Q6. Use Simple Kmeans, DBScan, Hierachical clustering algorithms for clustering. Compare the performance of clusters by changing the parameters involved in the algorithms.

```
from google.colab import drive
drive.mount('/content/gdrive')
```

```
Drive already mounted at /content/gdrive; to attempt to forcibly remount, call drive.mou
```

```
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
from sklearn.cluster import KMeans
from sklearn.cluster import hierarchical
from sklearn.cluster import DBSCAN
from sklearn import preprocessing
from sklearn.decomposition import PCA
from sklearn.cluster import KMeans
```

```
iris=pd.read_csv('/content/gdrive/MyDrive/iris.csv')
print(iris)
#print(iris.keys())
```

```
     sepal_length  sepal_width  petal_length  petal_width    species
                                         1.4          0.2     setosa
                                         1.4          0.2     setosa
                                         1.3          0.2     setosa
3             4.6          3.1           1.5          0.2     setosa
4             5.0          3.6           1.4          0.2     setosa
..            ...          ...           ...          ...        ...
145           6.7          3.0           5.2          2.3  virginica
146           6.3          2.5           5.0          1.9  virginica
147           6.5          3.0           5.2          2.0  virginica
148           6.2          3.4           5.4          2.3  virginica
149           5.9          3.0           5.1          1.8  virginica

[150 rows x 5 columns]
```

Saving...

```
sep_l=iris.values[:,0]
print(sep_l)
#print(len(sep_l))
sep_w=iris.values[:,1]
print(sep_w)
#print(len(sep_w))
pet_l=iris.values[:,2]
print(pet_l)
#print(len(pet_l))
pet_w=iris.values[:,3]
```

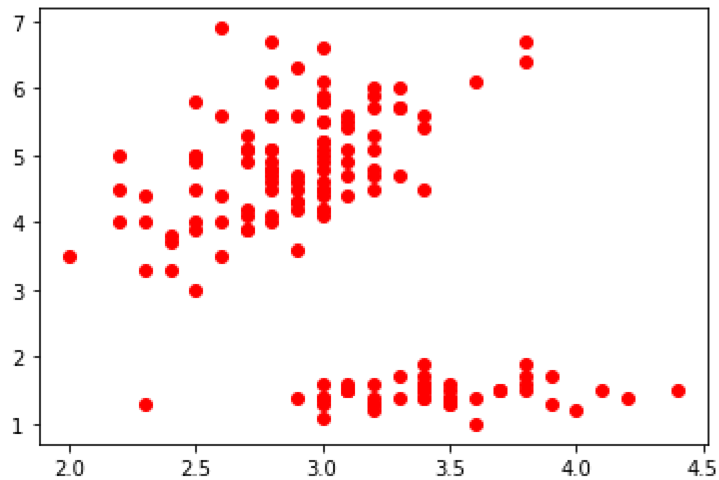
```
pet_w=iris.values[:,3]
print(pet_w)
#print(len(pet_w))
```

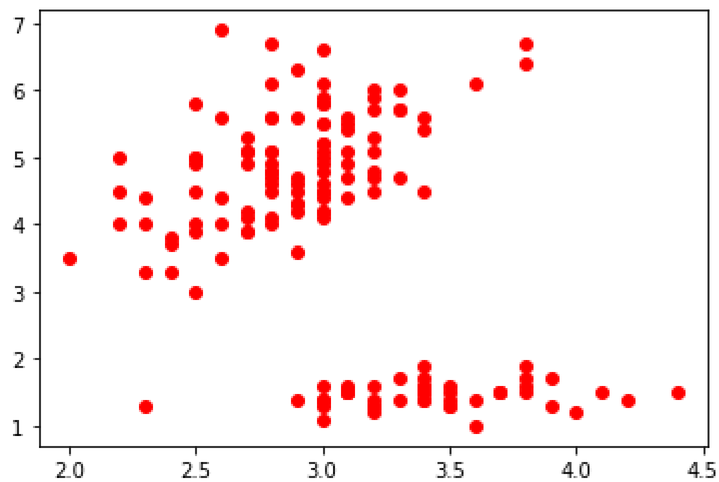
```
[5.1 4.9 4.7 4.6 5.0 5.4 4.6 5.0 4.4 4.9 5.4 4.8 4.8 4.3 5.8 5.7 5.4 5.1
 5.7 5.1 5.4 5.1 4.6 5.1 4.8 5.0 5.0 5.2 5.2 4.7 4.8 5.4 5.2 5.5 4.9 5.0
 5.5 4.9 4.4 5.1 5.0 4.5 4.4 5.0 5.1 4.8 5.1 4.6 5.3 5.0 7.0 6.4 6.9 5.5
 6.5 5.7 6.3 4.9 6.6 5.2 5.0 5.9 6.0 6.1 5.6 6.7 5.6 5.8 6.2 5.6 5.9 6.1
 6.3 6.1 6.4 6.6 6.8 6.7 6.0 5.7 5.5 5.5 5.8 6.0 5.4 6.0 6.7 6.3 5.6 5.5
 5.5 6.1 5.8 5.0 5.6 5.7 5.7 6.2 5.1 5.7 6.3 5.8 7.1 6.3 6.5 7.6 4.9 7.3
 6.7 7.2 6.5 6.4 6.8 5.7 5.8 6.4 6.5 7.7 7.7 6.0 6.9 5.6 7.7 6.3 6.7 7.2
 6.2 6.1 6.4 7.2 7.4 7.9 6.4 6.3 6.1 7.7 6.3 6.4 6.0 6.9 6.7 6.9 5.8 6.8
 6.7 6.7 6.3 6.5 6.2 5.9]
[3.5 3.0 3.2 3.1 3.6 3.9 3.4 3.4 2.9 3.1 3.7 3.4 3.0 3.0 4.0 4.4 3.9 3.5
 3.8 3.8 3.4 3.7 3.6 3.3 3.4 3.0 3.4 3.5 3.4 3.2 3.1 3.4 4.1 4.2 3.1 3.2
 3.5 3.1 3.0 3.4 3.5 2.3 3.2 3.5 3.8 3.0 3.8 3.2 3.7 3.3 3.2 3.2 3.1 2.3
 2.8 2.8 3.3 2.4 2.9 2.7 2.0 3.0 2.2 2.9 2.9 3.1 3.0 2.7 2.2 2.5 3.2 2.8
 2.5 2.8 2.9 3.0 2.8 3.0 2.9 2.6 2.4 2.4 2.7 2.7 3.0 3.4 3.1 2.3 3.0 2.5
 2.6 3.0 2.6 2.3 2.7 3.0 2.9 2.9 2.5 2.8 3.3 2.7 3.0 2.9 3.0 3.0 2.5 2.9
 2.5 3.6 3.2 2.7 3.0 2.5 2.8 3.2 3.0 3.8 2.6 2.2 3.2 2.8 2.8 2.7 3.3 3.2
 2.8 3.0 2.8 3.0 2.8 3.8 2.8 2.8 2.6 3.0 3.4 3.1 3.0 3.1 3.1 3.1 2.7 3.2
 3.3 3.0 2.5 3.0 3.4 3.0]
[1.4 1.4 1.3 1.5 1.4 1.7 1.4 1.5 1.4 1.5 1.5 1.6 1.4 1.1 1.2 1.5 1.3 1.4
 1.7 1.5 1.7 1.5 1.0 1.7 1.9 1.6 1.6 1.5 1.4 1.6 1.6 1.5 1.5 1.4 1.5 1.2
 1.3 1.5 1.3 1.5 1.3 1.3 1.3 1.6 1.9 1.4 1.6 1.4 1.5 1.4 4.7 4.5 4.9 4.0
 4.6 4.5 4.7 3.3 4.6 3.9 3.5 4.2 4.0 4.7 3.6 4.4 4.5 4.1 4.5 3.9 4.8 4.0
 4.9 4.7 4.3 4.4 4.8 5.0 4.5 3.5 3.8 3.7 3.9 5.1 4.5 4.5 4.7 4.4 4.1 4.0
 4.4 4.6 4.0 3.3 4.2 4.2 4.2 4.3 3.0 4.1 6.0 5.1 5.9 5.6 5.8 6.6 4.5 6.3
 5.8 6.1 5.1 5.3 5.5 5.0 5.1 5.3 5.5 6.7 6.9 5.0 5.7 4.9 6.7 4.9 5.7 6.0
 4.8 4.9 5.6 5.8 6.1 6.4 5.6 5.1 5.6 6.1 5.6 5.5 4.8 5.4 5.6 5.1 5.1 5.9
 5.7 5.2 5.0 5.2 5.4 5.1]
[0.2 0.2 0.2 0.2 0.2 0.4 0.3 0.2 0.2 0.1 0.2 0.2 0.1 0.1 0.2 0.4 0.4 0.3
 [illegible]2 0.4 0.2 0.2 0.2 0.2 0.4 0.1 0.2 0.1 0.2
 [illegible]6 0.4 0.3 0.2 0.2 0.2 0.2 1.4 1.5 1.5 1.3
 [illegible]5 1.0 1.4 1.3 1.4 1.5 1.0 1.5 1.1 1.8 1.3
 1.5 1.2 1.3 1.4 1.4 1.7 1.5 1.0 1.1 1.0 1.2 1.6 1.5 1.6 1.5 1.3 1.3 1.3
 1.2 1.4 1.2 1.0 1.3 1.2 1.3 1.3 1.1 1.3 2.5 1.9 2.1 1.8 2.2 2.1 1.7 1.8
 1.8 2.5 2.0 1.9 2.1 2.0 2.4 2.3 1.8 2.2 2.3 1.5 2.3 2.0 2.0 1.8 2.1 1.8
 1.8 1.8 2.1 1.6 1.9 2.0 2.2 1.5 1.4 2.3 2.4 1.8 1.8 2.1 2.4 2.3 1.9 2.3
 2.5 2.3 1.9 2.0 2.3 1.8]
```

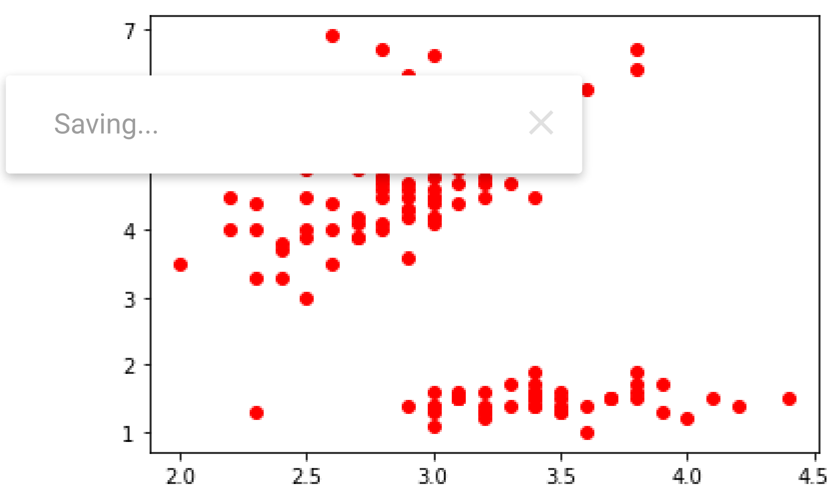
Saving...

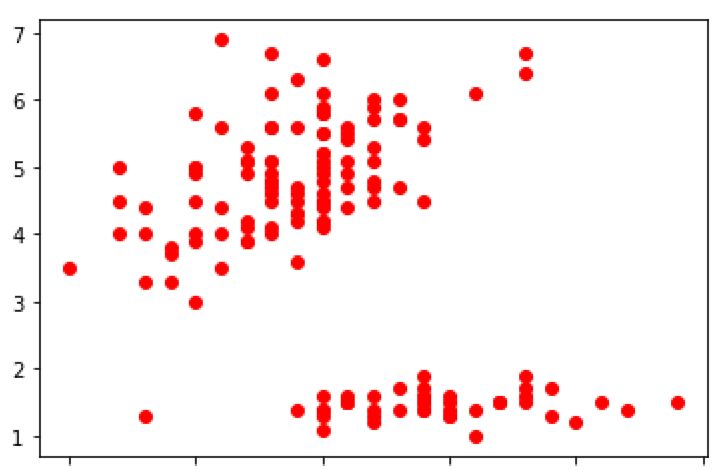
Taking Sepal Width and Petal Length as our two features for clustering

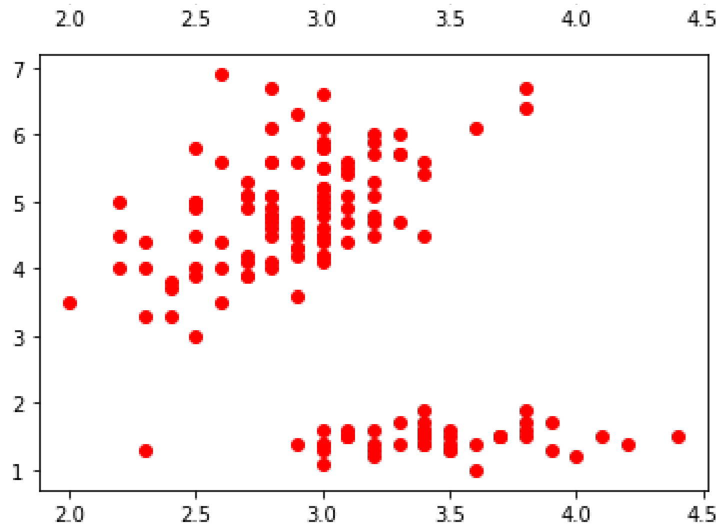
```
for i in range(150):
  if i<=49:
    plt.plot(iris.values[i:,1],iris.values[i:,2],'ro')
  if i>49 and i<=99:
    plt.plot(iris.values[i:,1],iris.values[i:,2],'bo')
  if i>99:
    plt.plot(iris.values[i:,1],iris.values[i:,2],'go')
  plt.show()
```

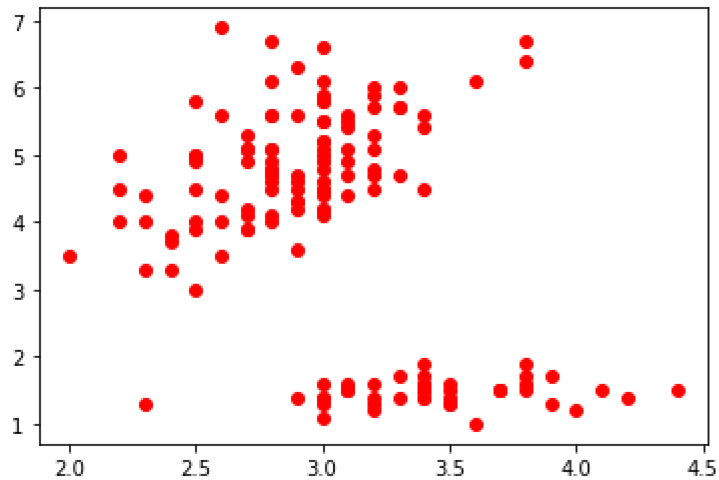

7
6
5
4
3
2
1
2.0
2.5
3.0
3.5
4.0
4.5

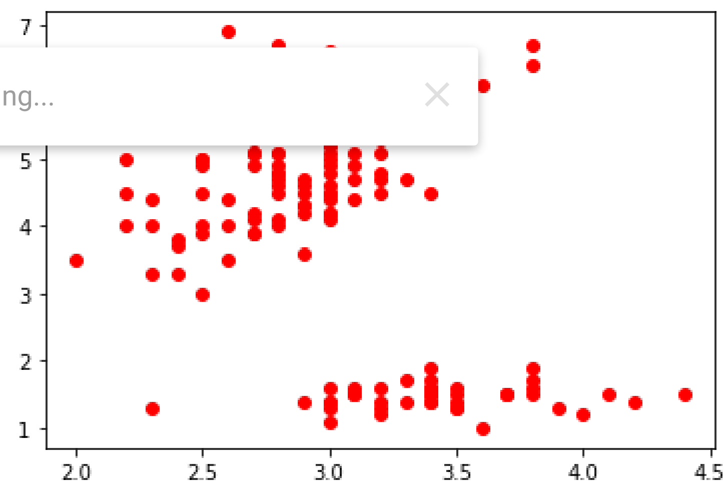

7
6
5
4
3
2
1
2.0
2.5
3.0
3.5
4.0
4.5

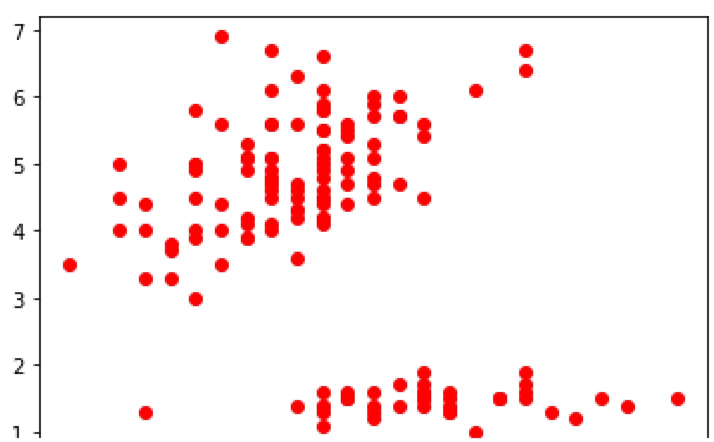

7
Saving...
4
3
2
1
2.0
2.5
3.0
3.5
4.0
4.5


7
6
5
4
3
2
1

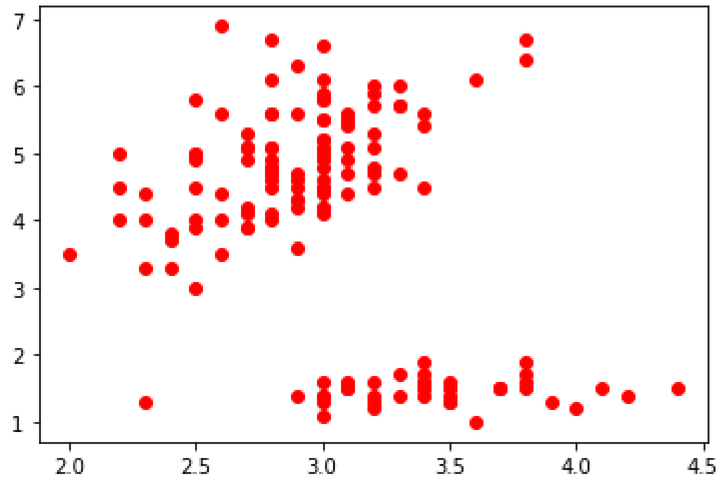

2.0 2.5 3.0 3.5 4.0 4.5
1 2 3 4 5 6 7
2.0 2.5 3.0 3.5 4.0 4.5

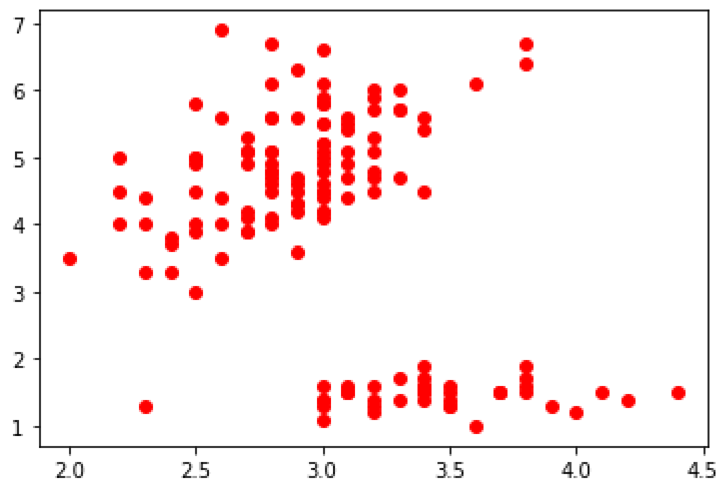

1 2 3 4 5 6 7
2.0 2.5 3.0 3.5 4.0 4.5

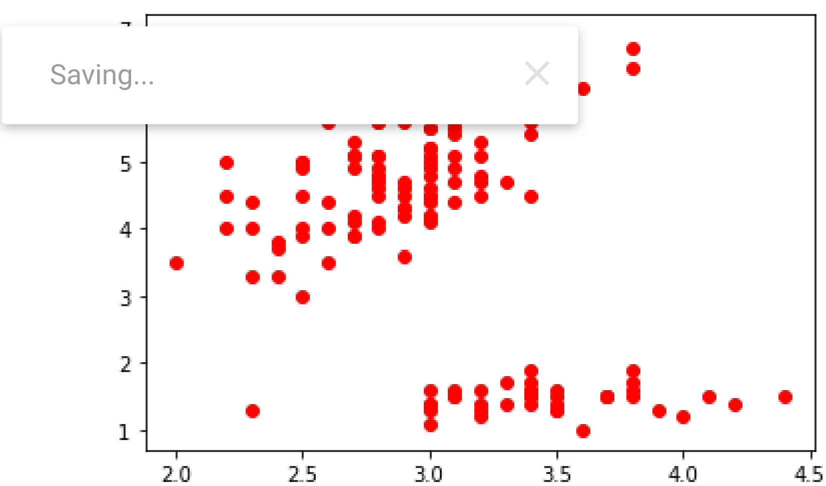

1 2 3 4 5 7
2.0 2.5 3.0 3.5 4.0 4.5

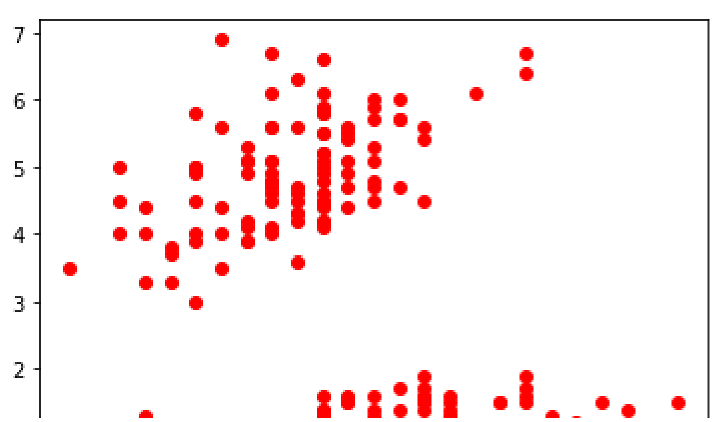

1 2 3 4 5 6 7

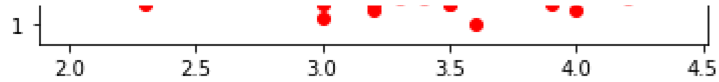

2.0
2.5
3.0
3.5
4.0
4.5

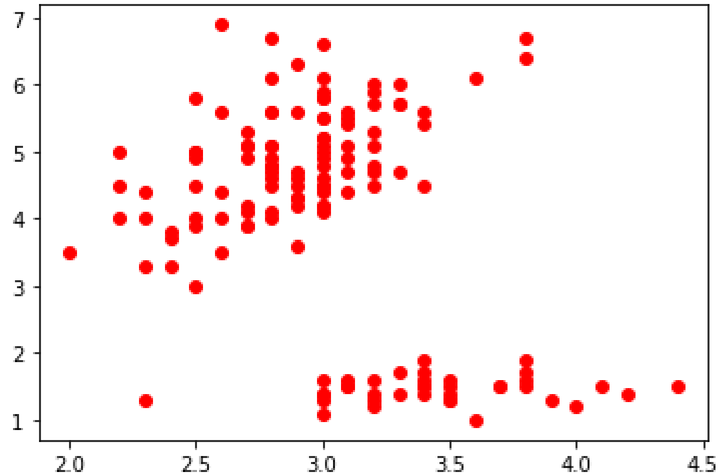

1
2
3
4
5
6
7
2.0
2.5
3.0
3.5
4.0
4.5

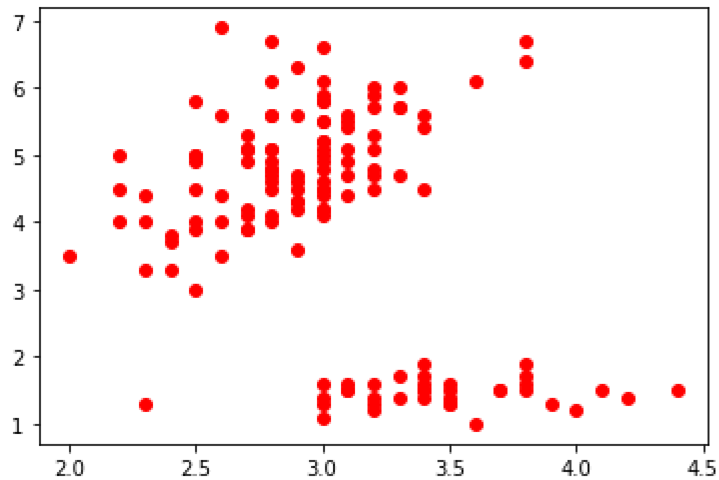

1
2
3
4
5
6
7
2.0
2.5
3.0
3.5
4.0
4.5


Saving...
1
2
3
4
5
2.0
2.5
3.0
3.5
4.0
4.5

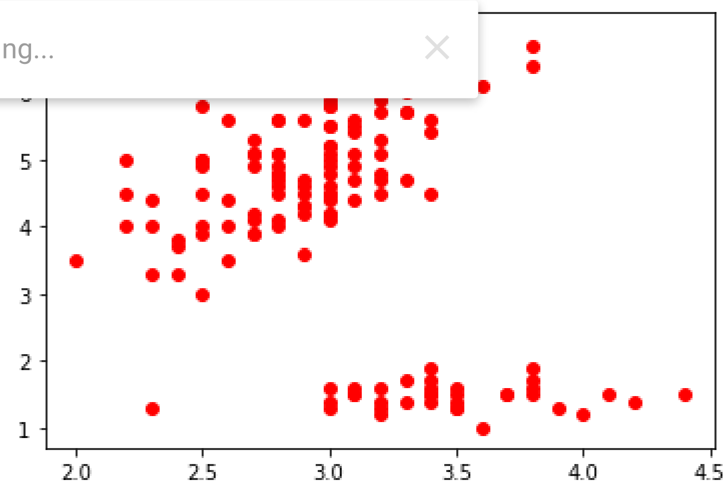

2
3
4
5
6
7

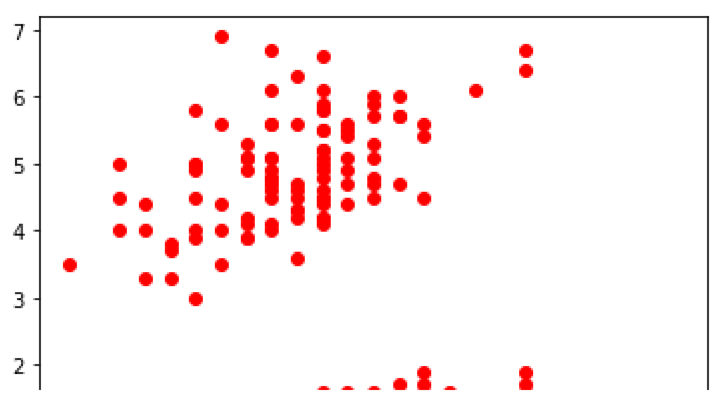

1
2.0
2.5
3.0
3.5
4.0
4.5

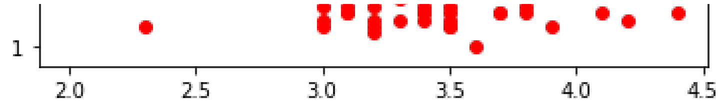

1
2
3
4
5
6
7
2.0
2.5
3.0
3.5
4.0
4.5

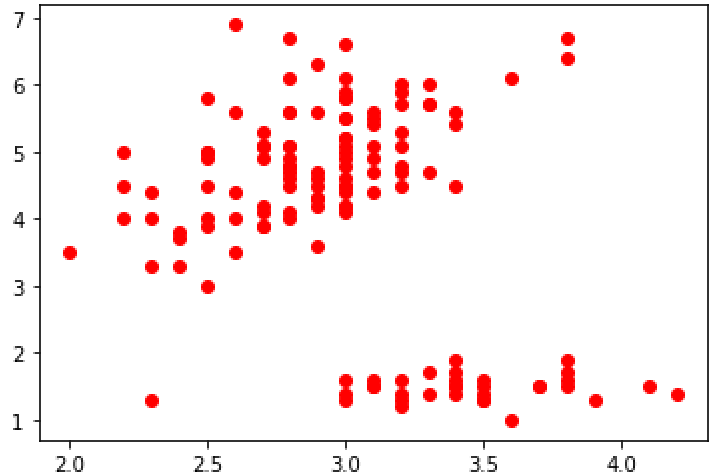

1
2
3
4
5
6
7
2.0
2.5
3.0
3.5
4.0
4.5

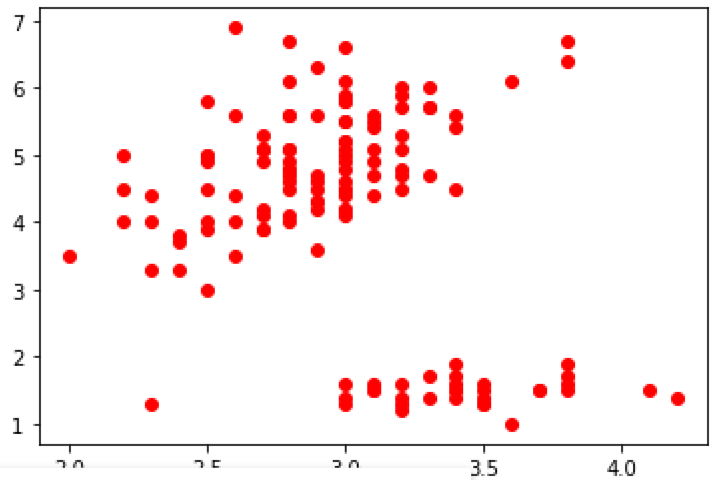
Saving...


