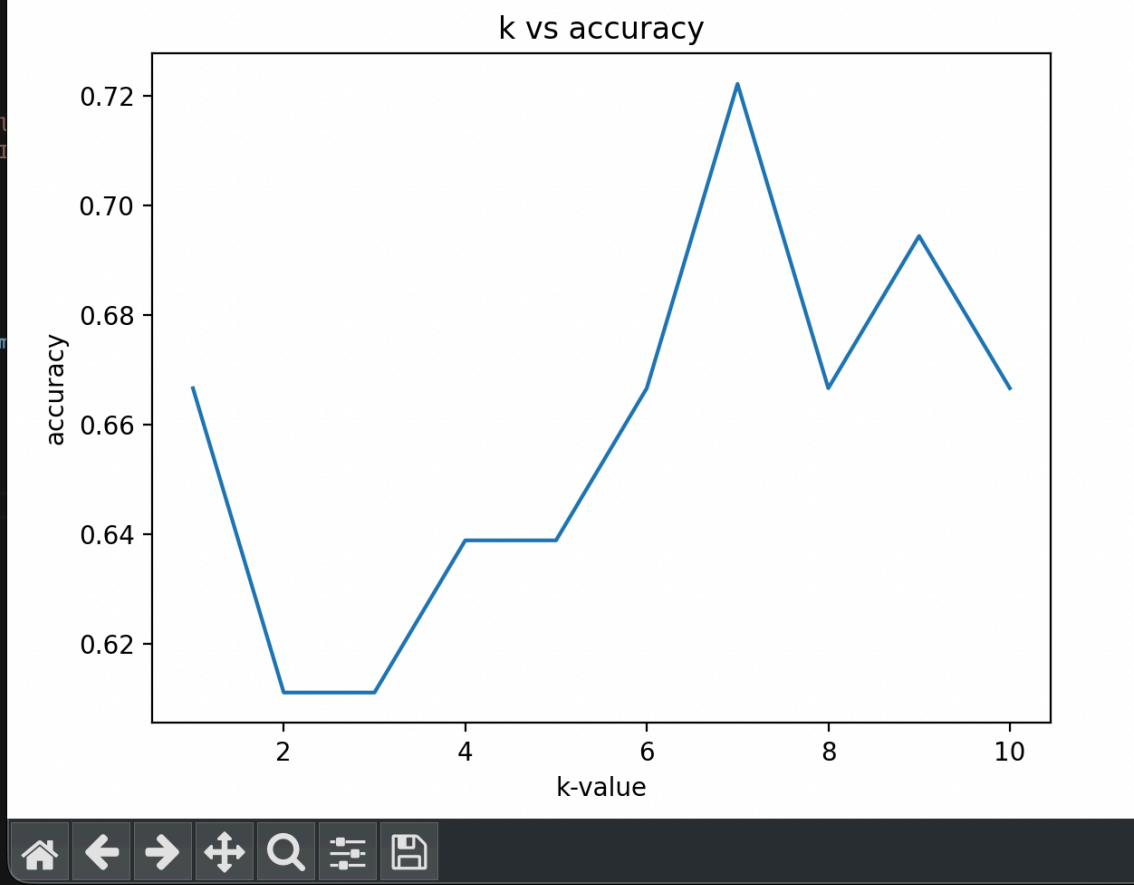
HW > WilliamsBenjamin_HW1 > Exercise1 > exercise1.py > ...

```python
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
from sklearn.model_selection import train_test_split
from sklearn.metrics import accuracy_score
from sklearn.neighbors import KNeighborsClassifier
from sklearn.metrics import confusion_matrix
import seaborn as sns



names =  ["class", "Alcohol","Malic Acid","Ash","Acadlinity","Magnisium","Total
          "Flavanoids","NonFlavanoid Phenols", "Proanthocyanins", "Color I
          "Hue", "OD280/OD315", "Proline" ]
df = pd.read_csv("wine.data.csv", header=None, names = names)

x = np.array(df.iloc[:, 1:14])
y = np.array(df['class'])

x_train, x_test, y_train, y_test = train_test_split(x, y, test_size=0.2, random

results = []
for i in range(1, 11):
    knn = KNeighborsClassifier(i)
    knn.fit(x_train, y_train)
    y_pred = knn.predict(x_test)
    accuracy = accuracy_score(y_test, y_pred)
    results.append([i, accuracy])


ks = [row[0] for row in results]
acc = [row[1] for row in results]

plt.plot(ks, acc)
plt.xlabel("k-value")
plt.ylabel("accuracy")
plt.title("k vs accuracy")
plt.show()