1
2
3
4
5
2.0
2.5
3.0
3.5
4.0
4.5

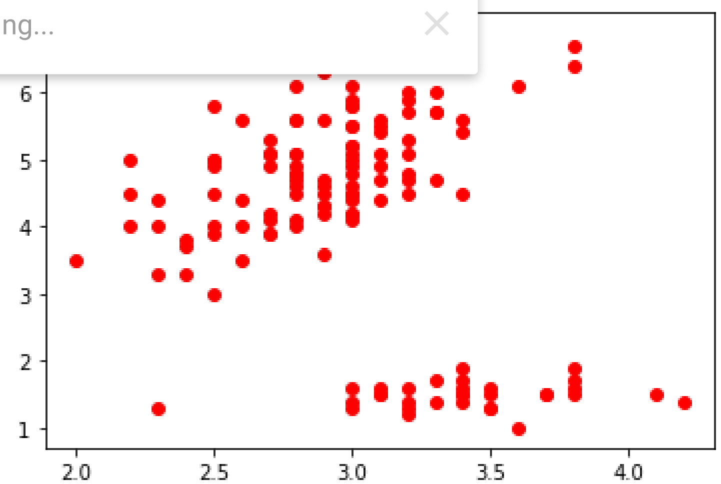

2
3
4
5
6
7

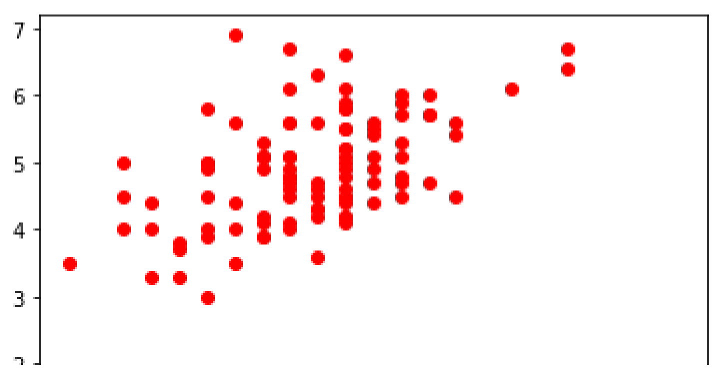

1
2.0
2.5
3.0
3.5
4.0
4.5

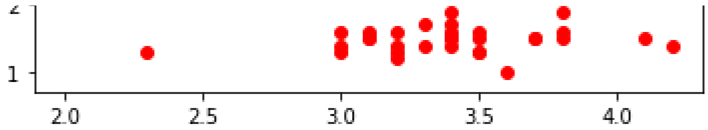

7
6
5
4
3
2
1
2.0
2.5
3.0
3.5
4.0

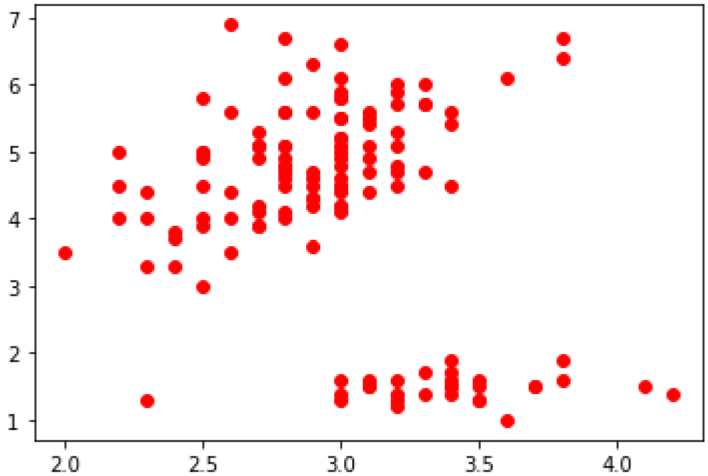

7
6
5
4
3
2
1
3.5
4.0

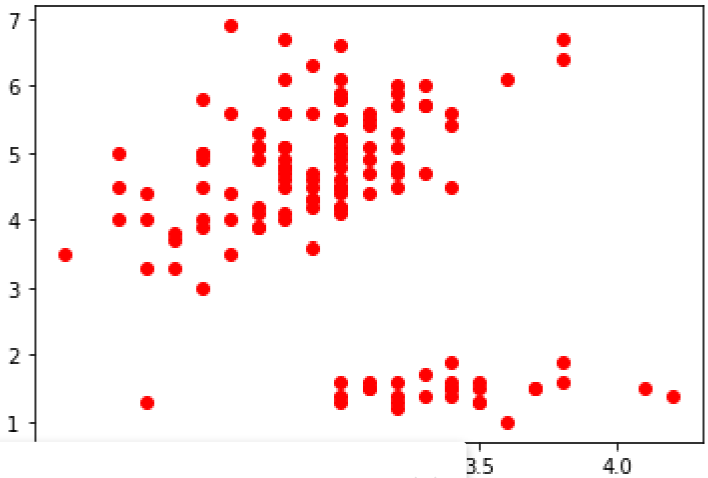
Saving...


6
5
4
3
2
1
2.0
2.5
3.0
3.5
4.0

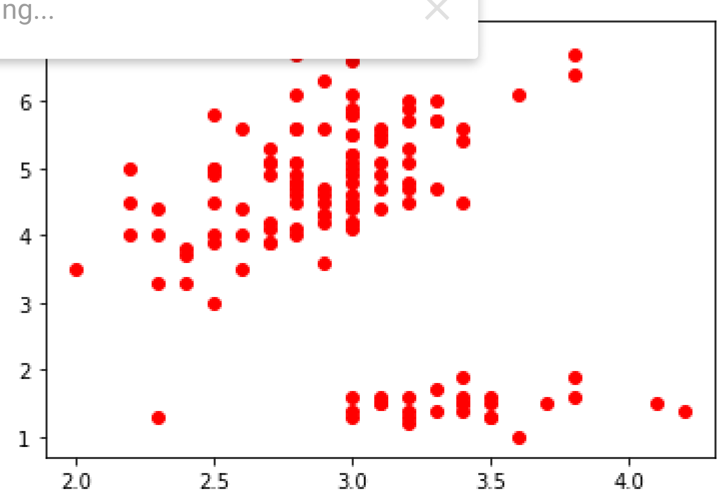

7
6
5
4
3

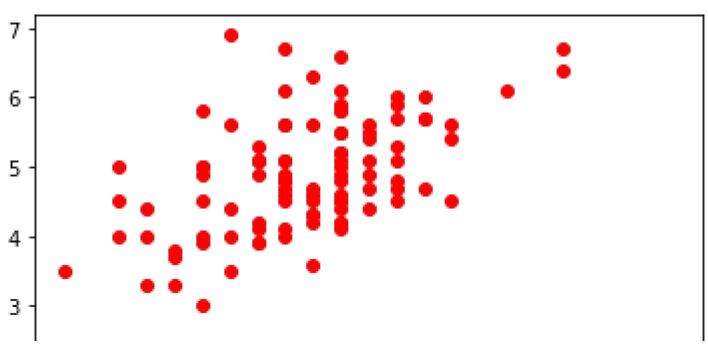

1
2.0
2.5
3.0
3.5
4.0

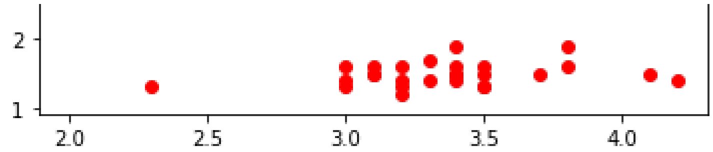

7
6
5
4
3
2
1
2.0
2.5
3.0
3.5
4.0

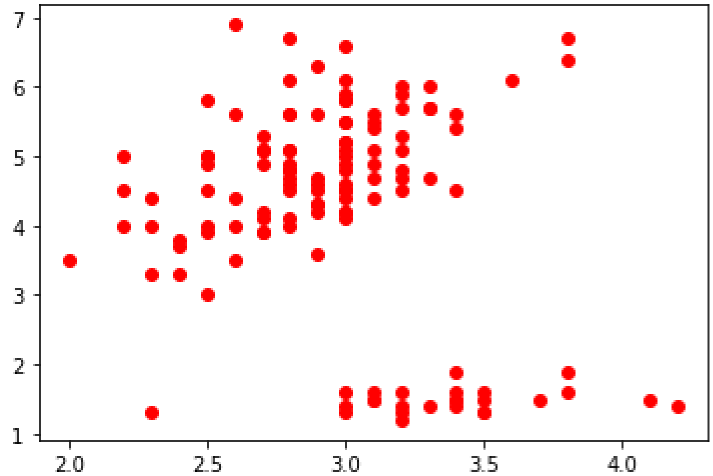

7
6
5
4
3
2
1
3.5
4.0

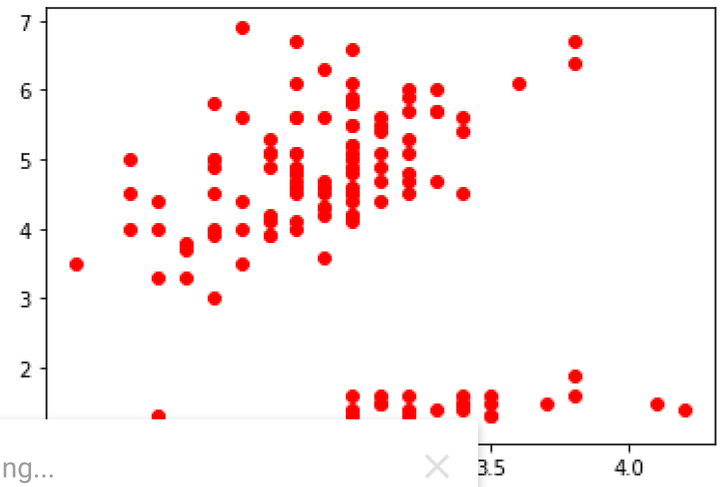
Saving...


6
5
4
3
2
1
2.0
2.5
3.0
3.5
4.0

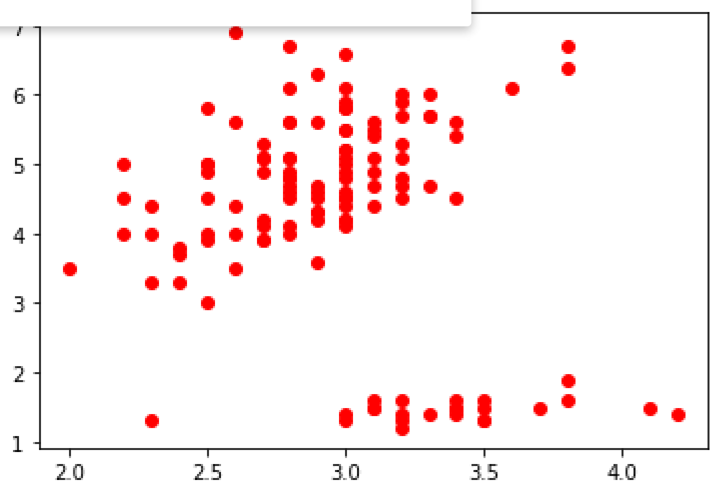

7
6
5
4
3

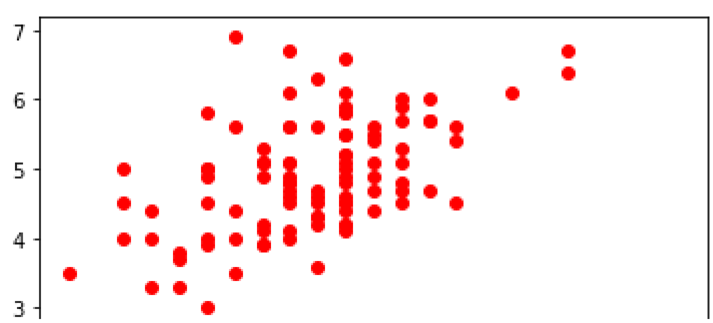


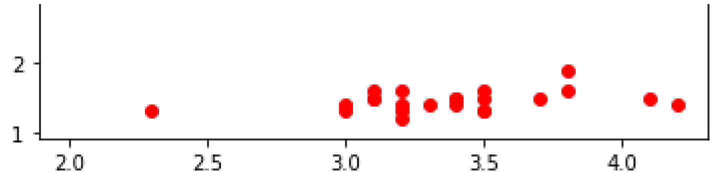


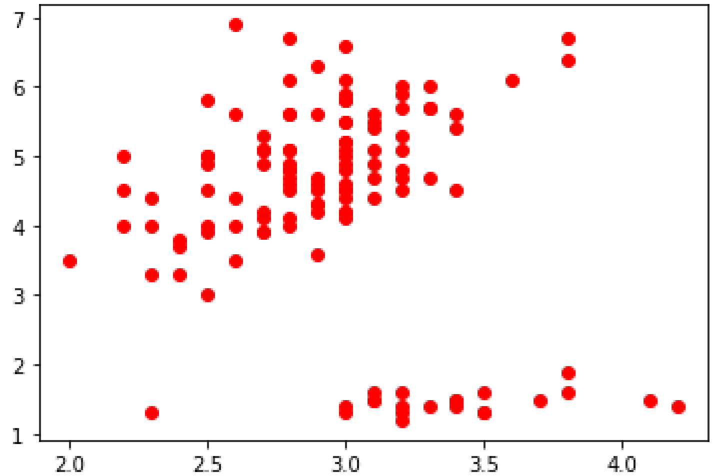


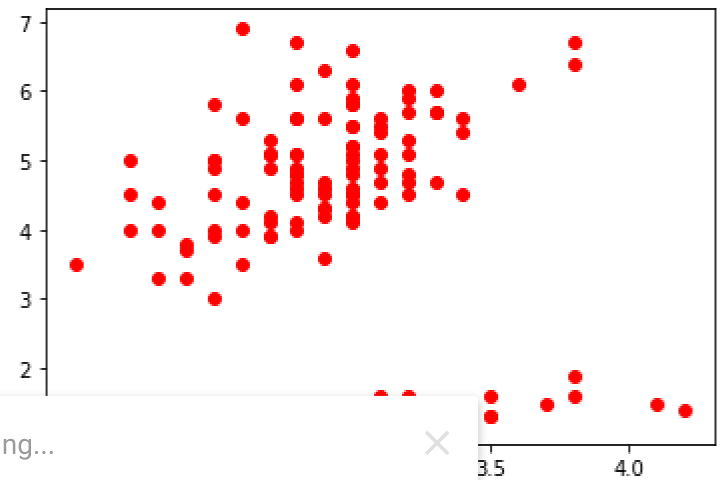
Saving...



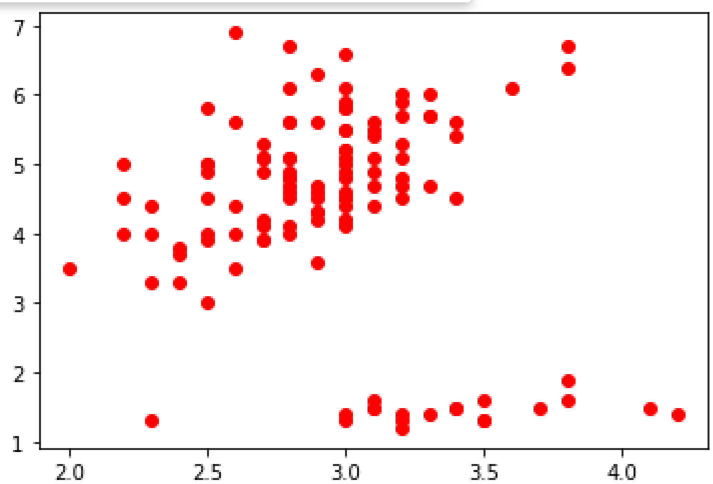


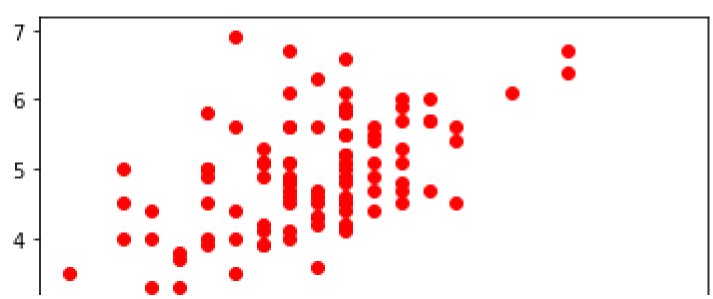

2
1
2.0
2.5
3.0
3.5
4.0

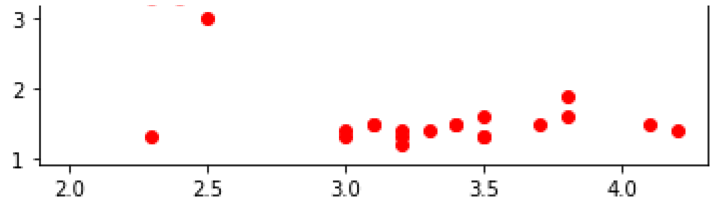

7
6
5
4
3
2
1
2.0
2.5
3.0
3.5
4.0

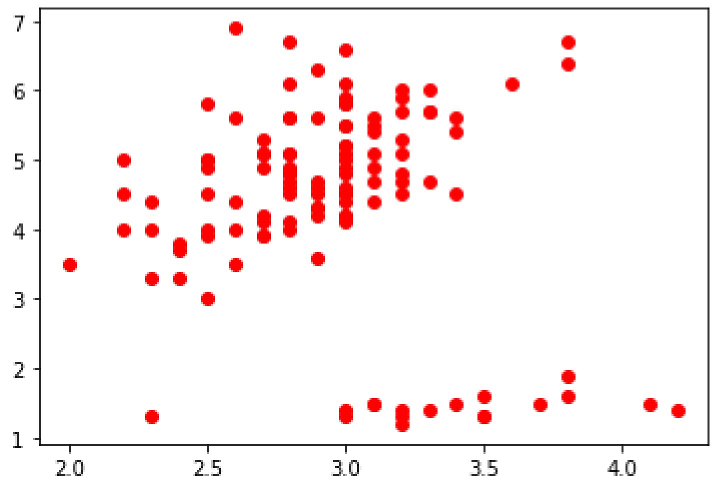

7
6
5
4
3
2
3.5
4.0

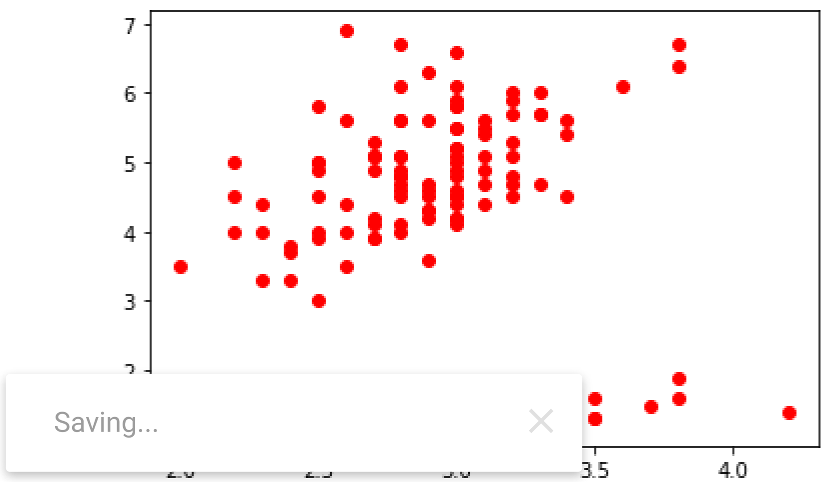
Saving...

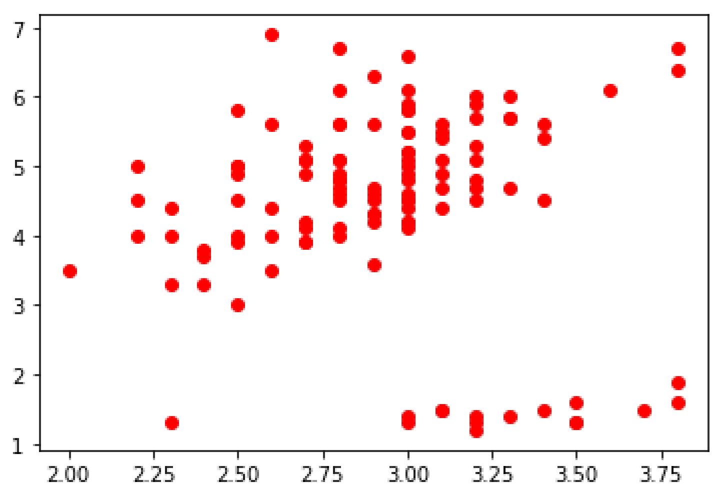

7
6
5
4
3
2
1
2.0
2.5
3.0
3.5
4.0

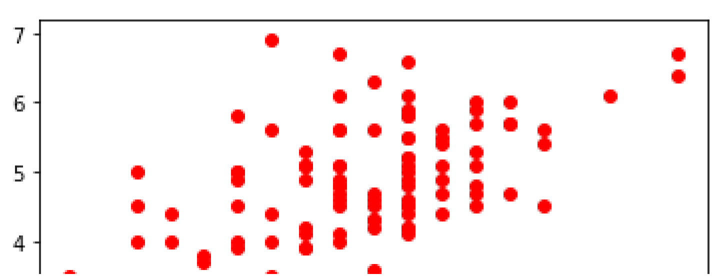

7
6
5
4

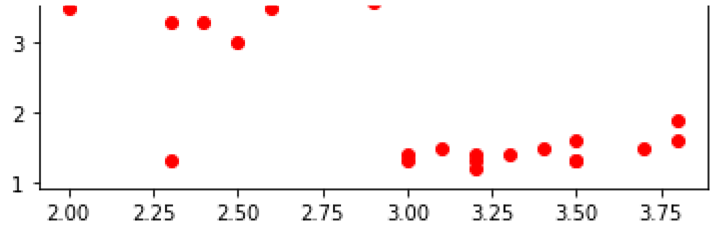

3
2
1
2.0 2.5 3.0 3.5 4.0

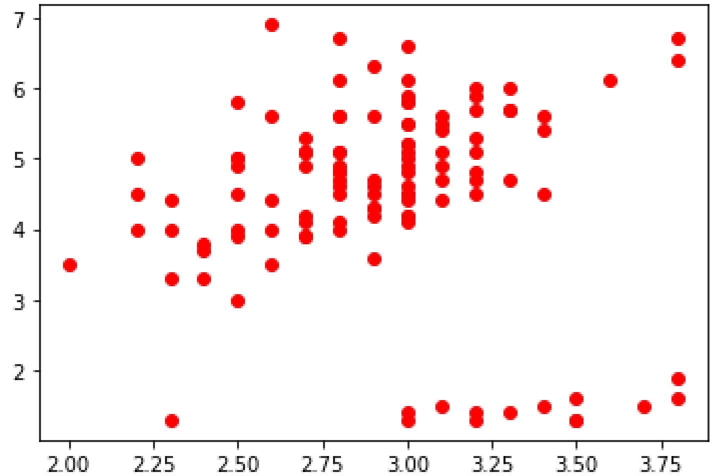

7
6
5
4
3
2
1
2.0 2.5 3.0 3.5 4.0

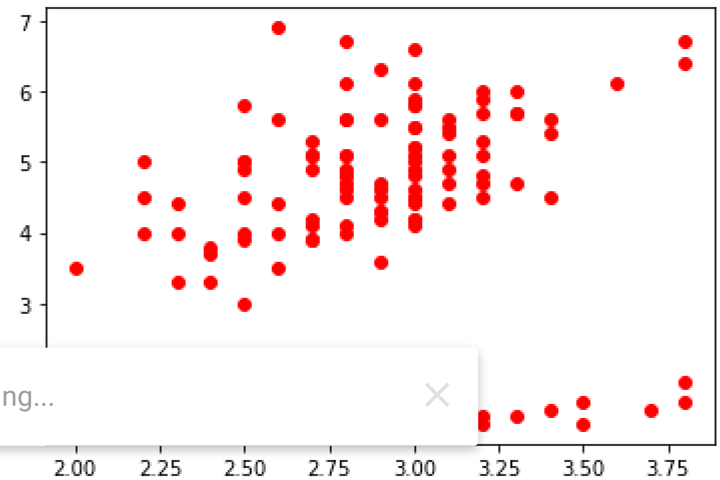

7
6
5
4
3
Saving...
3.5 4.0


7
6
5
4
3
2
1
2.00 2.25 2.50 2.75 3.00 3.25 3.50 3.75

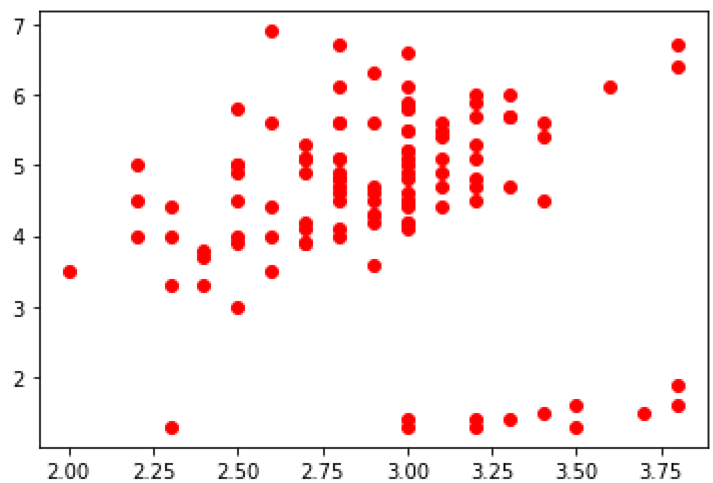

7
6
5
4

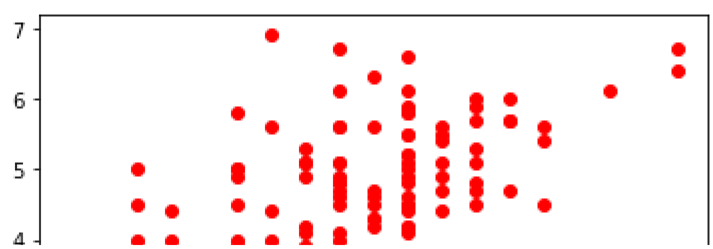

3
2
1
2.00 2.25 2.50 2.75 3.00 3.25 3.50 3.75

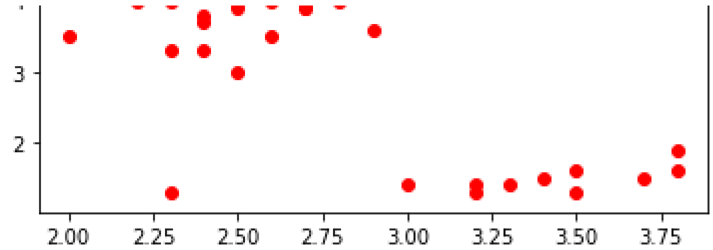

7
6
5
4
3
2
2.00 2.25 2.50 2.75 3.00 3.25 3.50 3.75

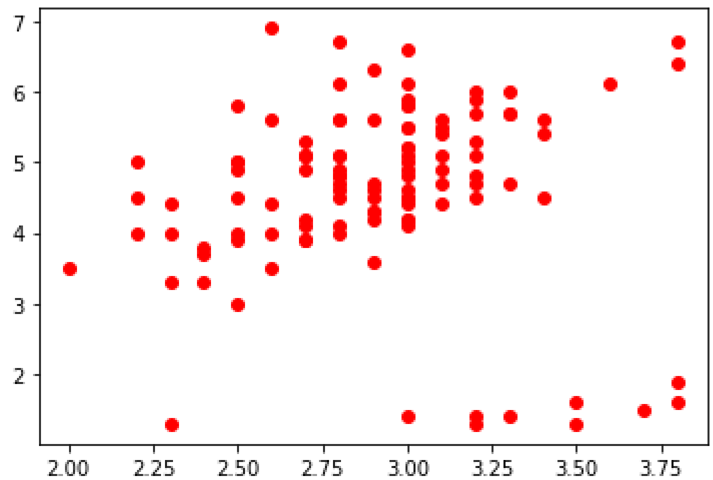

7
6
5
4
3
2.00 2.25 2.50 2.75 3.00 3.25 3.50 3.75

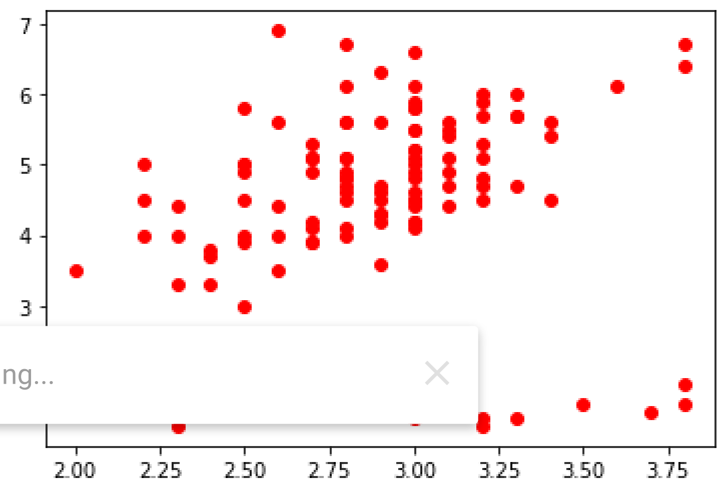
Saving...

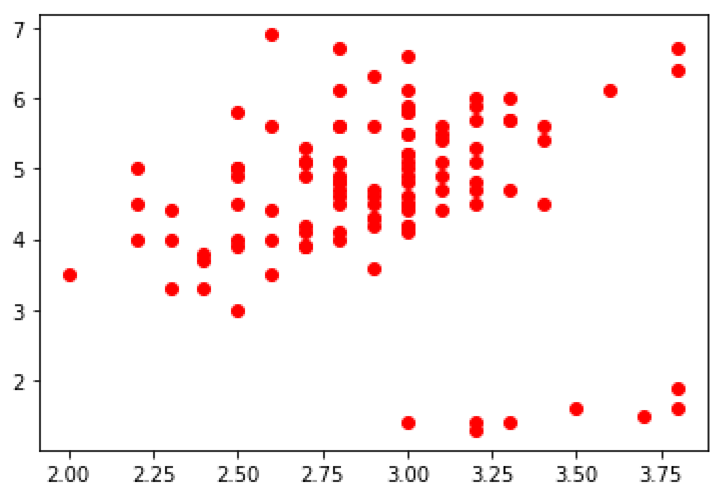

7
6
5
4
3
2
2.00 2.25 2.50 2.75 3.00 3.25 3.50 3.75

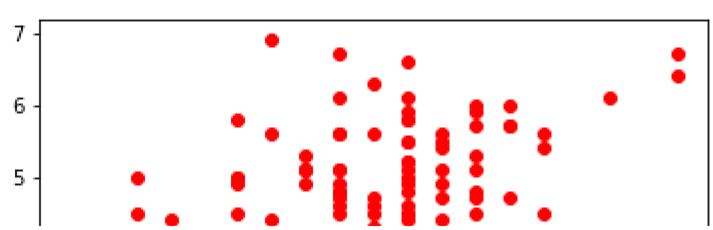

7
6
5
4

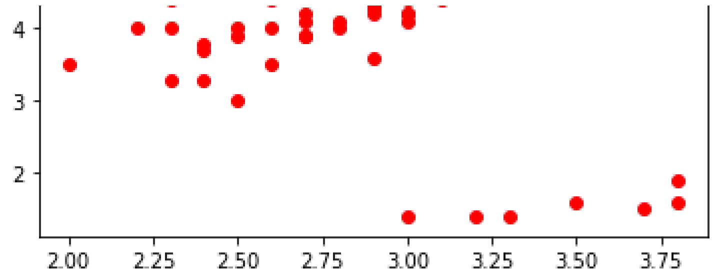

3
2
2.00
2.25
2.50
2.75
3.00
3.25
3.50
3.75

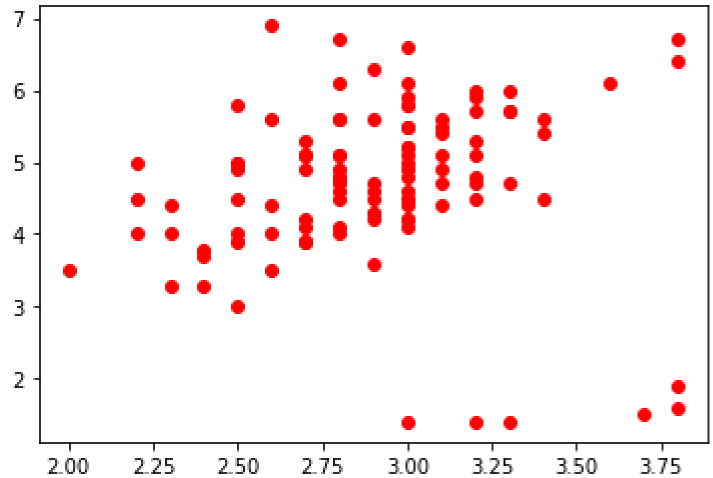

7
6
5
4
3
2
2.00
2.25
2.50
2.75
3.00
3.25
3.50
3.75

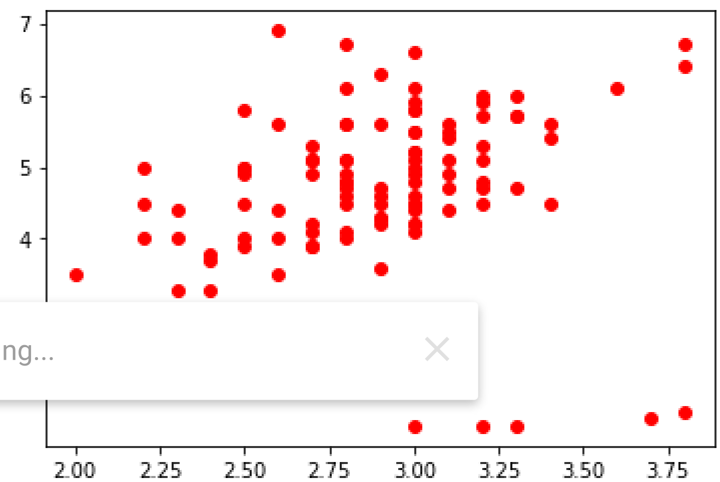

7
6
5
4
3
2.00
2.25
2.50
2.75
3.00
3.25
3.50
3.75

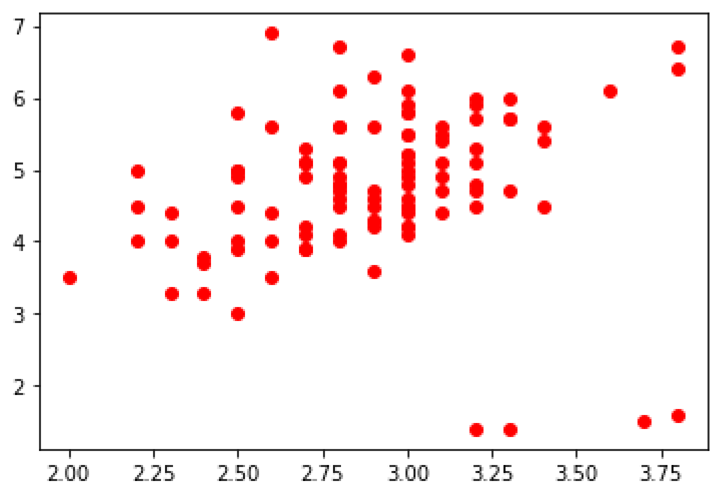

7
6
5
4
3
2
2.00
2.25
2.50
2.75
3.00
3.25
3.50
3.75

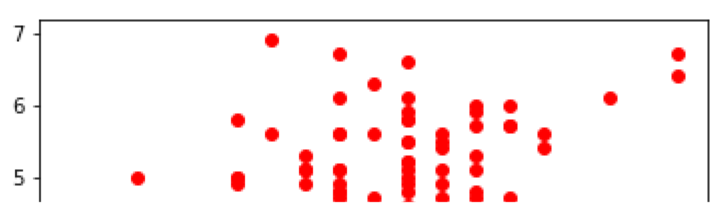

7
6
5

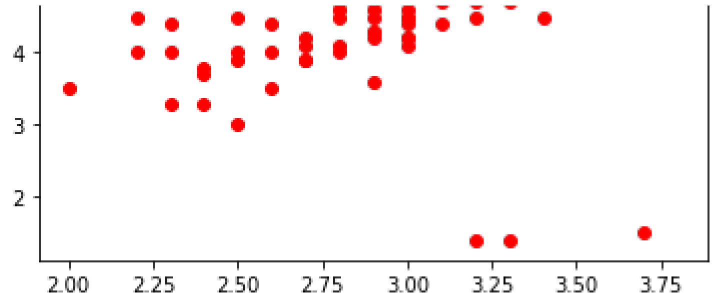

4
3
2
2.00 2.25 2.50 2.75 3.00 3.25 3.50 3.75

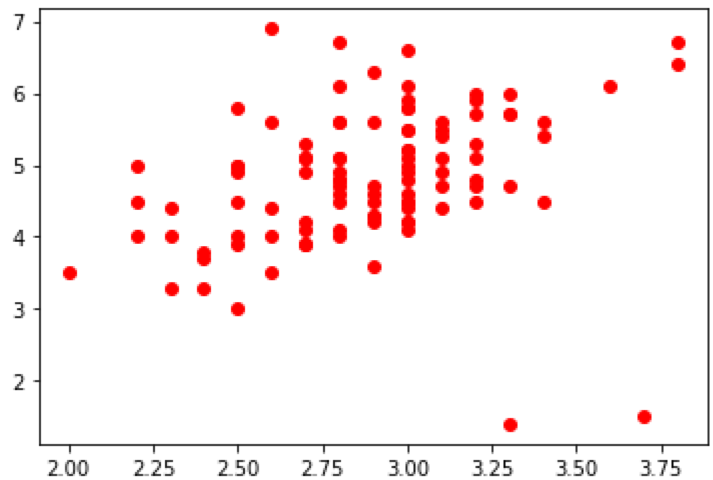

7
6
5
4
3
2
2.00 2.25 2.50 2.75 3.00 3.25 3.50 3.75

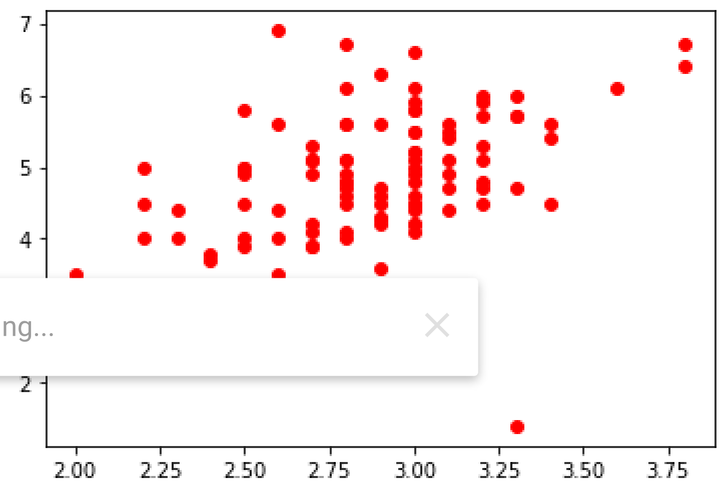

7
6
5
4
2.00 2.25 2.50 2.75 3.00 3.25 3.50 3.75

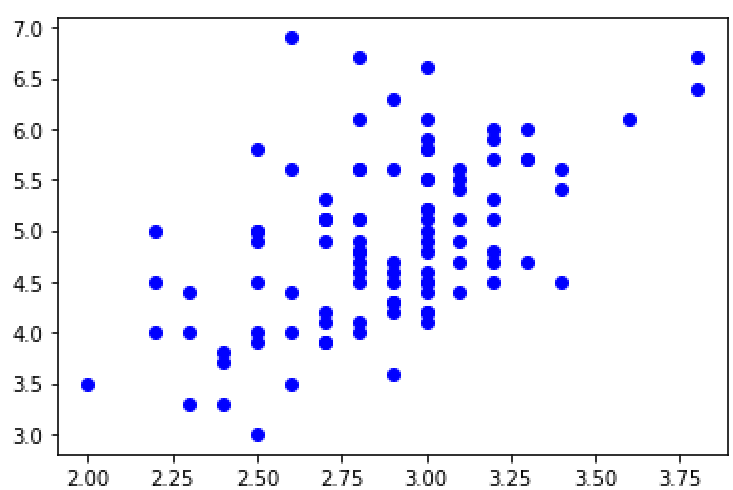

7
6
5
4
3
2
2.00 2.25 2.50 2.75 3.00 3.25 3.50 3.75

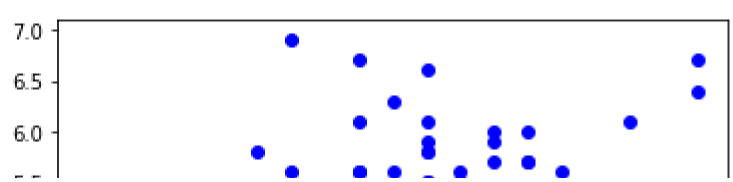

7
6
5

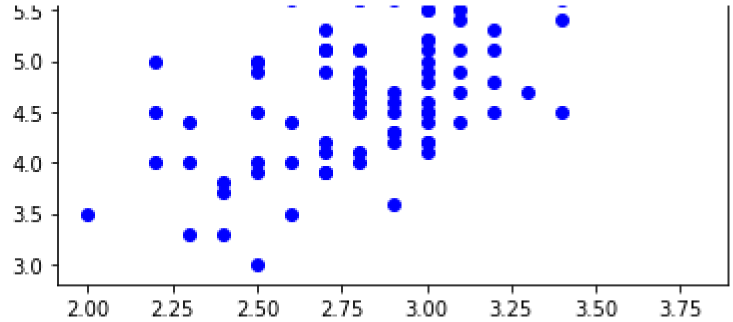

4
3
2
2.00 2.25 2.50 2.75 3.00 3.25 3.50 3.75

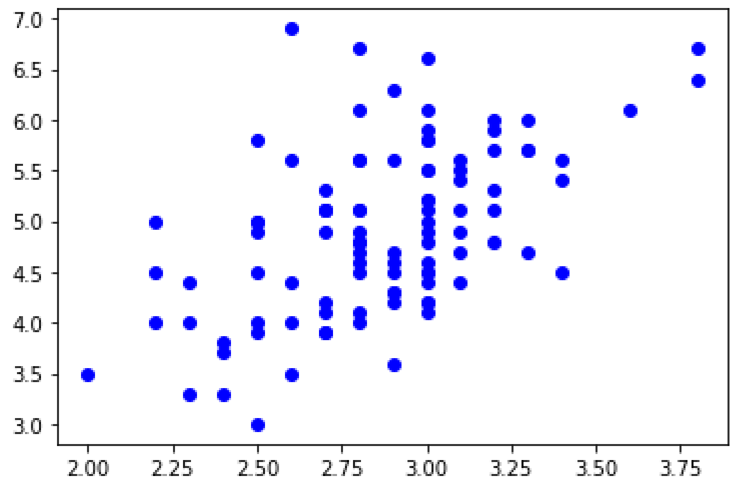

7
6
5
4
3
2
2.00 2.25 2.50 2.75 3.00 3.25 3.50 3.75

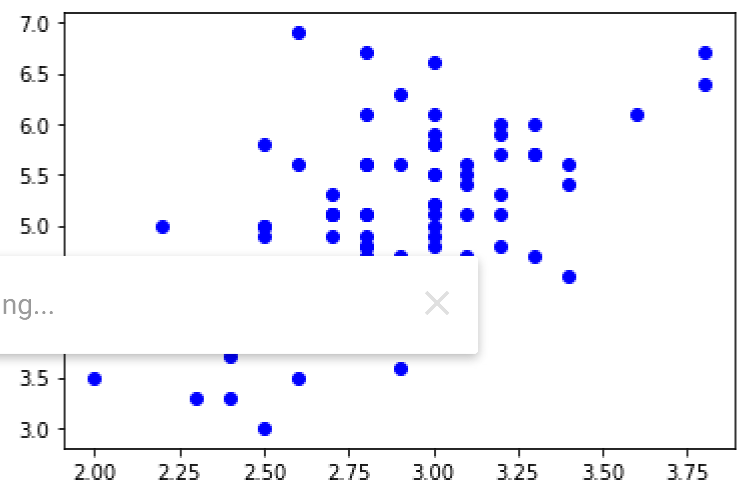

7
6
5
4
2
2.00 2.25 2.50 2.75 3.00 3.25 3.50 3.75


7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.00 2.25 2.50 2.75 3.00 3.25 3.50 3.75

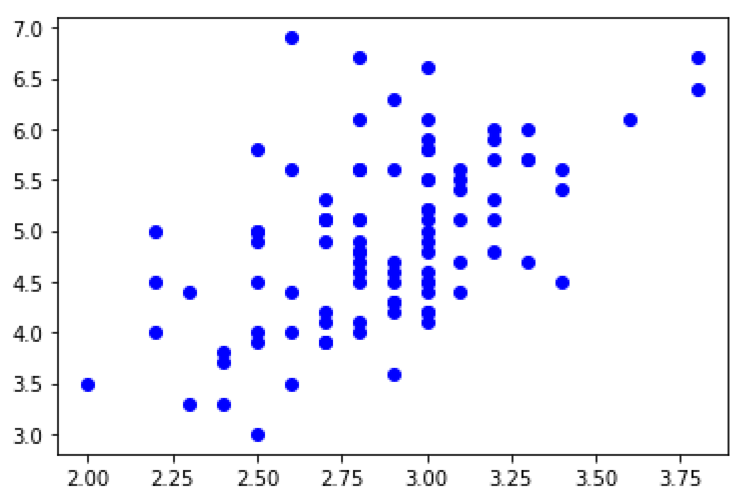

7.0
6.5
6.0

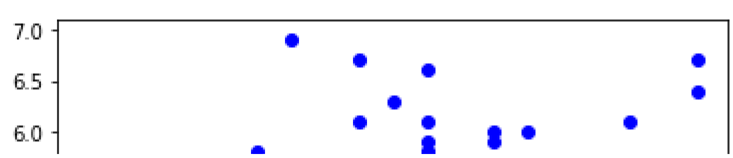

5.5
5.0
4.5
4.0
3.5
3.0
2.00 2.25 2.50 2.75 3.00 3.25 3.50 3.75

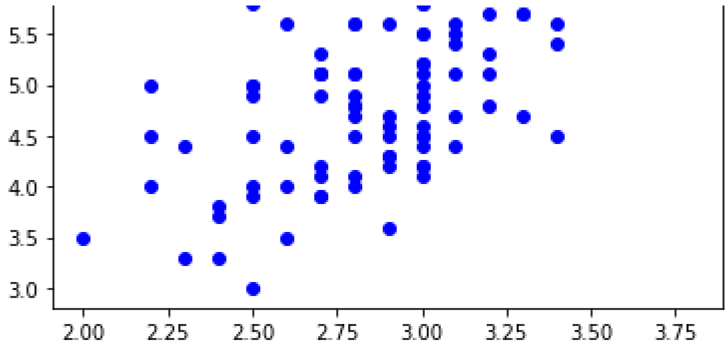

7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.00 2.25 2.50 2.75 3.00 3.25 3.50 3.75

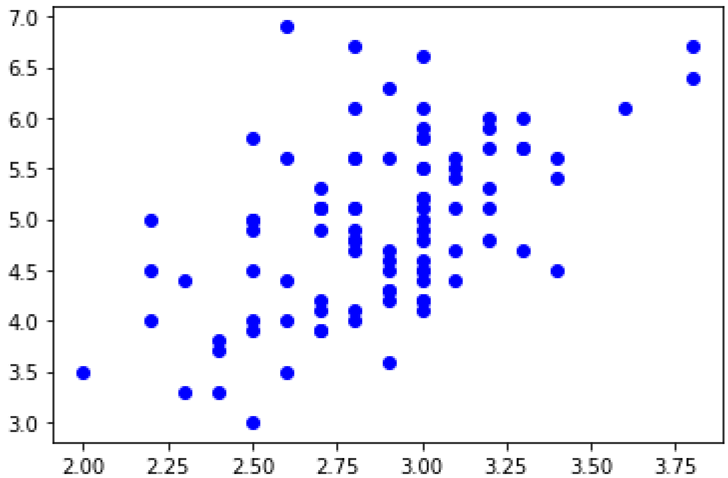

7.0
6.5
6.0
5.5
5.0
3.5
3.0
2.00 2.25 2.50 2.75 3.00 3.25 3.50 3.75

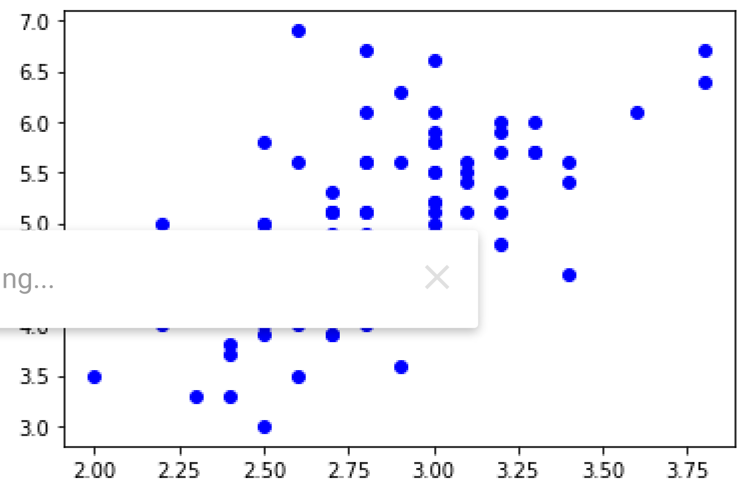
Saving...