```

CHAT TERMINAL

```
    )
    ^
  File "/Users/benwilliams/Documents/Development/MachineLearning/
.venv/lib/python3.13/site-packages/pandas/io/common.py", line 926
```

Figure 1

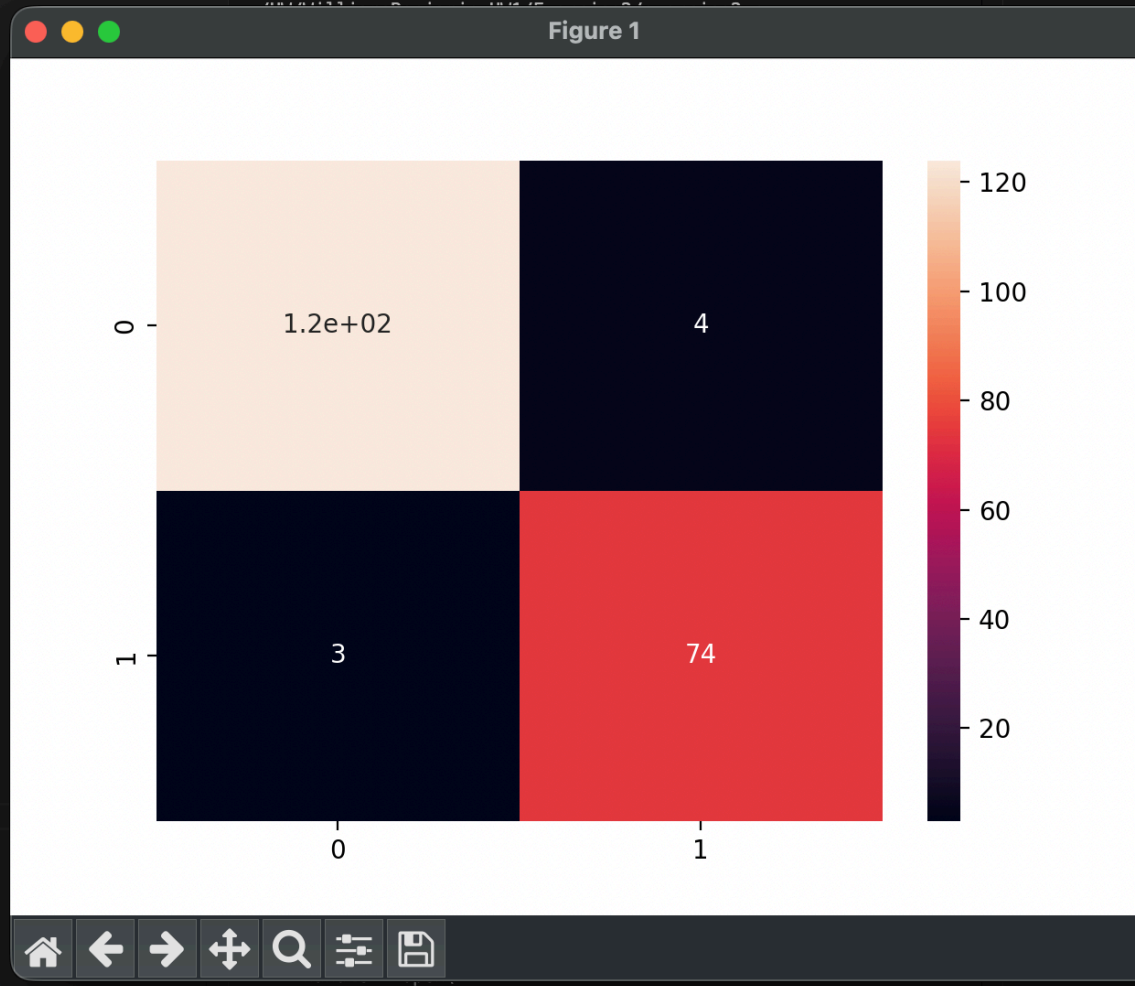



```
  File "/Users/benwilliams/Documents/Development/MachineLearning/
.venv/lib/python3.13/site-packages/matplotlib/backend_bases.py",
line 1660, in _allow_interrupt
    old_sigint_handler(*handler_args)
KeyboardInterrupt

(.venv) benwilliams@Bens-MacBook-Air-2 Exercise2 % cd ../Exercise
1
(.venv) benwilliams@Bens-MacBook-Air-2 Exercise1 % /Users/benwill
iams/Documents/Development/MachineLearning/.venv/bin/python /User
s/benwilliams/Documents/Development/MachineLearning/HW/WilliamsBe
```

exercise2.py .../WilliamsBenjamin_HW1/... U | exercise3.py U | breast-cancer-wisconsin.data.csv U