7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.00 2.25 2.50 2.75 3.00 3.25 3.50 3.75

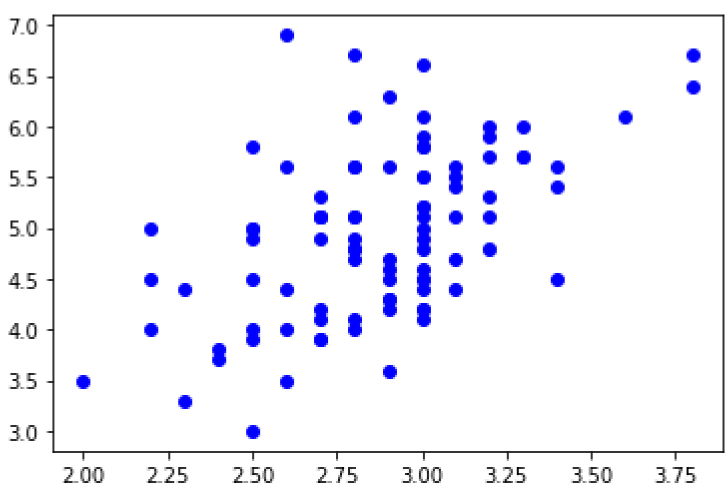

7.0
6.5
6.0

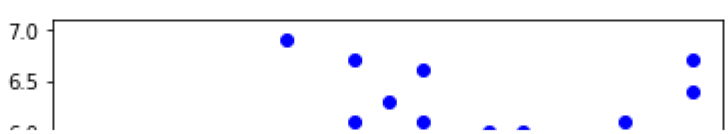

5.5
5.0
4.5
4.0
3.5
3.0
2.00 2.25 2.50 2.75 3.00 3.25 3.50 3.75

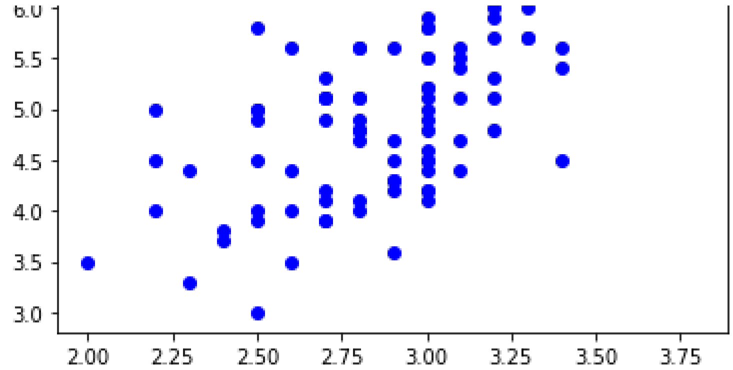

7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.00 2.25 2.50 2.75 3.00 3.25 3.50 3.75

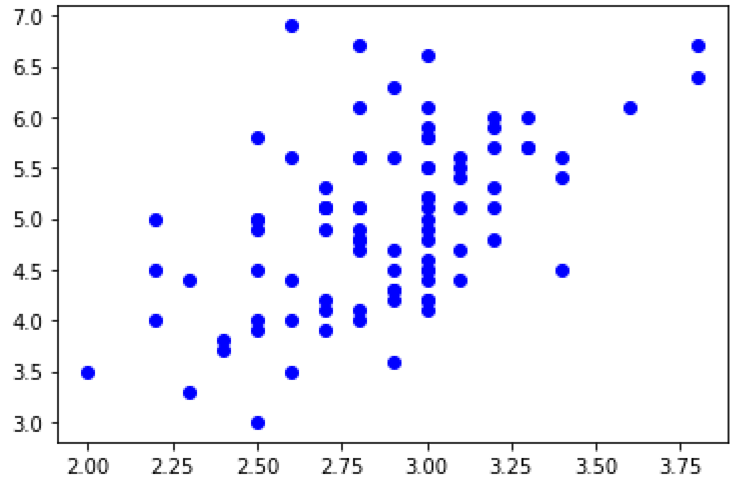

7.0
6.5
6.0
5.5
3.5
3.0
2.00 2.25 2.50 2.75 3.00 3.25 3.50 3.75

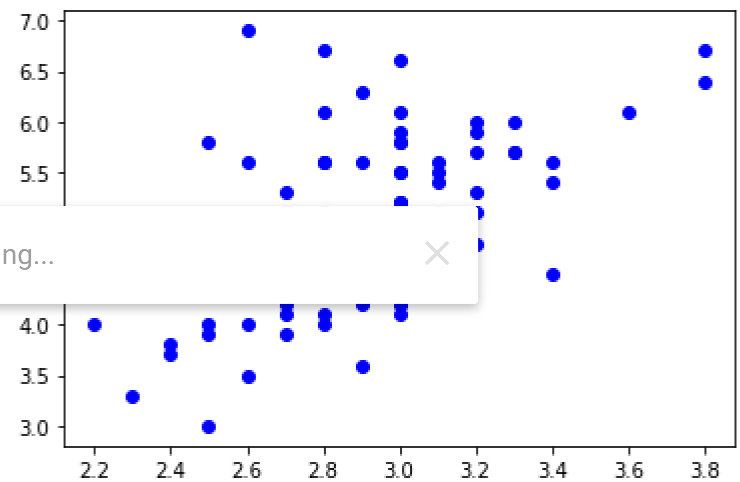
Saving...


7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.00 2.25 2.50 2.75 3.00 3.25 3.50 3.75

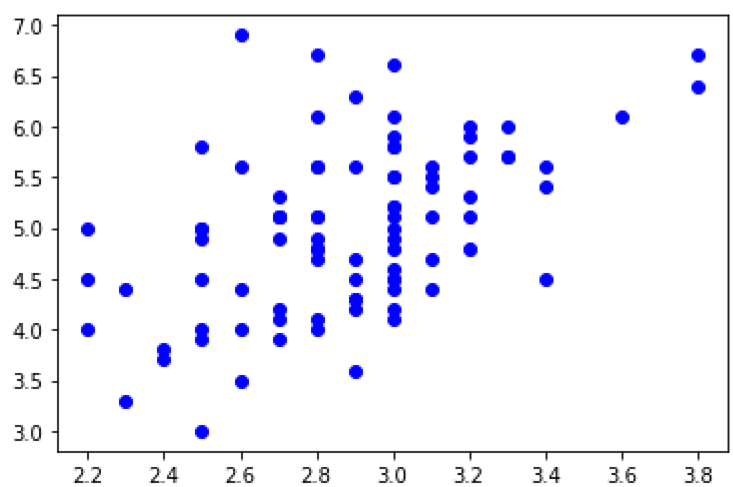

7.0
6.5

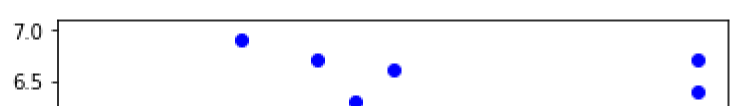

6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.00 2.25 2.50 2.75 3.00 3.25 3.50 3.75

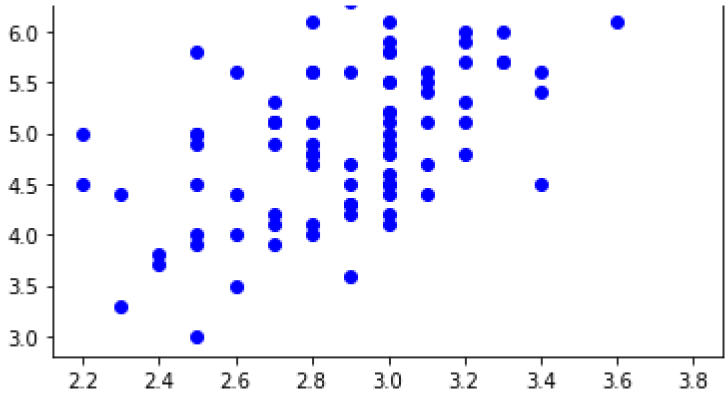

7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.00 2.25 2.50 2.75 3.00 3.25 3.50 3.75

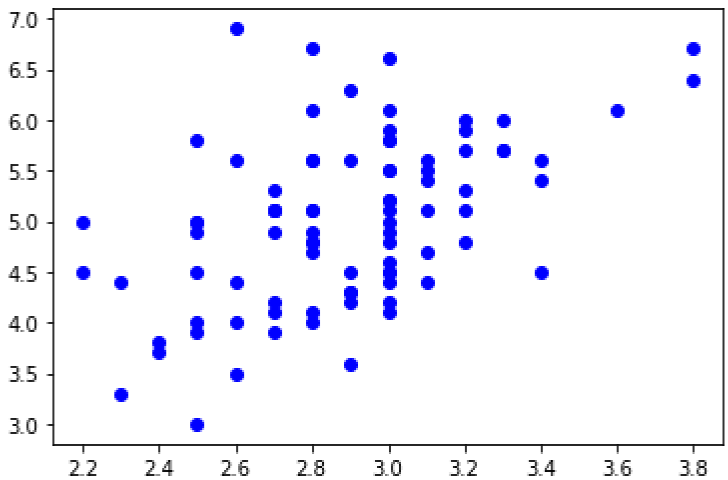

7.0
6.5
6.0
5.5
4.0
3.5
3.0
2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8

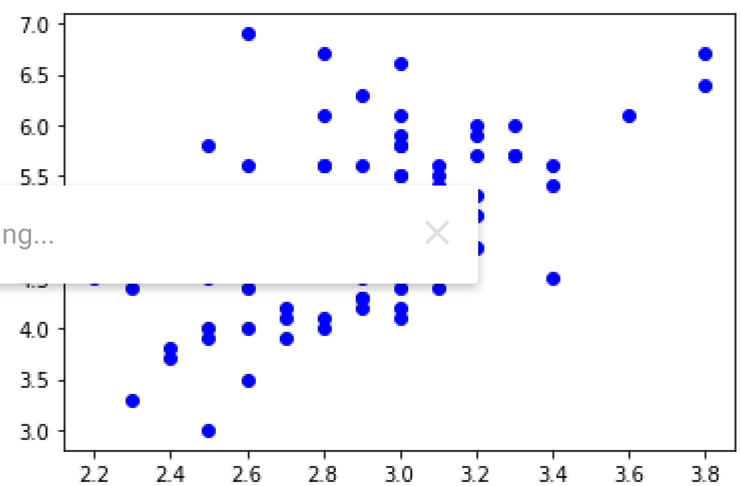
Saving...


7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8

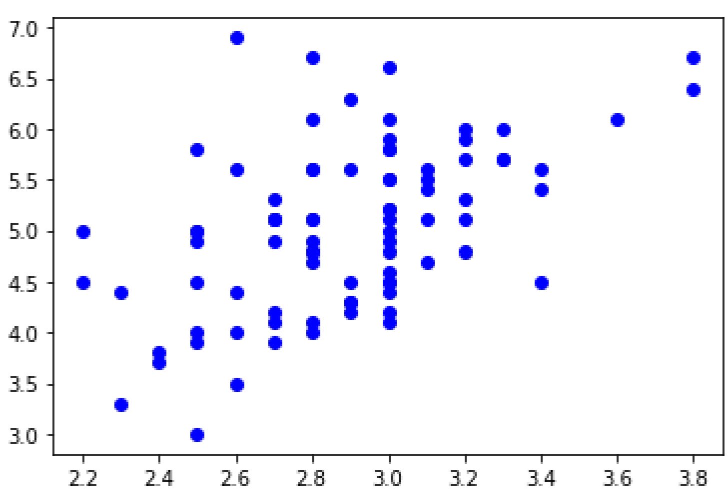

7.0
6.5

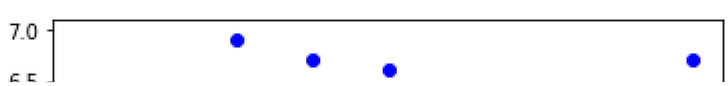

6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.2
2.4
2.6
2.8
3.0
3.2
3.4
3.6
3.8

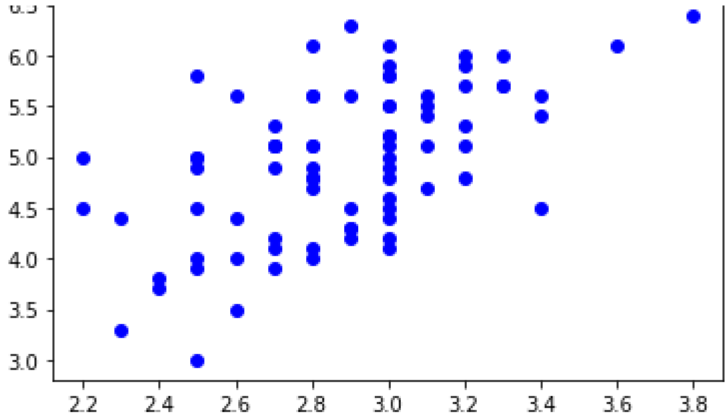

7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.2
2.4
2.6
2.8
3.0
3.2
3.4
3.6
3.8

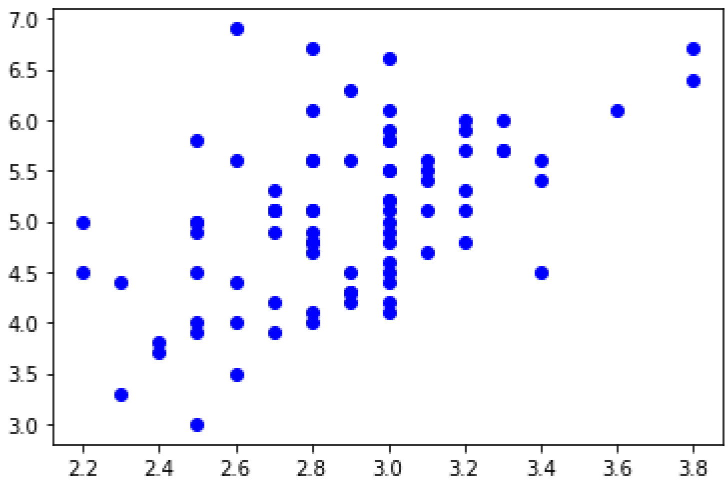

7.0
6.5
6.0
5.5
4.0
3.5
3.0
2.2
2.4
2.6
2.8
3.0
3.2
3.4
3.6
3.8

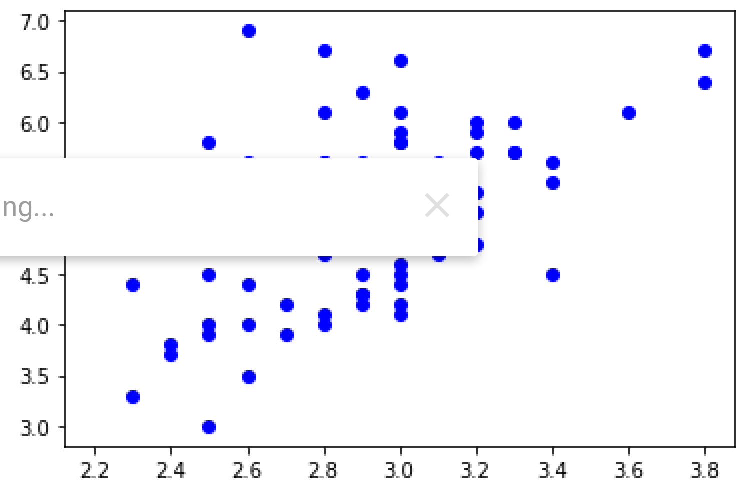
Saving...


7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.2
2.4
2.6
2.8
3.0
3.2
3.4
3.6
3.8

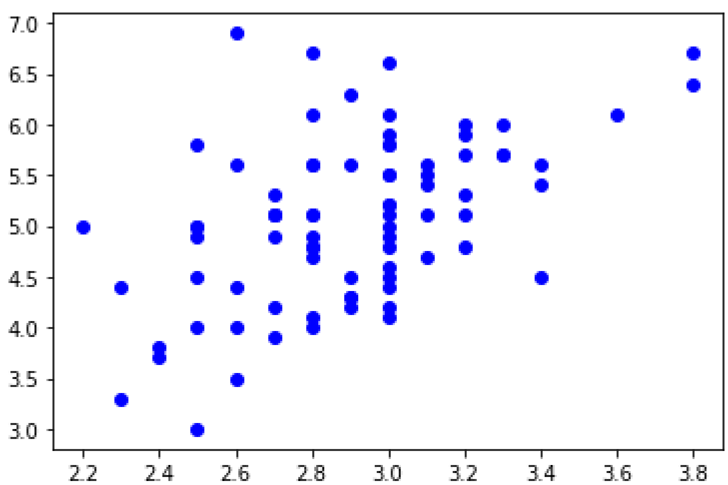

7.0


6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8

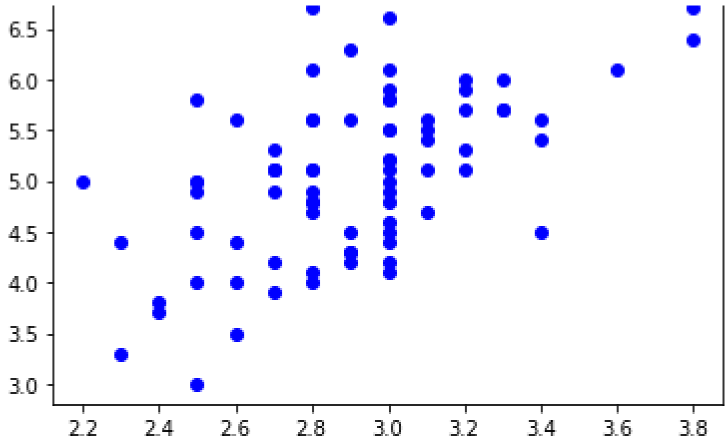

7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8

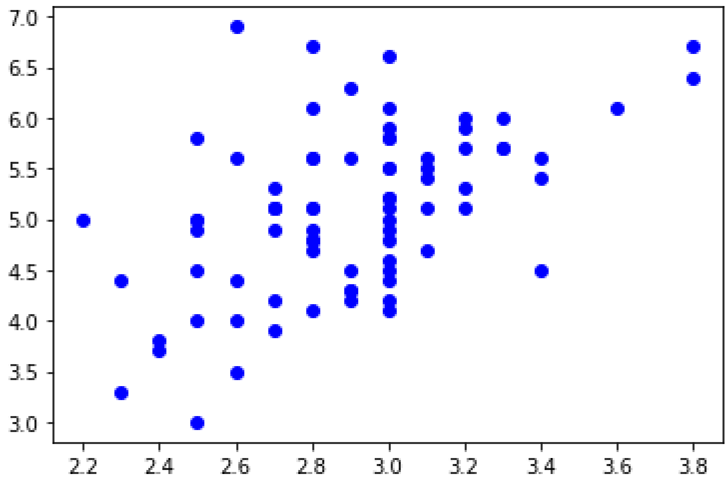

7.0
6.5
6.0
4.5
4.0
3.5
3.0
2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8

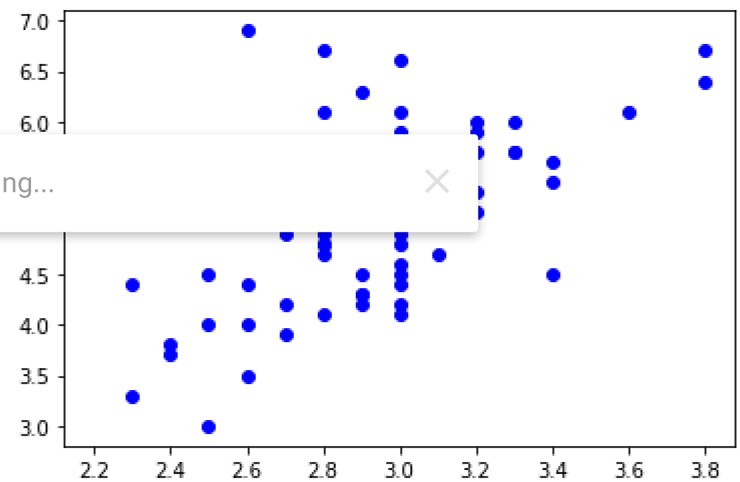
Saving...

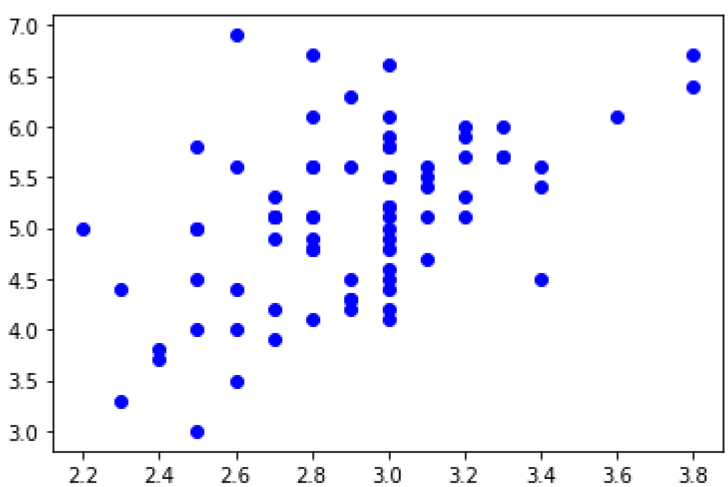

7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8

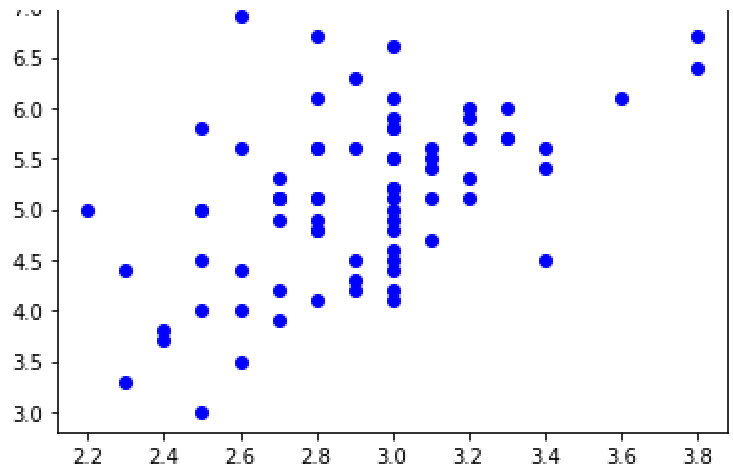

7.0

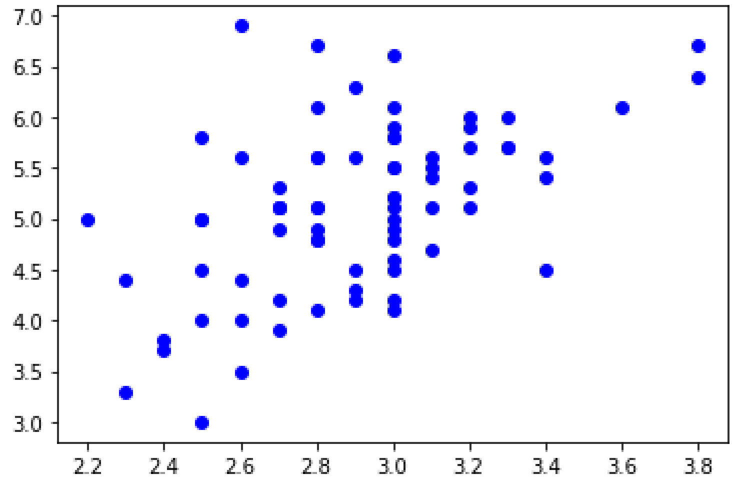

6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8

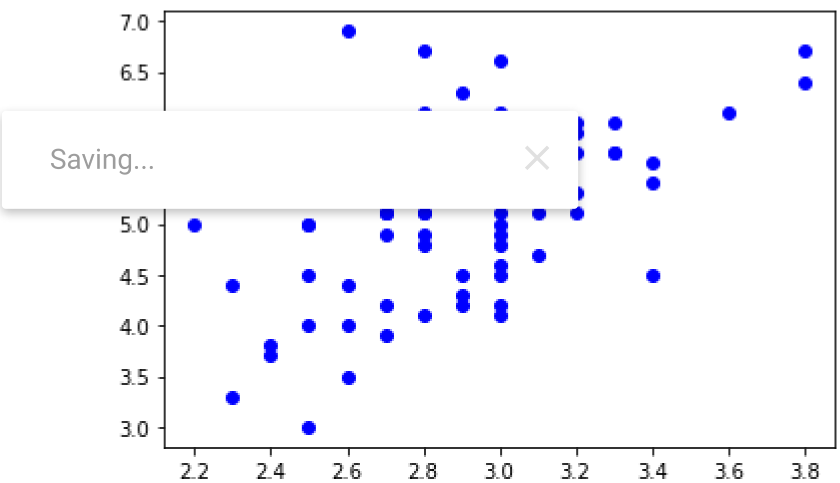

7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8

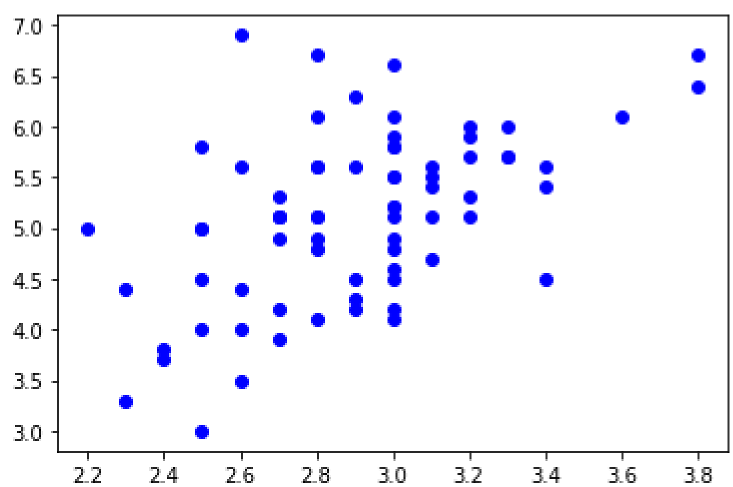

7.0
6.5
6.0
4.5
4.0
3.5
3.0
2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8

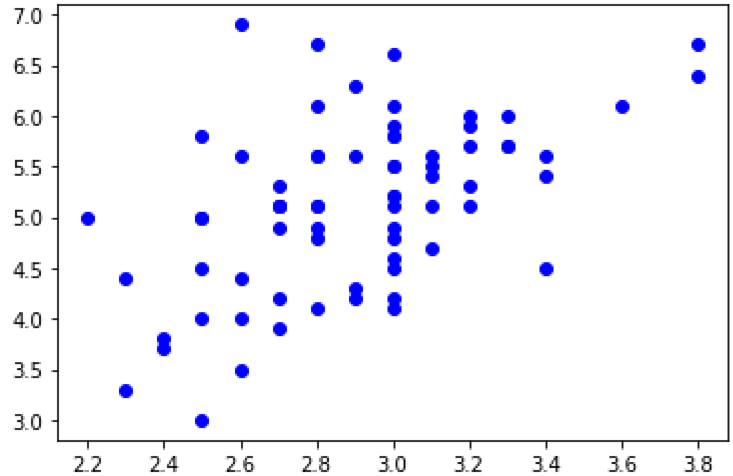

7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8

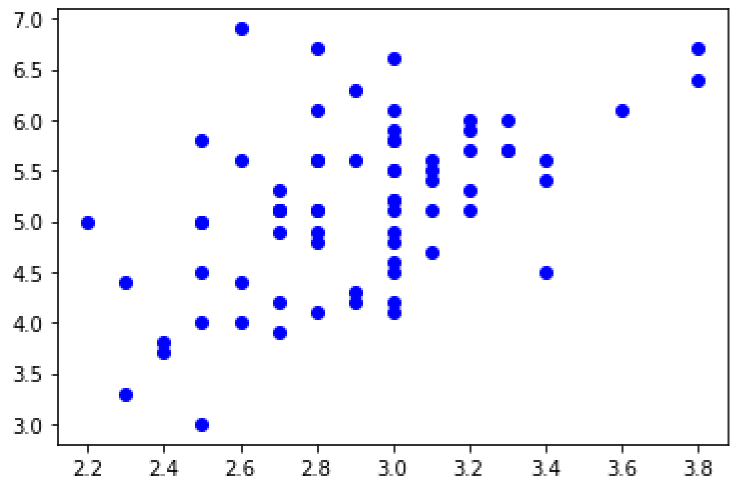

6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8

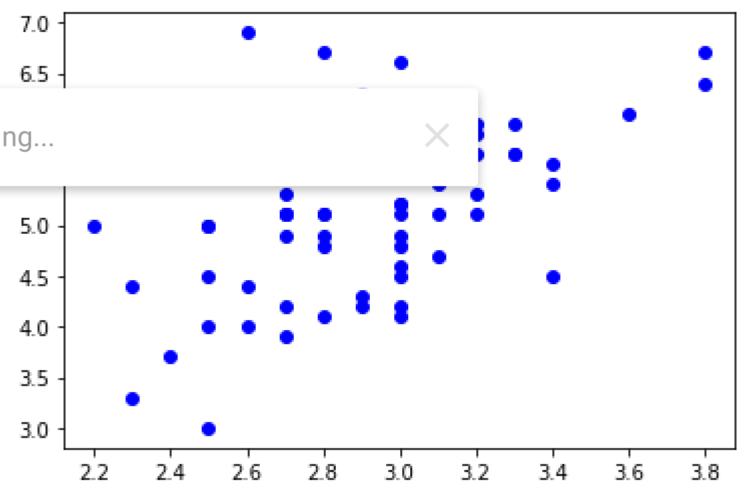

7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8


7.0
6.5
Saving...
5.0
4.5
4.0
3.5
3.0
2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8

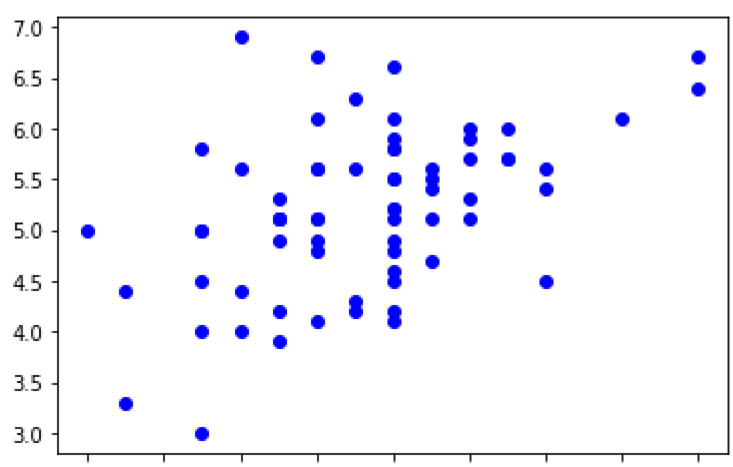

7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8

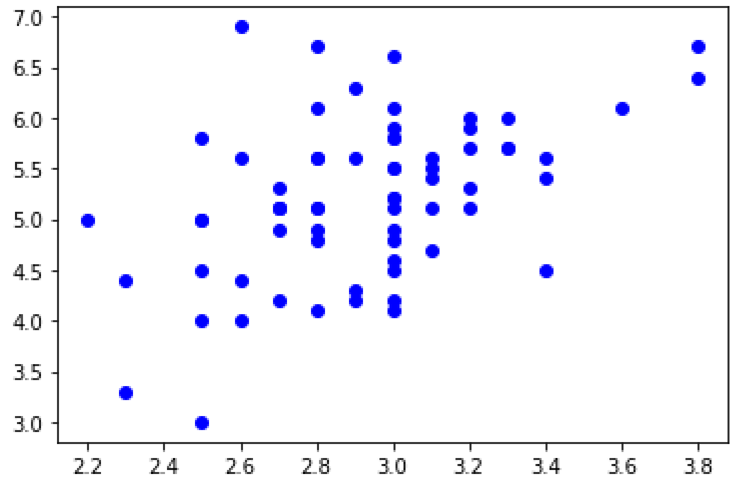

7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.2
2.4
2.6
2.8
3.0
3.2
3.4
3.6
3.8

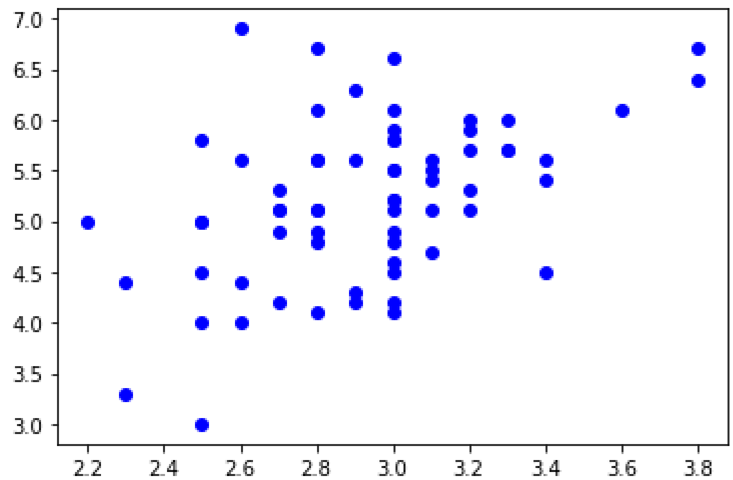

7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.2
2.4
2.6
2.8
3.0
3.2
3.4
3.6
3.8

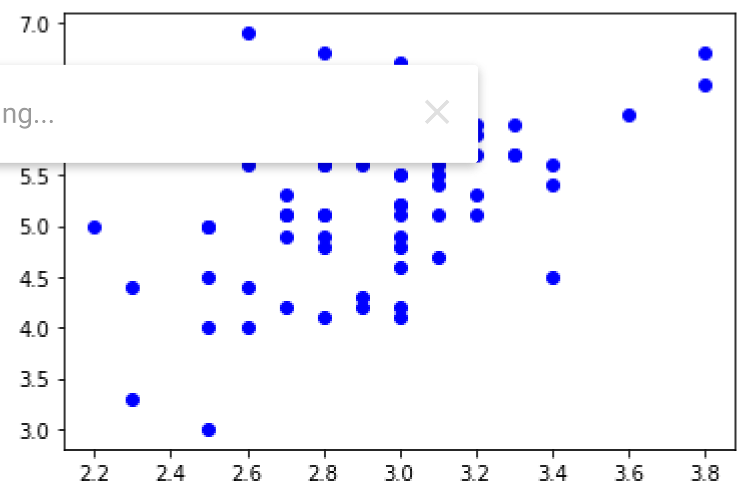

7.0
6.5
5.0
4.5
4.0
3.5
3.0
2.2
2.4
2.6
2.8
3.0
3.2
3.4
3.6
3.8

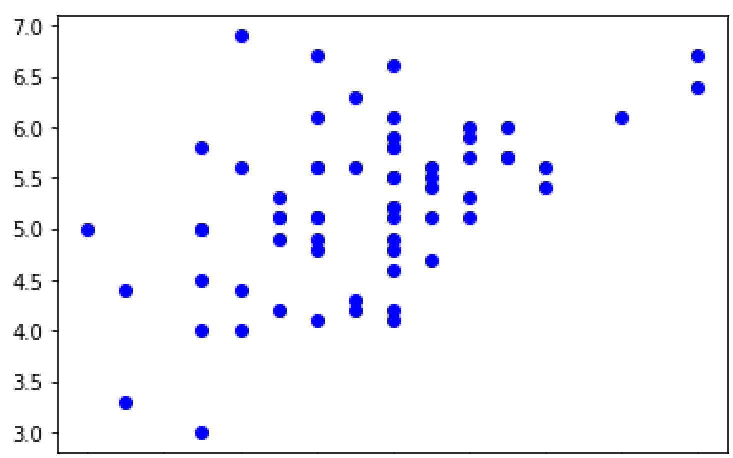
Saving...


7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0

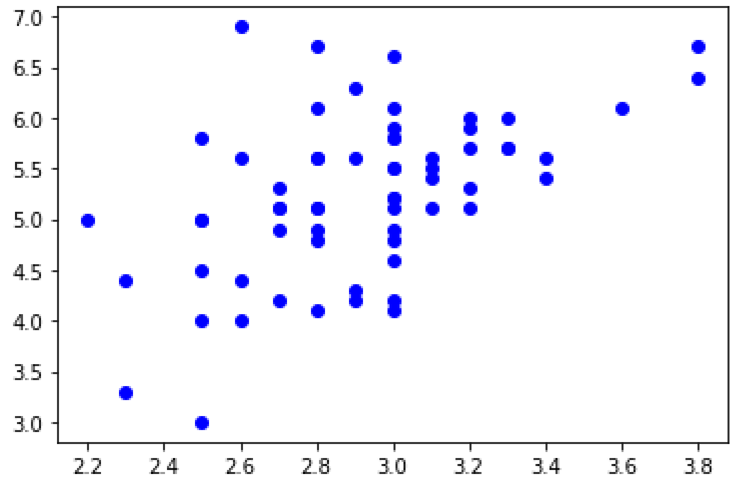

7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8

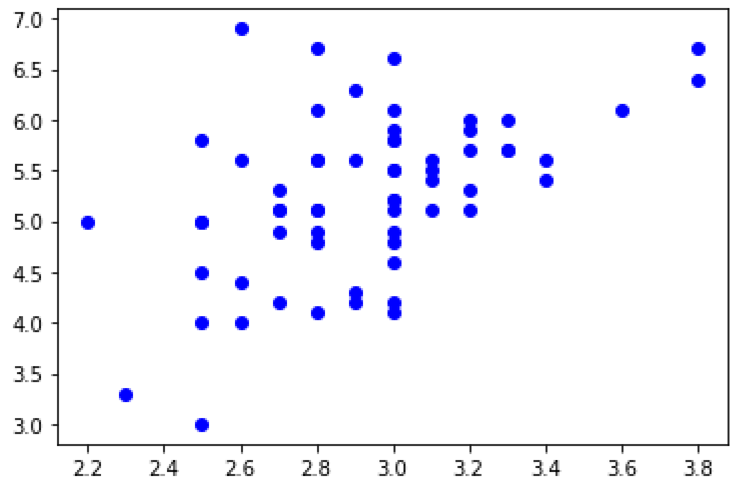

7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8


7.0
5.5
5.0
4.5
4.0
3.5
3.0
2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8

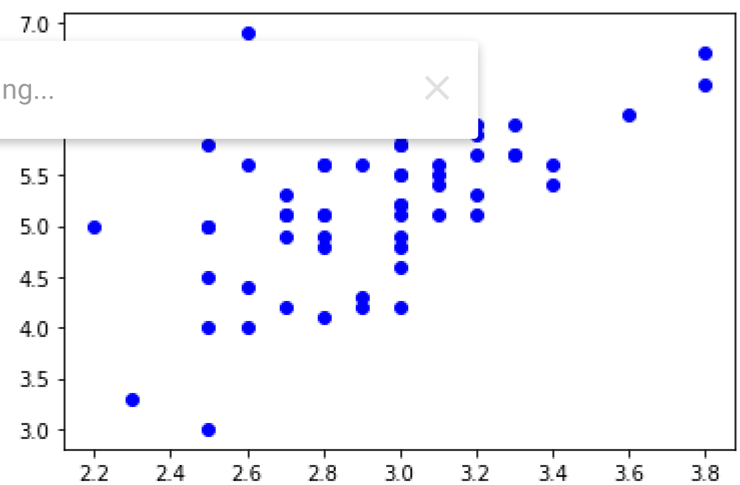

7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0

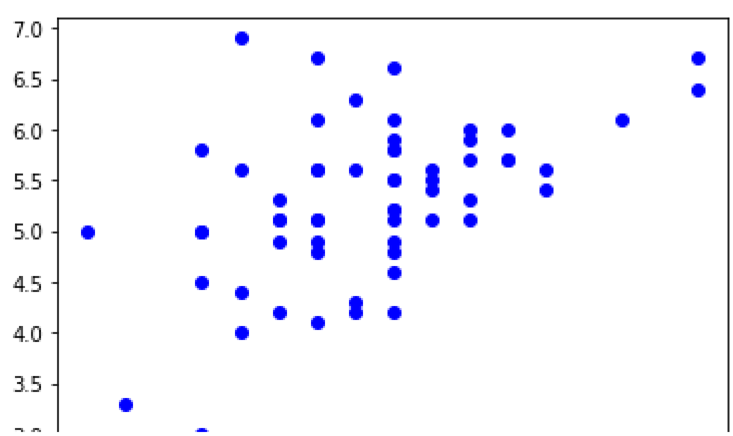

2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8


7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8

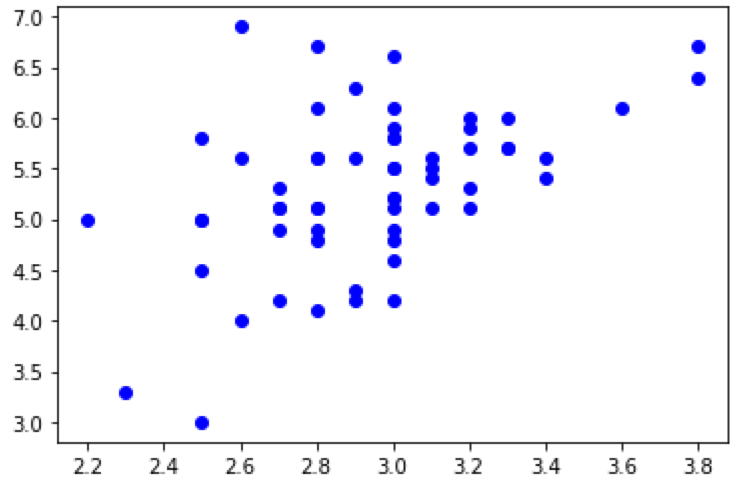

7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8

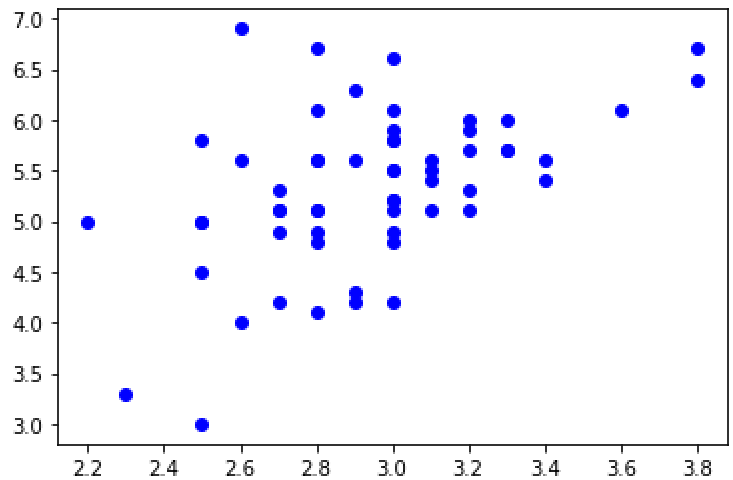
Saving...

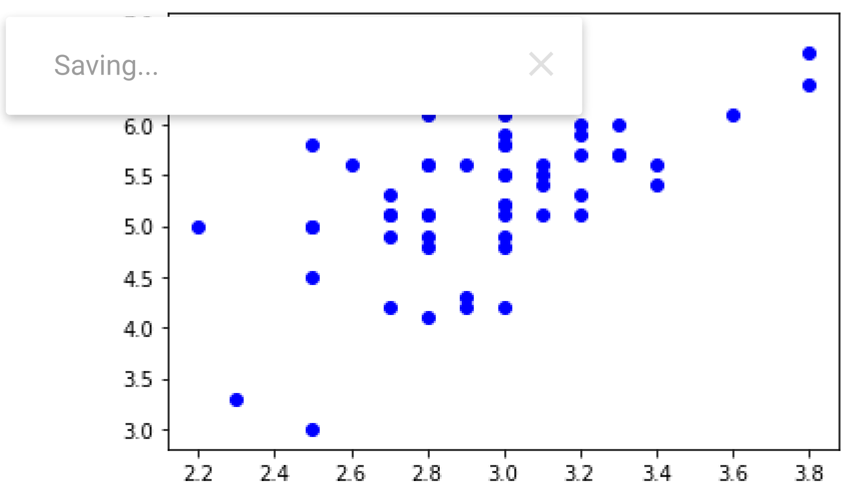

7.0
5.5
5.0
4.5
4.0
3.5
3.0
2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8

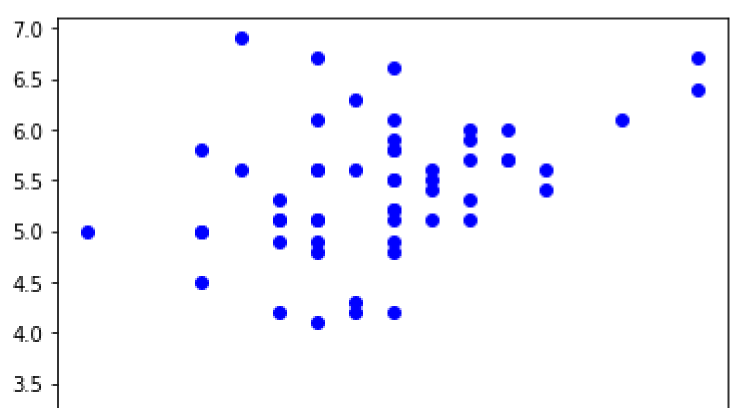

7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5

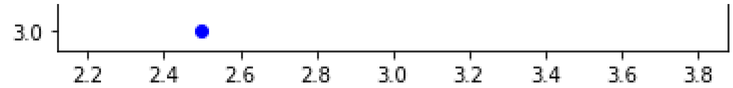

3.0
2.2
2.4
2.6
2.8
3.0
3.2
3.4
3.6
3.8

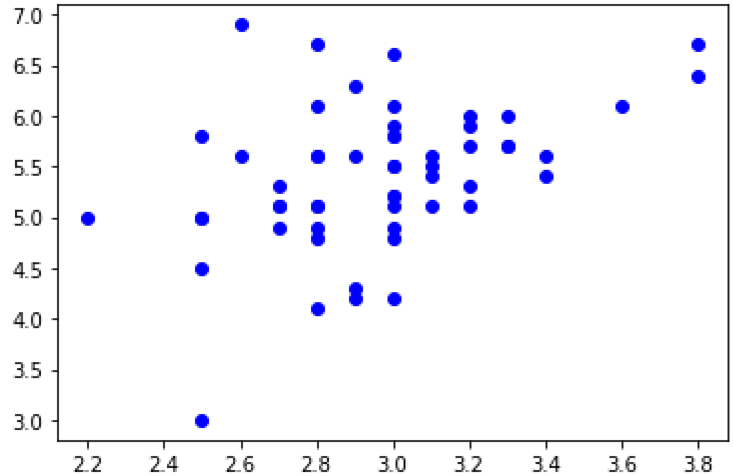

7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.2
2.4
2.6
2.8
3.0
3.2
3.4
3.6
3.8

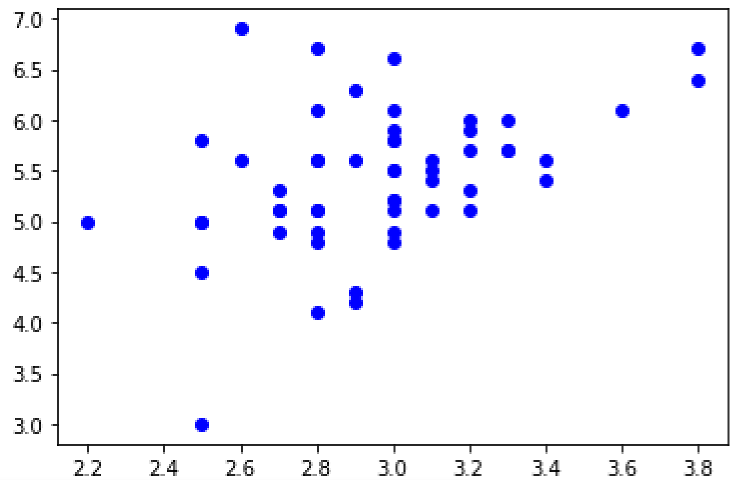

7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.2
2.4
2.6
2.8
3.0
3.2
3.4
3.6
3.8


Saving...
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.2
2.4
2.6
2.8
3.0
3.2
3.4
3.6
3.8

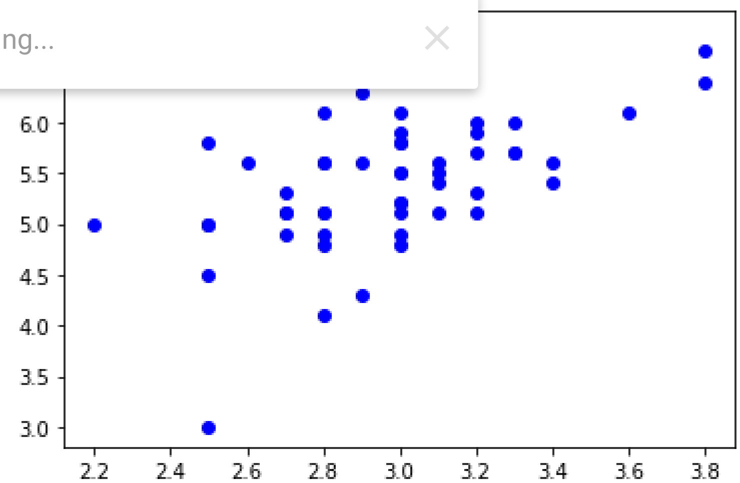

7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5

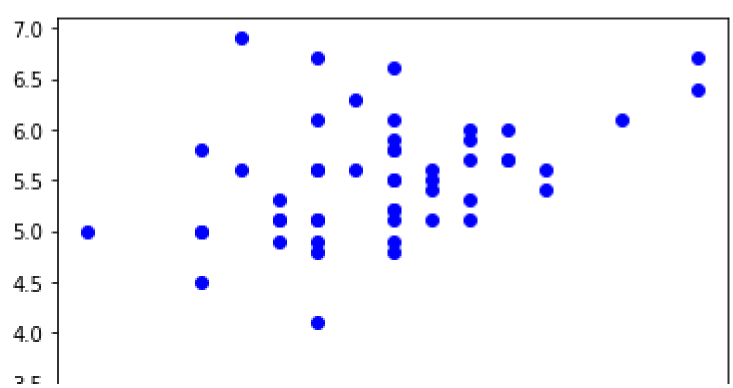

3.0
2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8

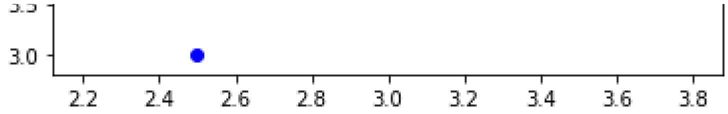

7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0
2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8

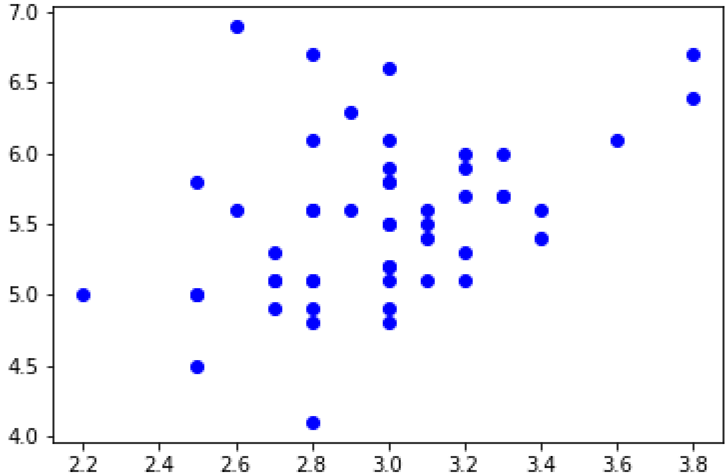

7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0
2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8

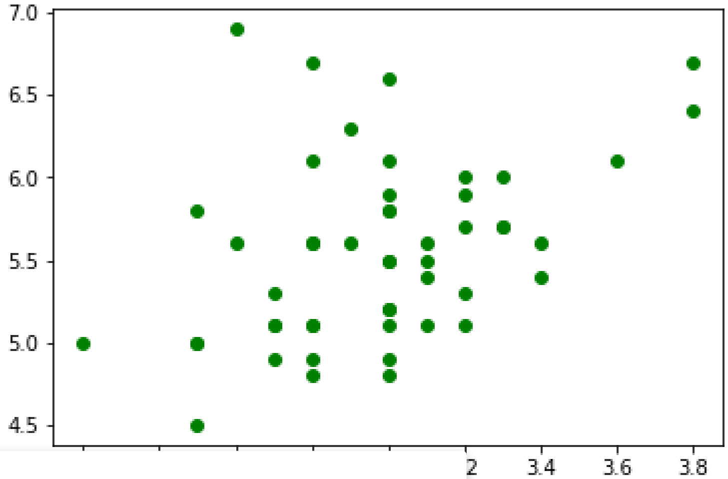
Saving...