HW > WilliamsBenjamin_HW1 > Exercise2 > exercise2.py > ...

```python
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
from sklearn.model_selection import train_test_split
from sklearn.metrics import accuracy_score
from sklearn.neighbors import KNeighborsClassifier
from sklearn.metrics import confusion_matrix
import seaborn as sns


df = pd.read_csv("breast-cancer-wisconsin.data.csv", header=None)

df = df.replace("?", np.nan).dropna()

x = df.iloc[:, 1:-1].astype(float).to_numpy()
y = df.iloc[:, -1].astype(int).to_numpy()

x_train, x_test, y_train, y_test = train_test_split(x, y, test_size=0.3, random_state=3)

knn = KNeighborsClassifier(n_neighbors=5)
knn.fit(x_train, y_train)
y_pred = knn.predict(x_test)

cm = confusion_matrix(y_test, y_pred)

accuracy = accuracy_score(y_test, y_pred)
print(f"Accuracy: {accuracy*100:.2f}%")

sns.heatmap(cm, annot=True)
plt.show()
```



CHAT TERMINAL

n/python /Users/benwilliams/Documents/Development/MachineLearning

zsh

```
        handle,
    ...<3 lines>...
        newline="",
    )
FileNotFoundError: [Errno 2] No such file or directory: 'breast-cancer-wisconsin.data.csv'
(.venv) benwilliams@Bens-MacBook-Air-2 MachineLearning % cd HW/WilliamsBenjamin_HW1/Exercise2
(.venv) benwilliams@Bens-MacBook-Air-2 Exercise2 % /Users/benwilliams/Documents/Development/MachineLearning/.venv/bin/python /Users/benwilliams/Documents/Development/MachineLearning/HW/WilliamsBenjamin_HW1/Exercise2/exercise2.py
Accuracy: 96.59%
(.venv) benwilliams@Bens-MacBook-Air-2 Exercise2 % /Users/benwilliams/Documents/Development/MachineLearning/.venv/bin/python /Users/benwilliams/Documents/Development/MachineLearning/HW/WilliamsBenjamin_HW1/Exercise2/exercise2.py
Accuracy: 96.59%
```

Ln 30, Col 1 Spaces: 4 UTF-8 LF {} Python .venv (3.13.7)

.py .../WilliamsBenjamin_HW1/... U | image.png .../WilliamsBenjamin_HW1/Exercise2 U | exercise3.py U

HW > WilliamsBenjamin_HW1 > Exercise3 > exercise3.py > ...

```python
n = 100
open_lockers = [False] * (n + 1)

for student in range(1, n + 1):
    #for each student, we start at the students number, and add the number of the student to follo
    #the described pattern
    for locker in range(student, n + 1, student):
        #All students, even the first and second, change the state of every locker they visit
        open_lockers[locker] = not open_lockers[locker]

#Find the open lockers
result = [i for i in range(1, n + 1) if open_lockers[i]]
print(result)
print('Interesting, it ends up being the perfect squares up to 100!')

```

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```
.framework/Versions/3.13/lib/python3.13/contextlib.py", line 148,
 in __exit__
    next(self.gen)
    ^^^^^^^^^^^^^^
  File "/Users/benwilliams/Documents/Development/MachineLearning/
.venv/lib/python3.13/site-packages/matplotlib/backend_bases.py",
line 1660, in _allow_interrupt
    old_sigint_handler(*handler_args)
    ^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^
KeyboardInterrupt

(.venv) benwilliams@Bens-MacBook-Air-2 Exercise1 % cd ../Exercise
3
(.venv) benwilliams@Bens-MacBook-Air-2 Exercise3 % /Users/benwill
iams/Documents/Development/MachineLearning/.venv/bin/python /User
s/benwilliams/Documents/Development/MachineLearning/HW/WilliamsBe
njamin_HW1/Exercise3/exercise3.py
[1, 4, 9, 16, 25, 36, 49, 64, 81, 100]
(.venv) benwilliams@Bens-MacBook-Air-2 Exercise3 % /Users/benwill
iams/Documents/Development/MachineLearning/.venv/bin/python /User
s/benwilliams/Documents/Development/MachineLearning/HW/WilliamsBe
njamin_HW1/Exercise3/exercise3.py
[1, 4, 9, 16, 25, 36, 49, 64, 81, 100]
Interesting, it ends up being the perfect squares up to 100!
```