6.0 5.5 5.0 4.5 4.0 3.5 3.0
2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8

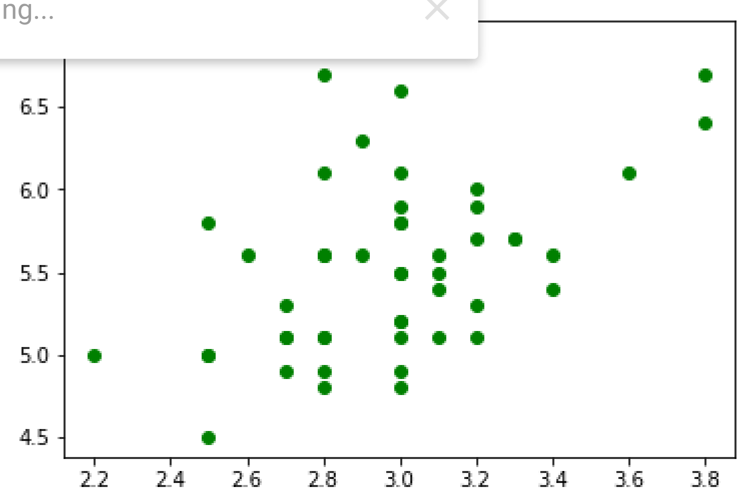

7.0 6.5 6.0 5.5 5.0 4.5 4.0

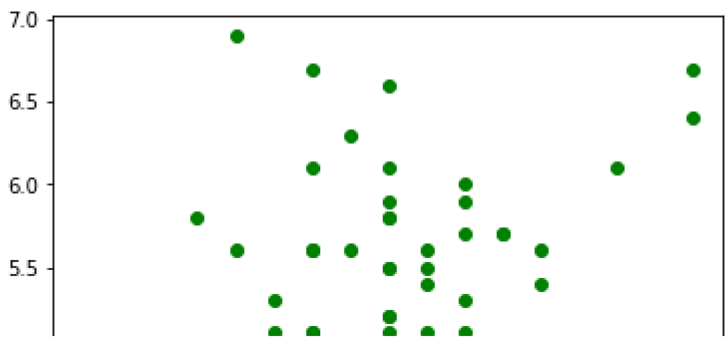

3.0
2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8

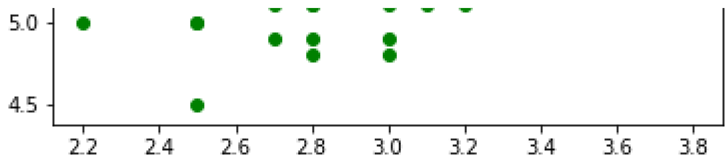

7.0 6.5 6.0 5.5 5.0 4.5 4.0
2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8

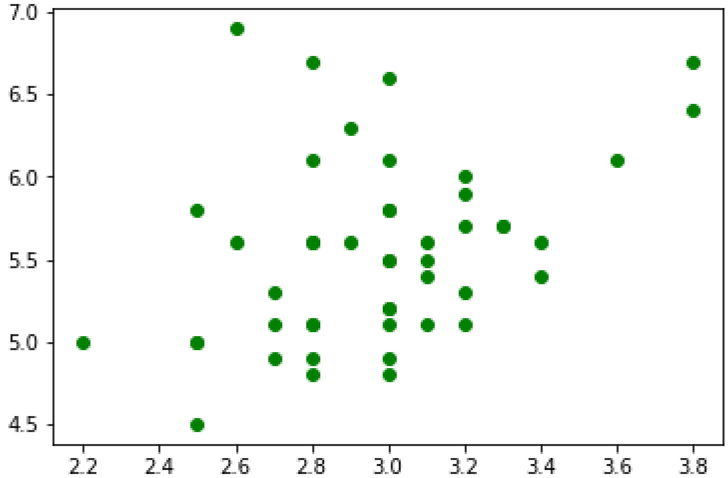

7.0 6.5 6.0 5.5 5.0 4.5
3.4 3.6 3.8

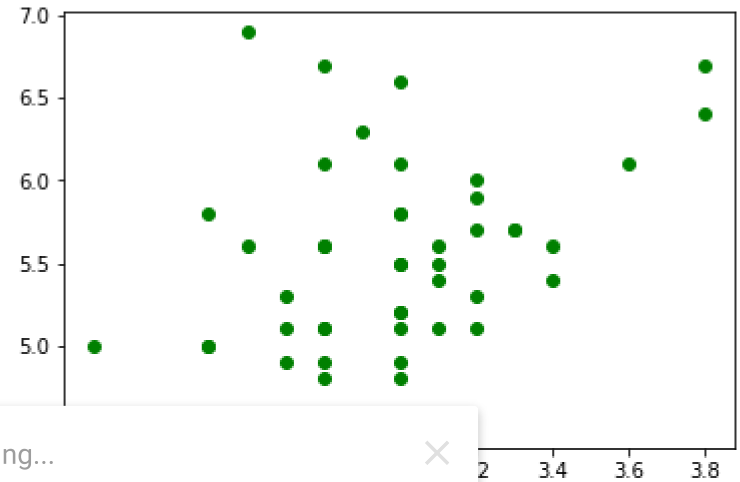
Saving...


6.5 6.0 5.5 5.0 4.5
2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8

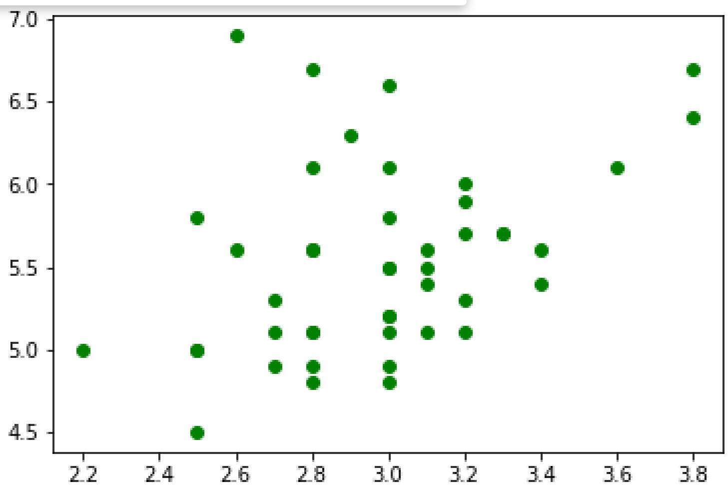

7.0 6.5 6.0 5.5

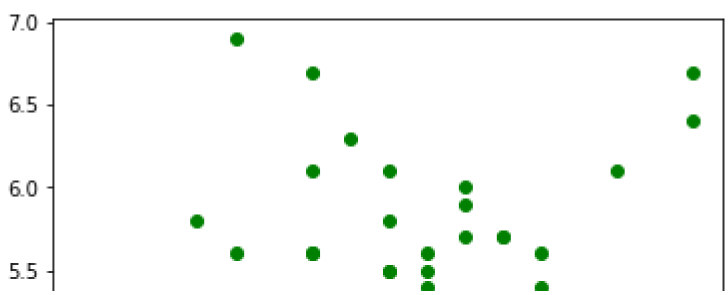

5.0
4.5
2.2
2.4
2.6
2.8
3.0
3.2
3.4
3.6
3.8

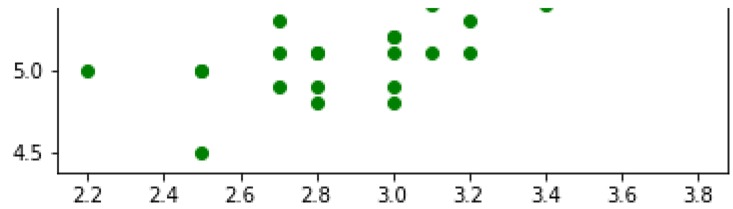

7.0
6.5
6.0
5.5
5.0
4.5
2.2
2.4
2.6
2.8
3.0
3.2
3.4
3.6
3.8

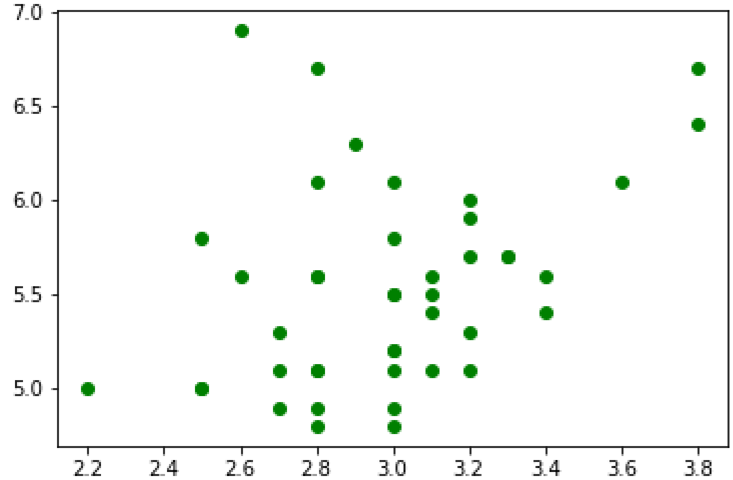

7.0
6.5
6.0
5.5
5.0
3.4
3.6
3.8

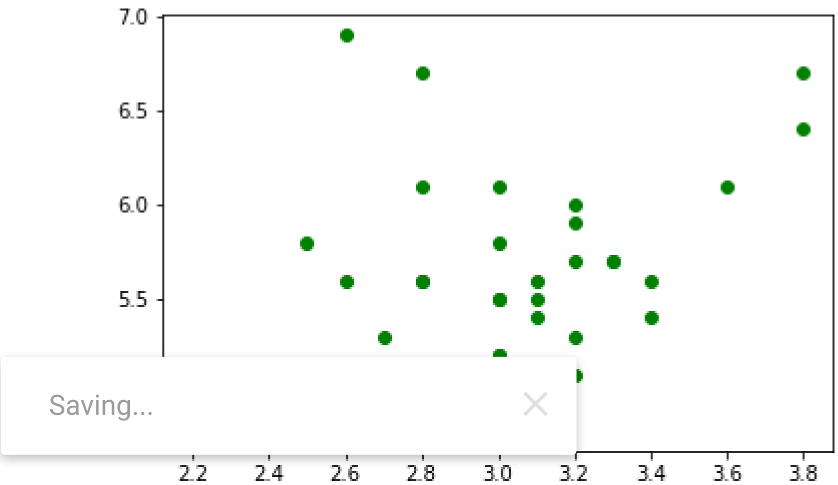
Saving...


7.0
6.5
6.0
5.5
5.0
4.5
2.2
2.4
2.6
2.8
3.0
3.2
3.4
3.6
3.8

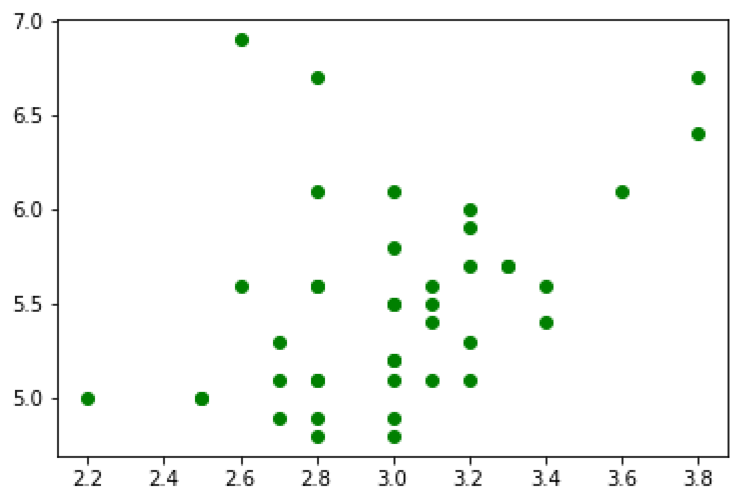

7.0
6.5
6.0
5.5

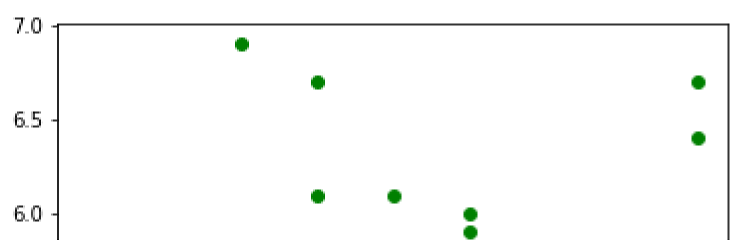

5.0
4.5
2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8

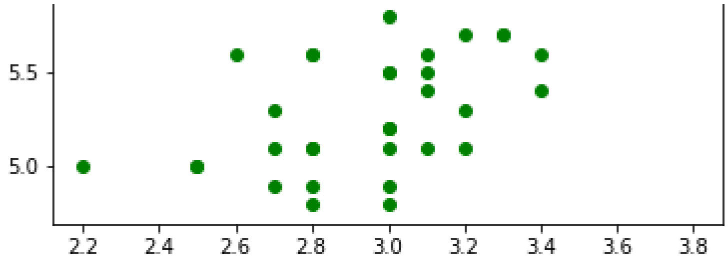

7.0
6.5
6.0
5.5
5.0
2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8

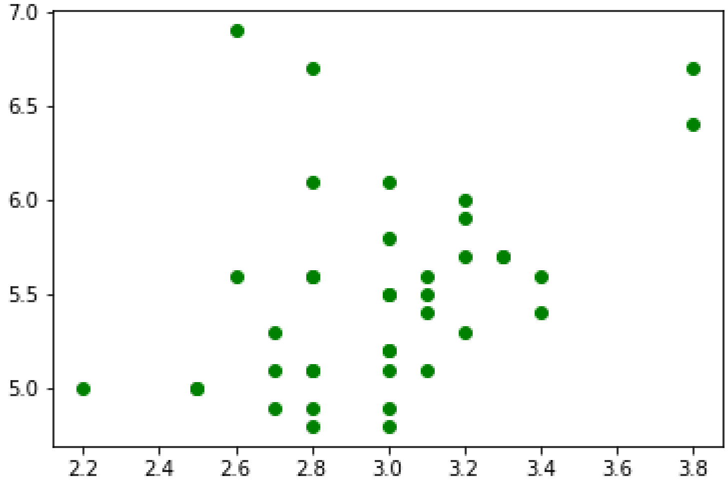

7.0
6.5
6.0
5.5
2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8

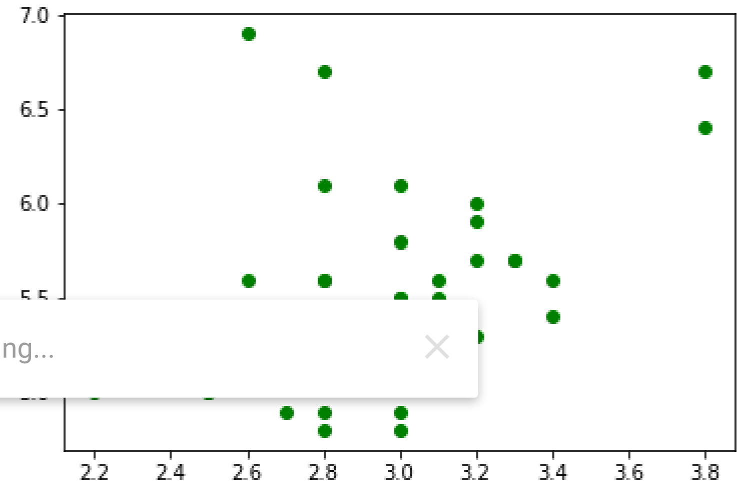
Saving...


7.0
6.5
6.0
5.5
5.0
2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8

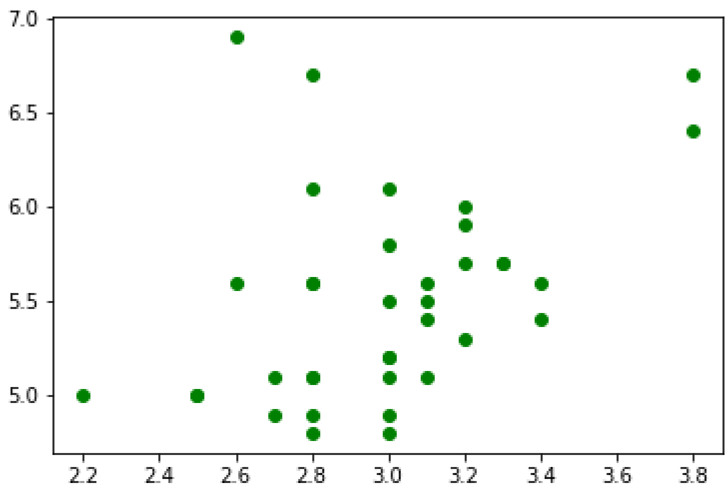

7.0
6.5
6.0

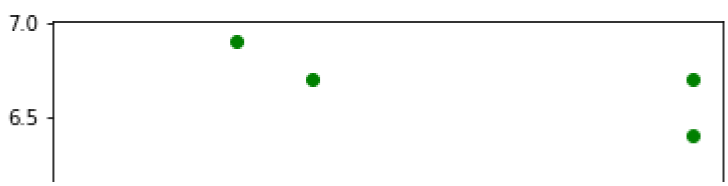

5.5
5.0
2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8

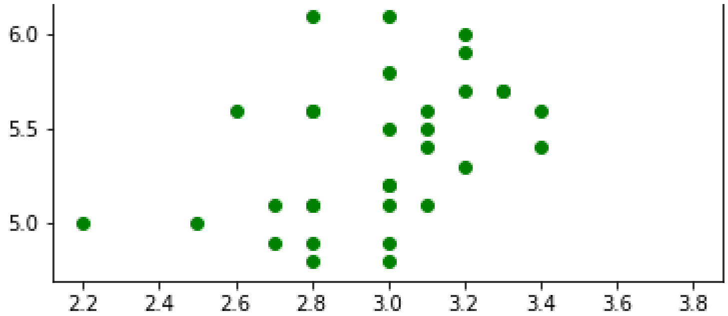

7.0
6.5
6.0
5.5
5.0
2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8

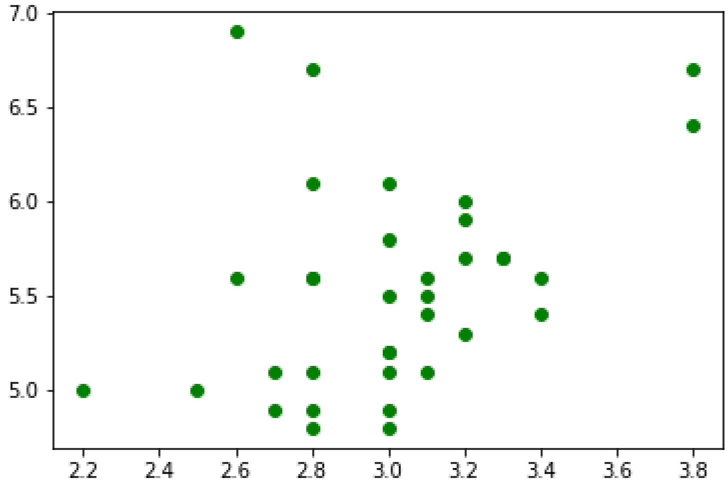

7.0
6.5
6.0
2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8

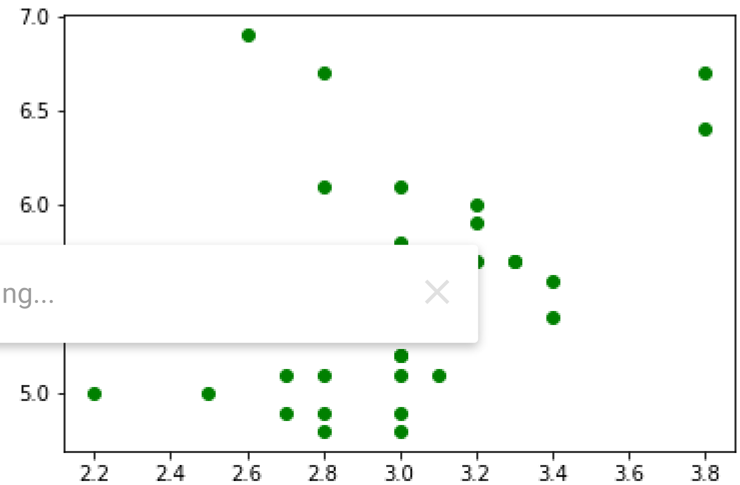
Saving...


7.0
6.5
6.0
5.5
5.0
2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8

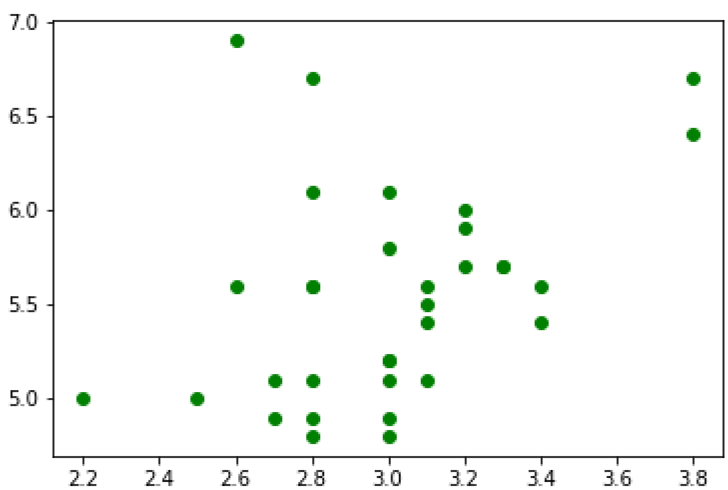

7.0
6.5

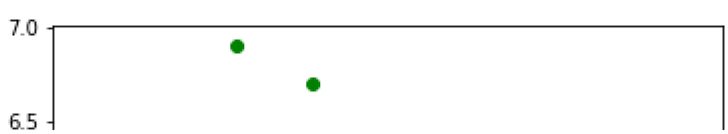

6.0
5.5
5.0
2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8

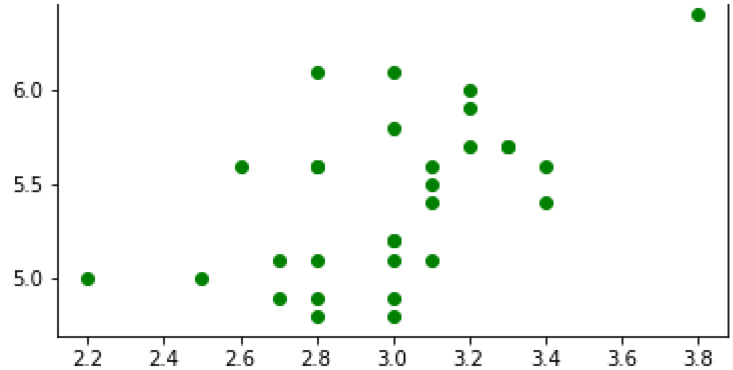

7.0
6.5
6.0
5.5
5.0
2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8

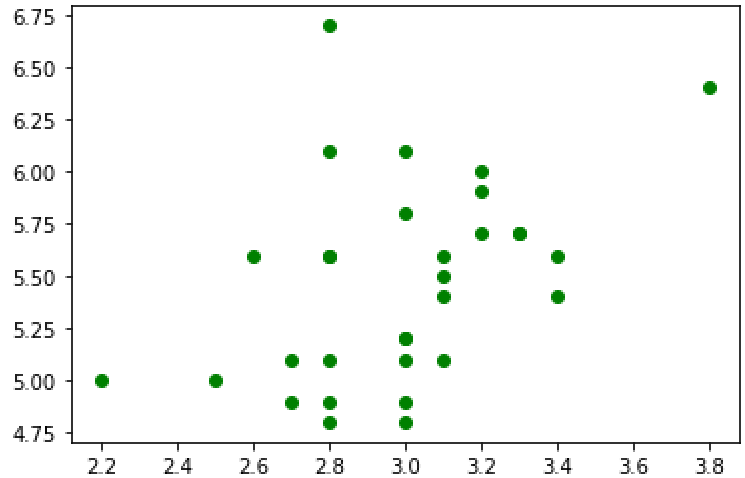

7.0
6.5
6.0
5.0
2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8

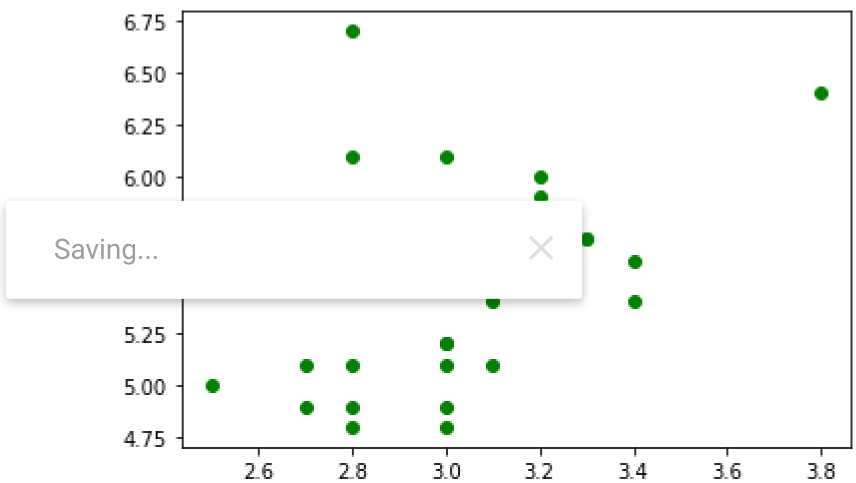
Saving...

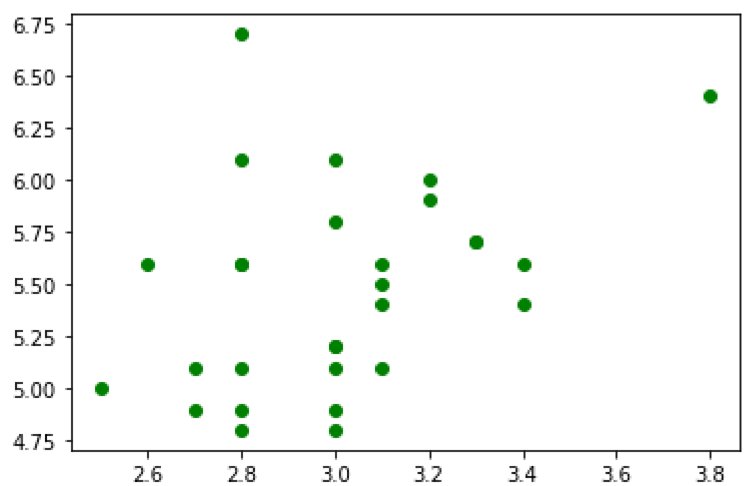

7.0
6.5
6.0
5.5
5.0
2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8


7.0
6.5

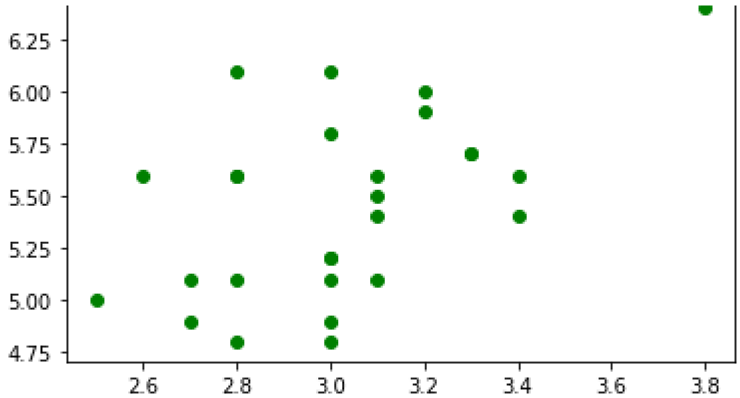

6.0
5.5
5.0
2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8

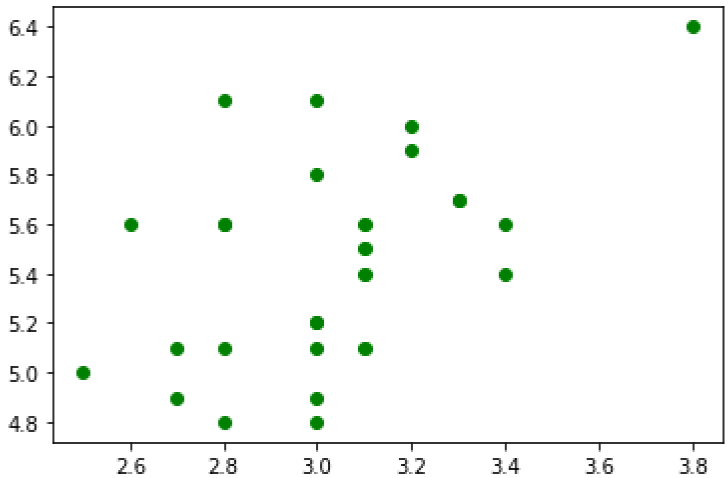

6.75
6.50
6.25
6.00
5.75
5.50
5.25
5.00
4.75
2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8

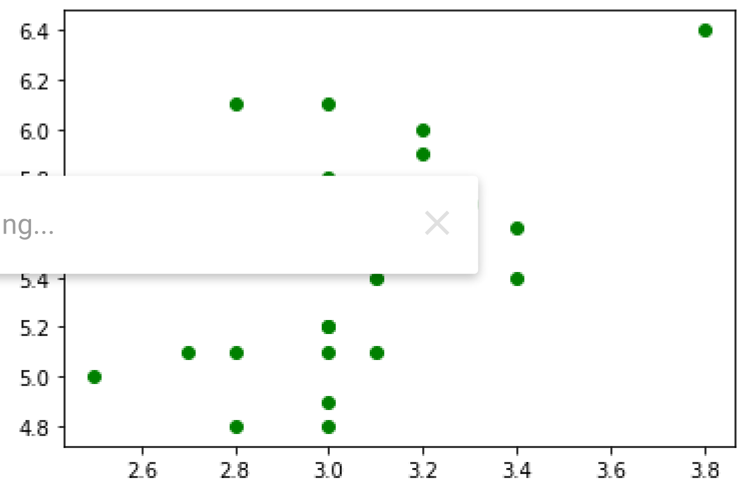

6.75
6.50
6.25
6.00
Saving...
5.25
5.00
4.75
2.6 2.8 3.0 3.2 3.4 3.6 3.8


6.75
6.50
6.25
6.00
5.75
5.50
5.25
5.00
4.75
2.6 2.8 3.0 3.2 3.4 3.6 3.8

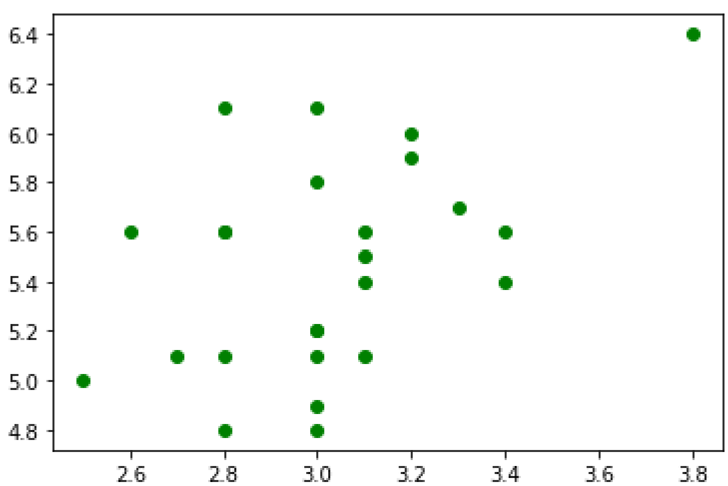

6.75
6.50

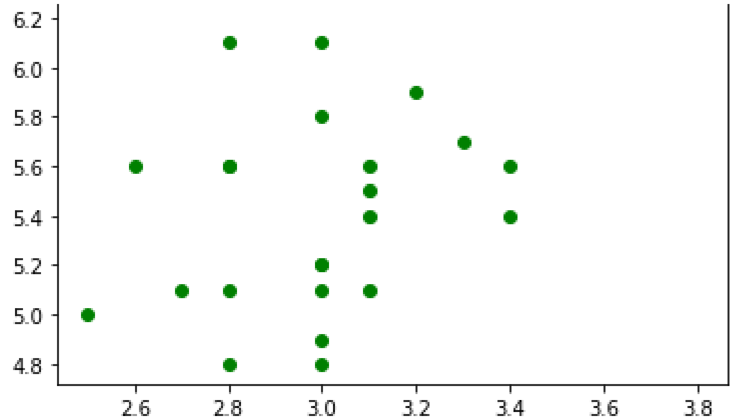


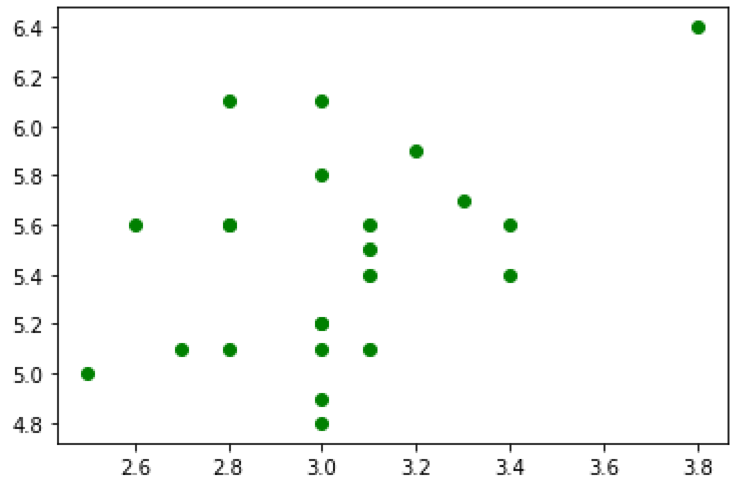


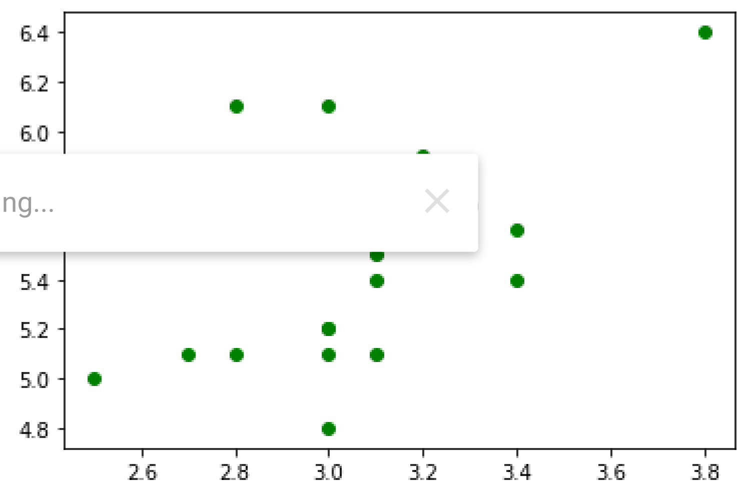


Saving...

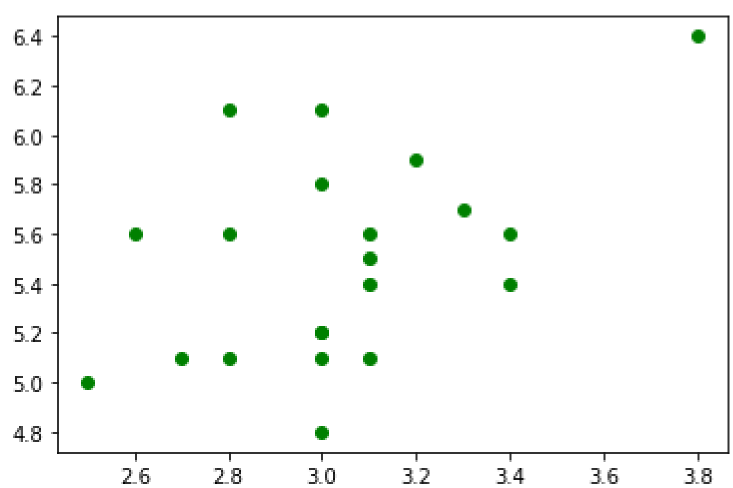



6.2
6.0
5.8
5.6
5.4
5.2
5.0
4.8
2.6 2.8 3.0 3.2 3.4 3.6 3.8

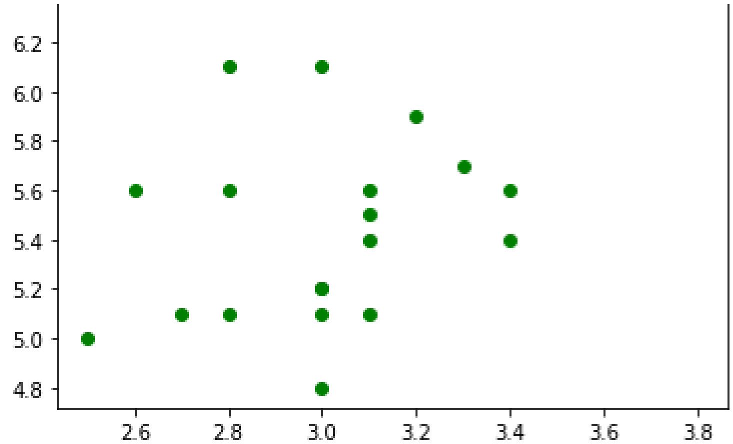

6.4
6.2
6.0
5.8
5.6
5.4
5.2
5.0
4.8
2.6 2.8 3.0 3.2 3.4 3.6 3.8

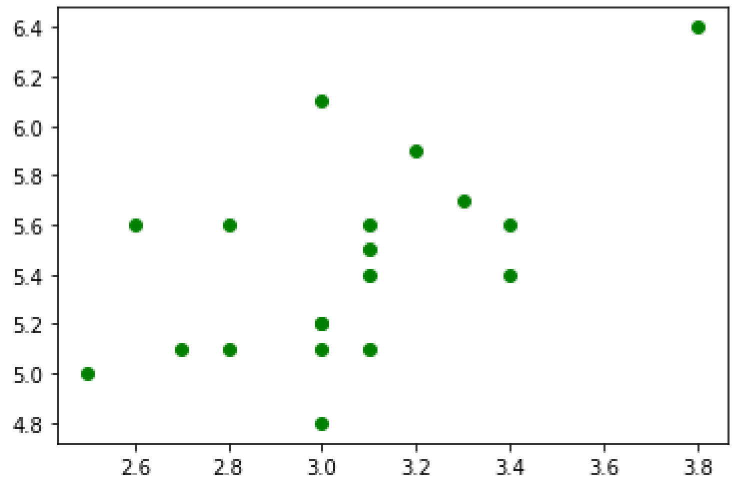

6.4
6.2
6.0
5.4
5.2
5.0
4.8
2.6 2.8 3.0 3.2 3.4 3.6 3.8

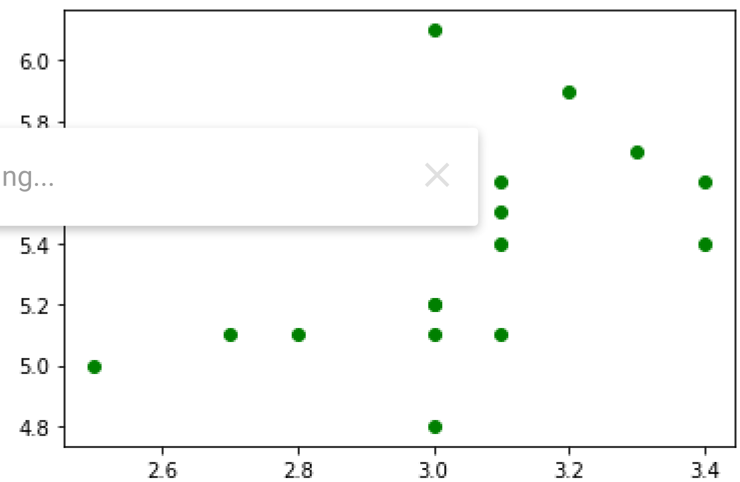
Saving...


6.4
6.2
6.0
5.8
5.6
5.4
5.2
5.0
4.8
2.6 2.8 3.0 3.2 3.4 3.6 3.8

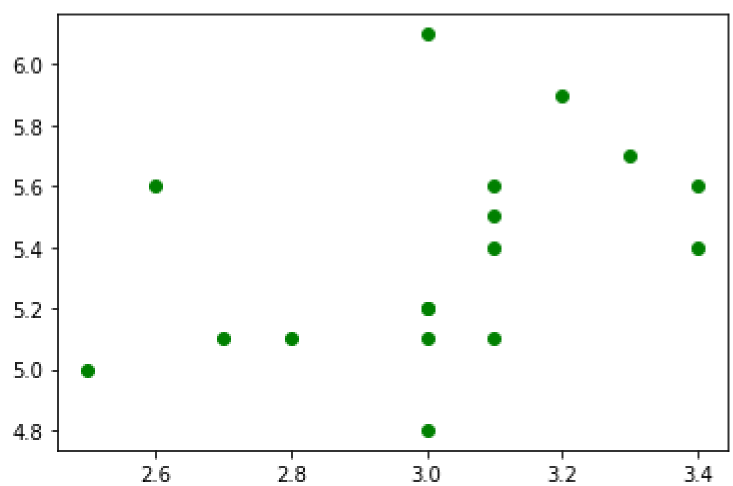

6.4

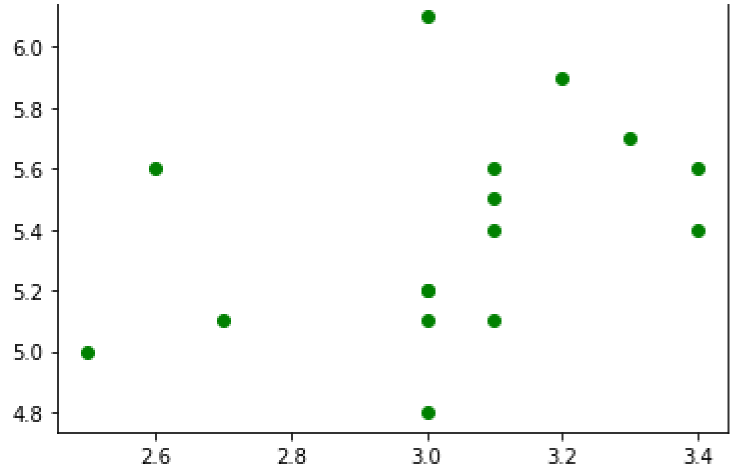

6.2
6.0
5.8
5.6
5.4
5.2
5.0
4.8
2.6
2.8
3.0
3.2
3.4
3.6
3.8

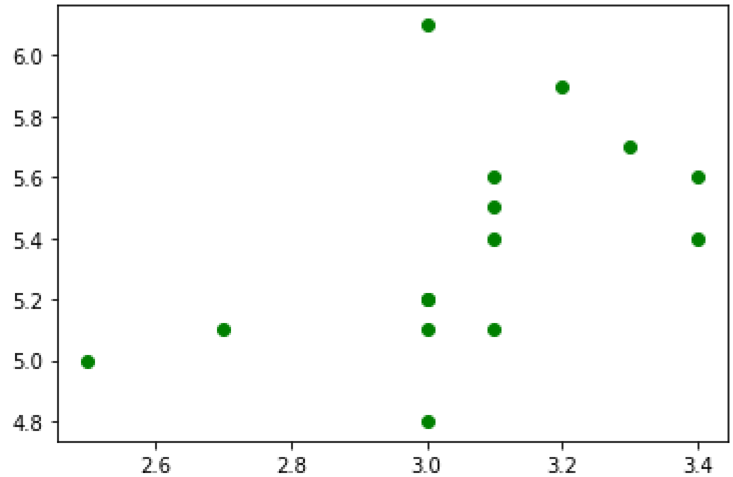

6.4
6.2
6.0
5.8
5.6
5.4
5.2
5.0
4.8
2.6
2.8
3.0
3.2
3.4
3.6
3.8

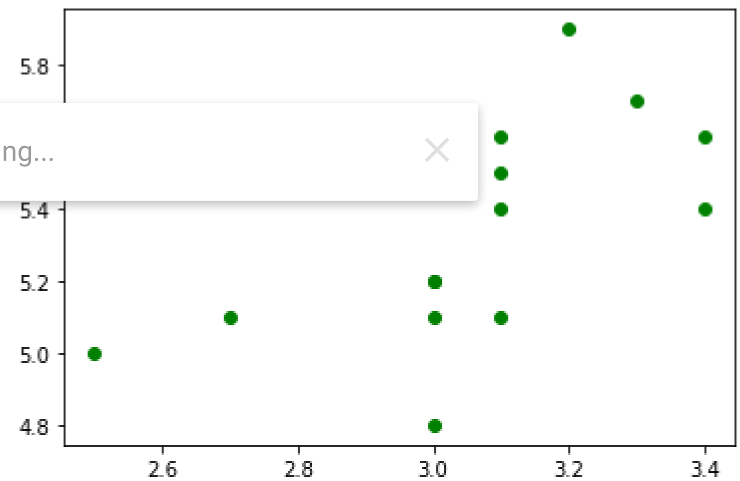

6.0
5.4
5.2
5.0
4.8
2.6
2.8
3.0
3.2
3.4

Saving...

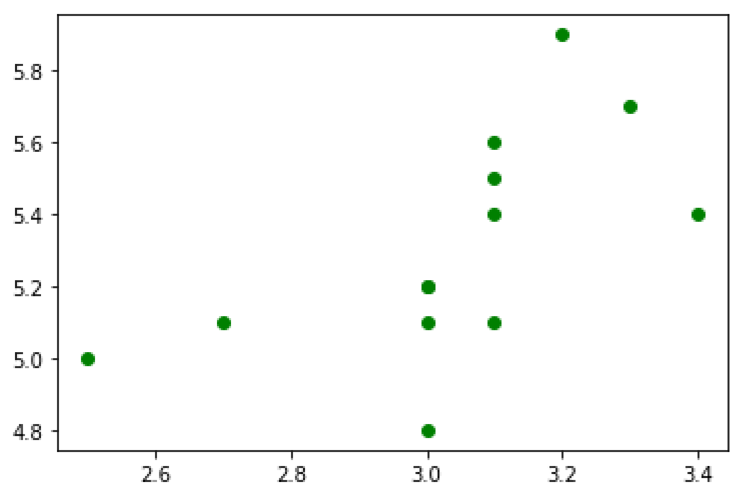

6.0
5.8
5.6
5.4
5.2
5.0
4.8
2.6
2.8
3.0
3.2
3.4

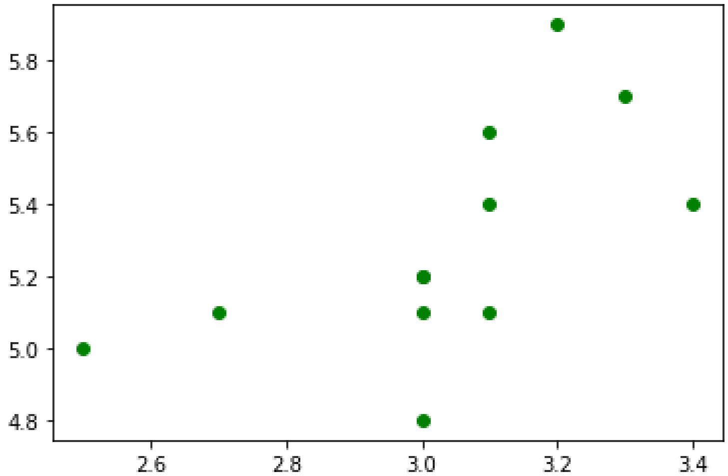

6.0
5.8
5.6
5.4
5.2
5.0
4.8
2.6
2.8
3.0
3.2
3.4

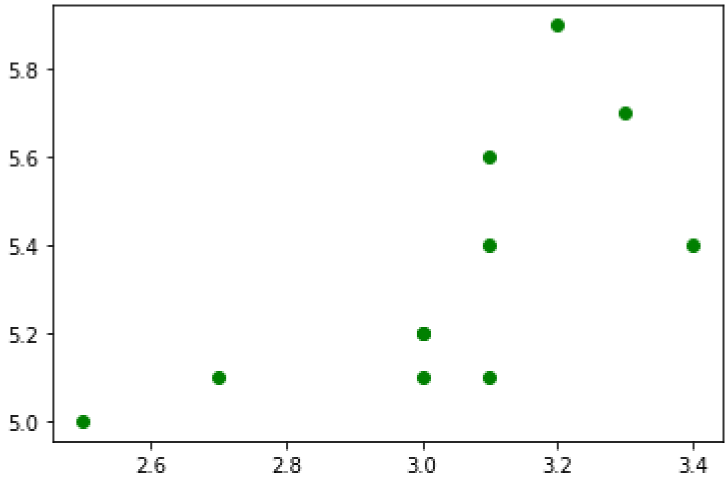

6.0
5.8
5.6
5.4
5.2
5.0
4.8
2.6
2.8
3.0
3.2
3.4

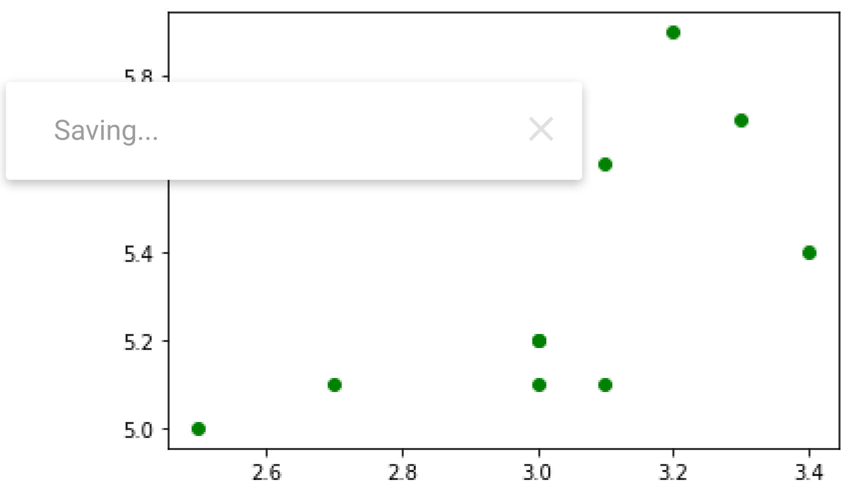

5.8
5.4
5.2
5.0
4.8
2.6
2.8
3.0
3.2
3.4

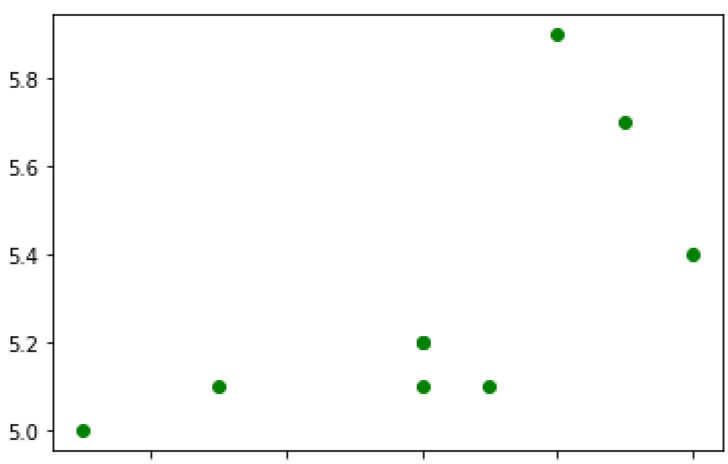
Saving...

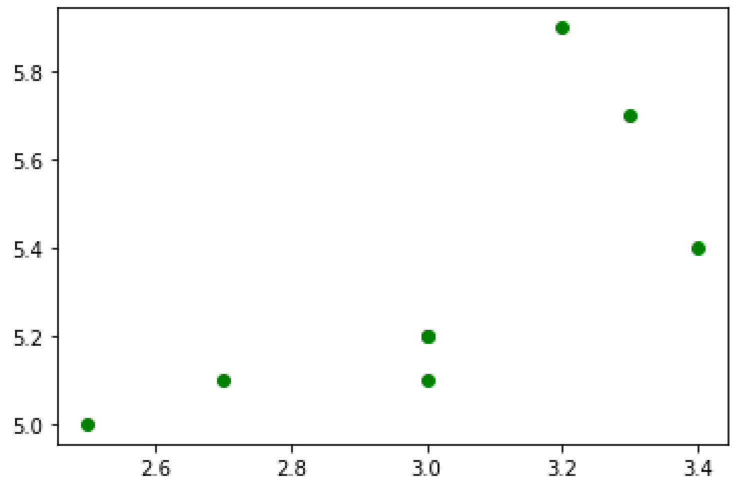

5.8
5.6
5.4
5.2
5.0
4.8
2.6
2.8
3.0
3.2
3.4

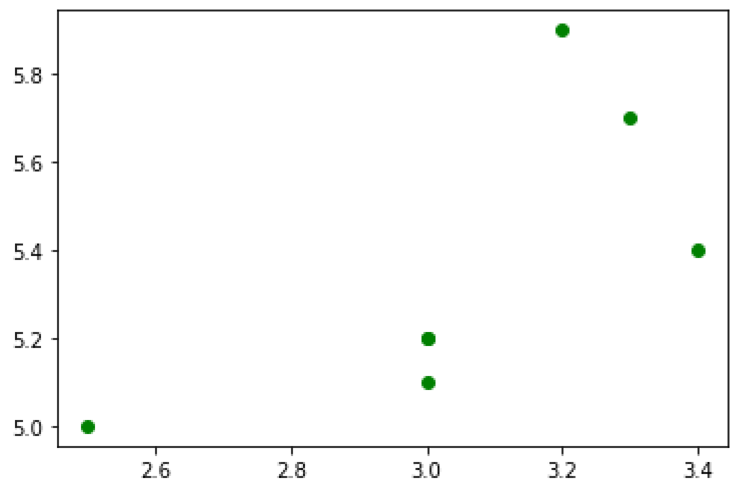

5.8
5.6
5.4
5.2
5.0
4.8
2.6
2.8
3.0
3.2
3.4

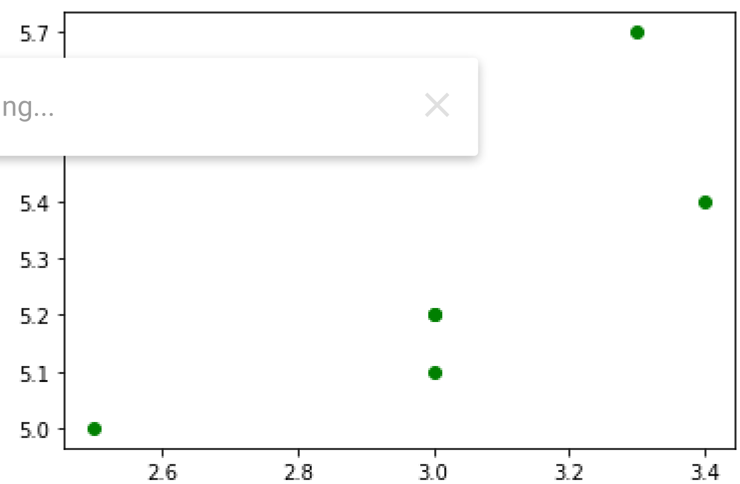

5.8
5.6
5.4
5.2
5.0
2.6
2.8
3.0
3.2
3.4


Saving...
5.4
5.2
5.0
2.6
2.8
3.0
3.2
3.4

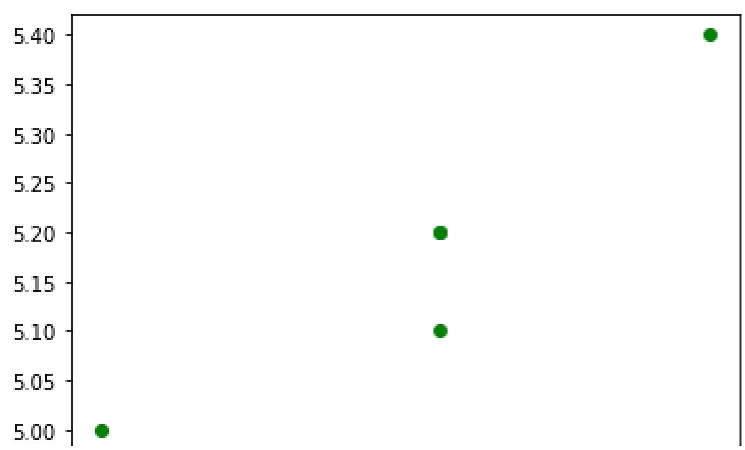

5.8
5.6
5.4
5.2
5.0

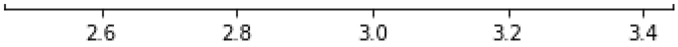

5.8
5.6
5.4
5.2
5.0
2.6
2.8
3.0
3.2
3.4

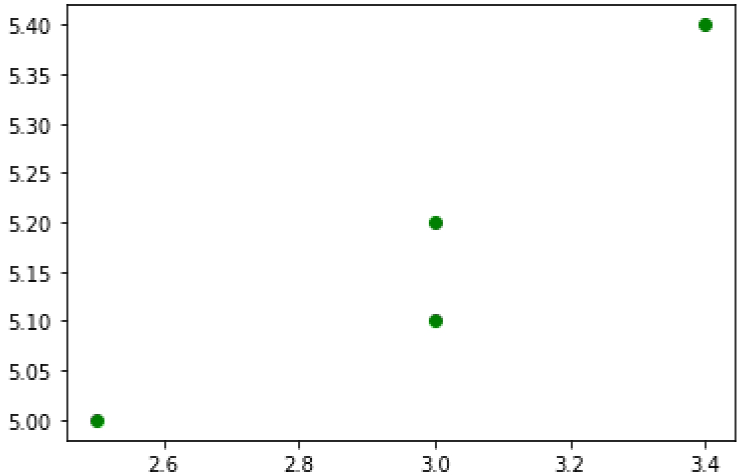

5.8
5.6
5.4
5.2
5.0
2.6
2.8
3.0
3.2
3.4

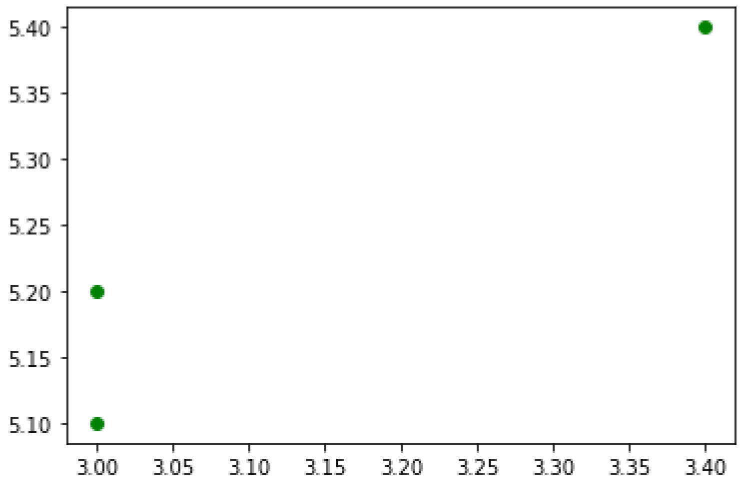

5.7
5.4
5.3
5.2
5.1
5.0
2.6
2.8
3.0
3.2
3.4

Saving...

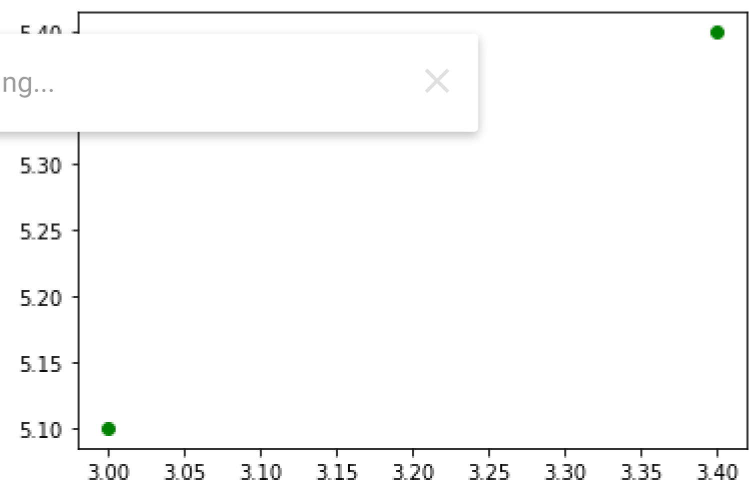

5.40
5.35
5.30
5.25
5.20
5.15
5.10
5.05
5.00

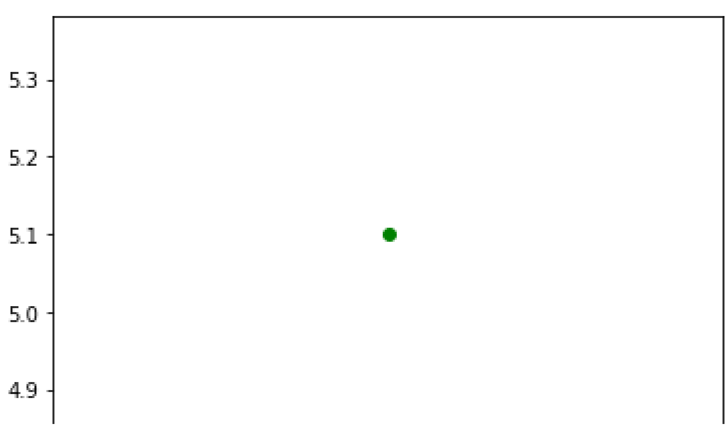

2.6
2.8
3.0
3.2
3.4


5.40
5.35
5.30
5.25
5.20
5.15
5.10
5.05
5.00
2.6
2.8
3.0
3.2
3.4


5.40
5.35
5.30
5.25
5.20
5.15
5.10
3.00
3.05
3.10
3.15
3.20
3.25
3.30
3.35
3.40

Saving...

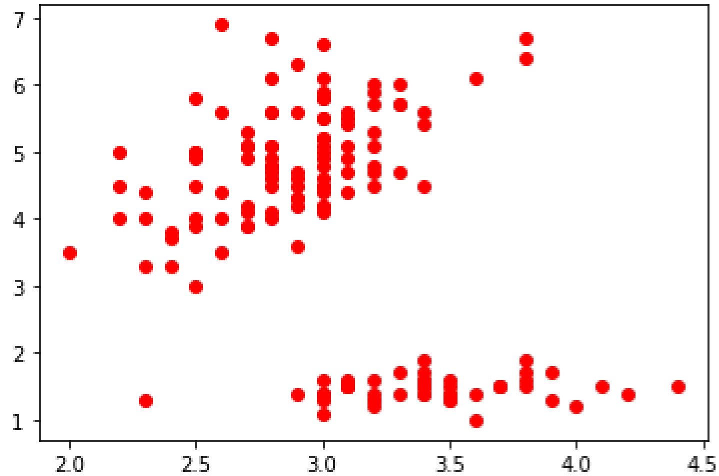

5.30
5.25
5.20
5.15
5.10
3.00
3.05
3.10
3.15
3.20
3.25
3.30
3.35
3.40

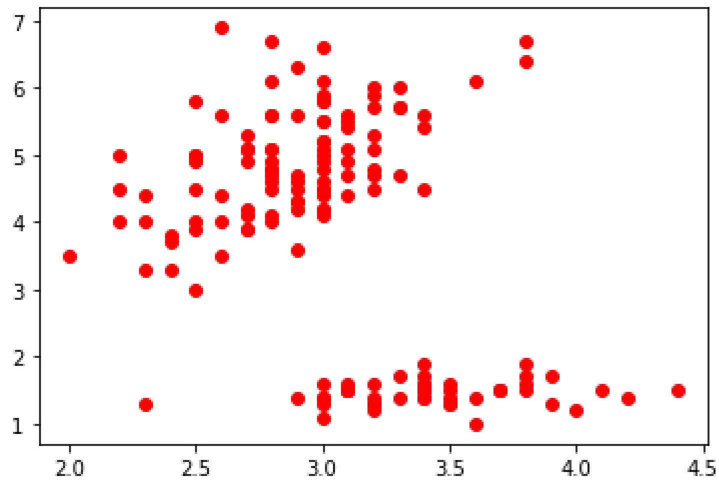

5.3
5.2
5.1
5.0
4.9

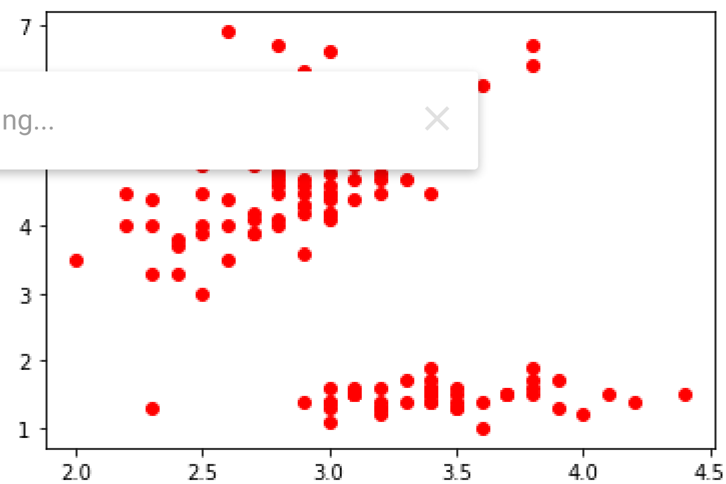
Taking Sepal Width and Petal Length as our two features for clustering

```
for i in range(150):
  if i<=49:
    plt.plot(iris.values[i:,1],iris.values[i:,2],'ro')
  if i>49 and i<=99:
    plt.plot(iris.values[i:,1],iris.values[i:,2],'bo')
  if i>99:
    plt.plot(iris.values[i:,1],iris.values[i:,2],'go')
  plt.show()
```

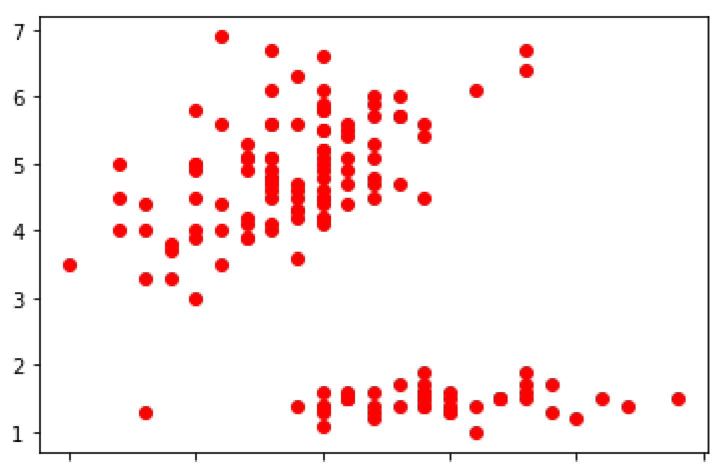
Saving...

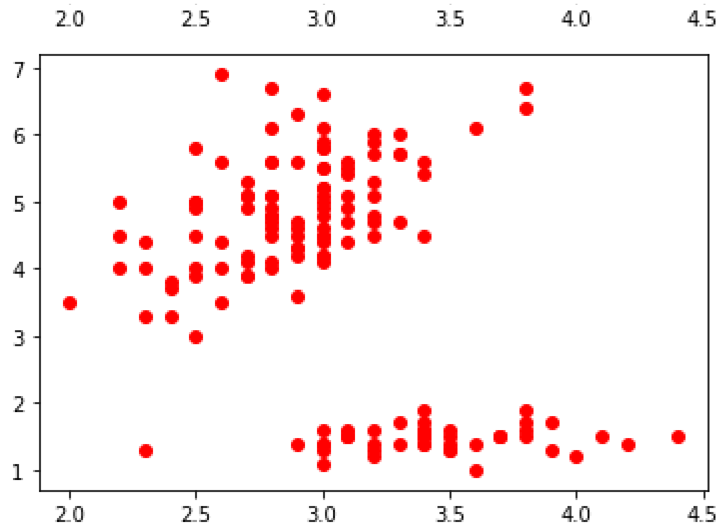

1
2
3
4
5
6
7
2.0
2.5
3.0
3.5
4.0
4.5

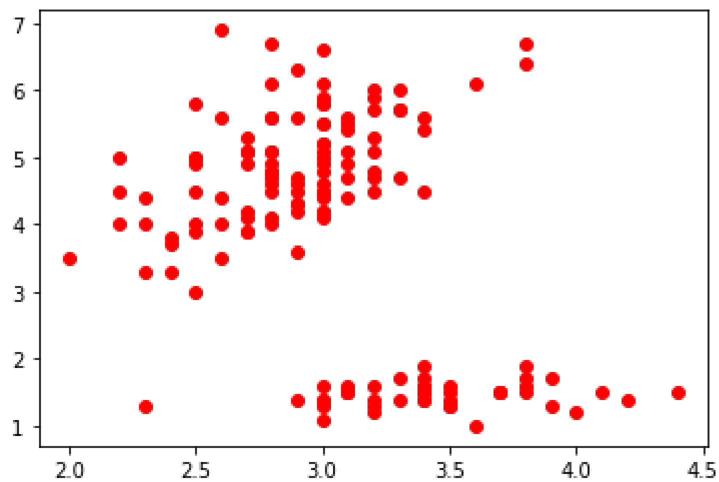

1
2
3
4
5
6
7
2.0
2.5
3.0
3.5
4.0
4.5

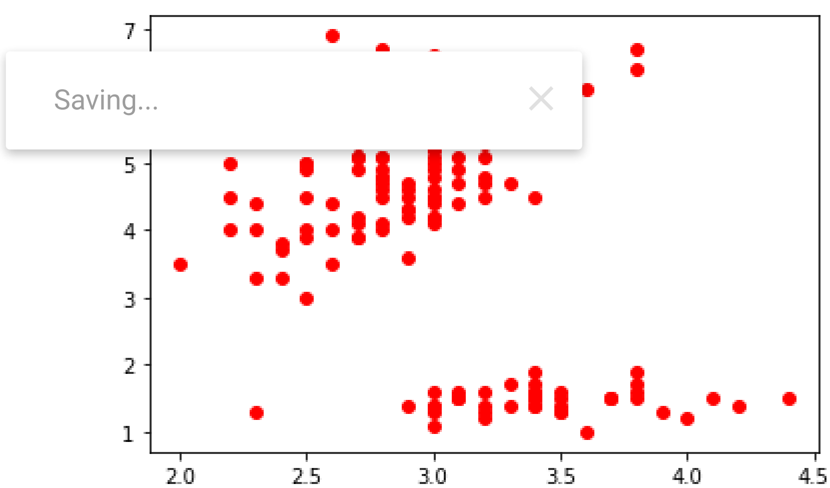

1
2
3
4
7
2.0
2.5
3.0
3.5
4.0
4.5

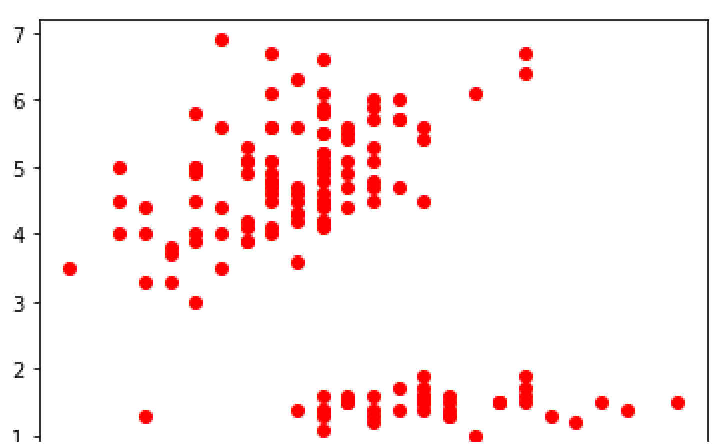
Saving...


1
2
3
4
5
6
7

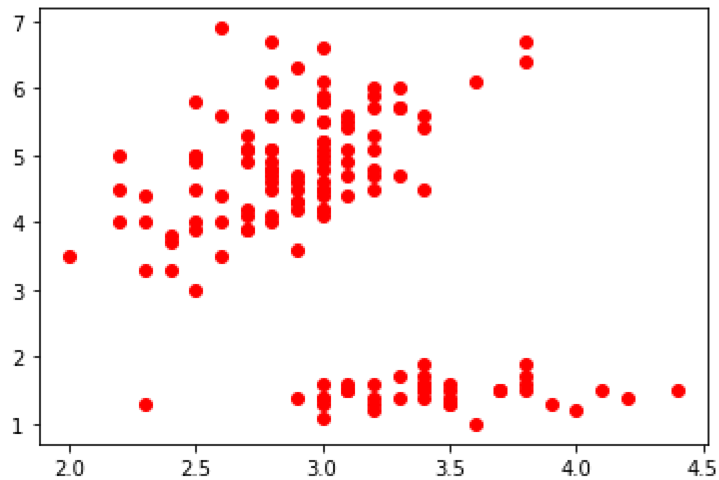

2.0 2.5 3.0 3.5 4.0 4.5
7 6 5 4 3 2 1
2.0 2.5 3.0 3.5 4.0 4.5

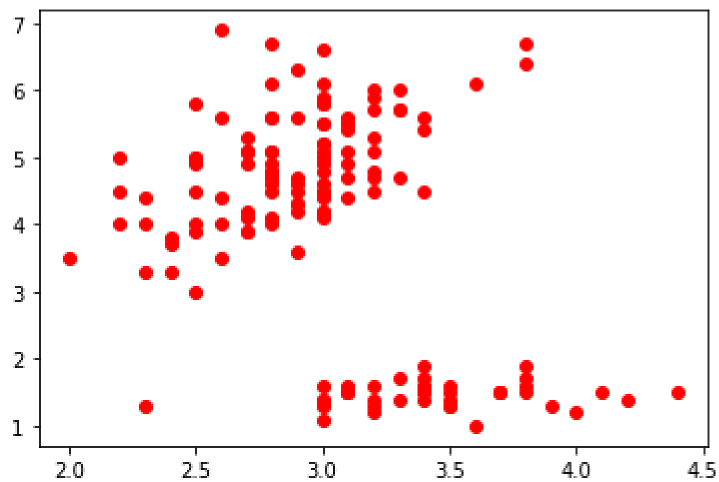

7 6 5 4 3 2 1
2.0 2.5 3.0 3.5 4.0 4.5


Saving...
7 5 4 3 2 1
2.0 2.5 3.0 3.5 4.0 4.5

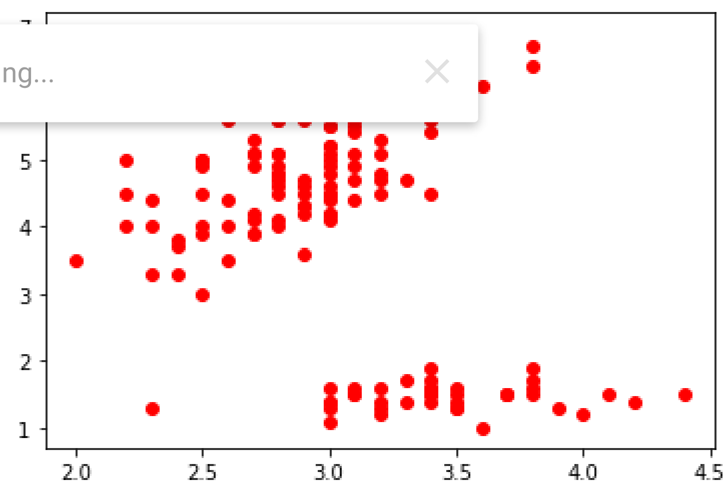

7 6 5 4 3 2 1

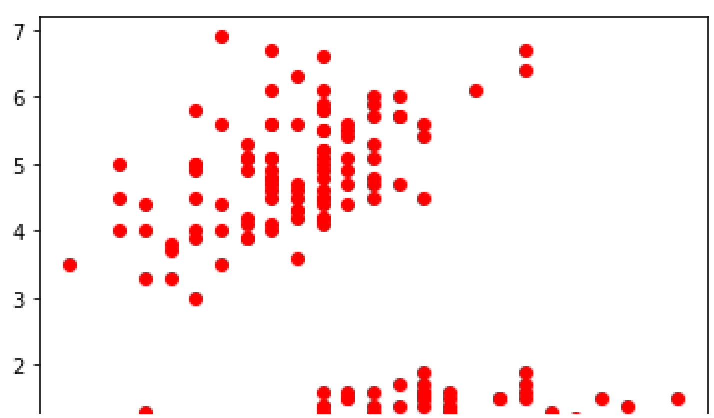

2.0
2.5
3.0
3.5
4.0
4.5

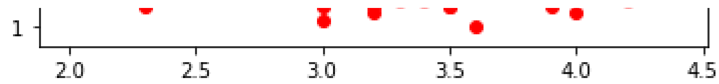

7
6
5
4
3
2
1
2.0
2.5
3.0
3.5
4.0
4.5

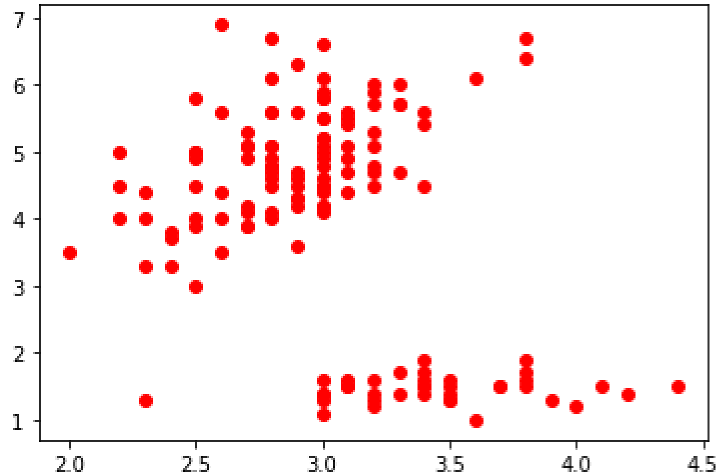

7
6
5
4
3
2
1
2.0
2.5
3.0
3.5
4.0
4.5

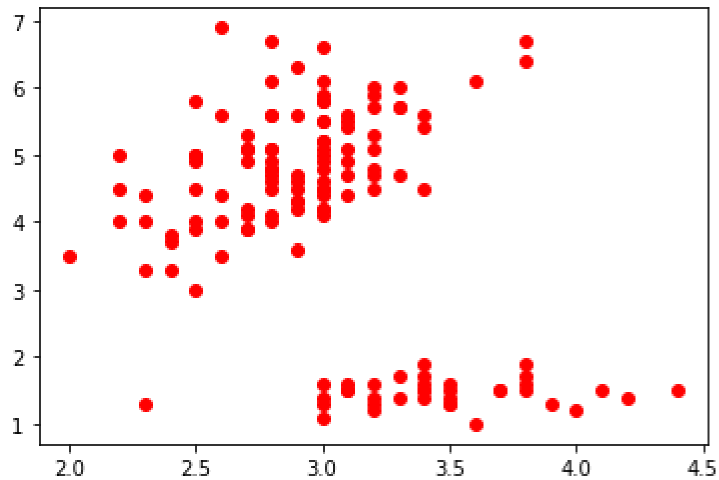
Saving...

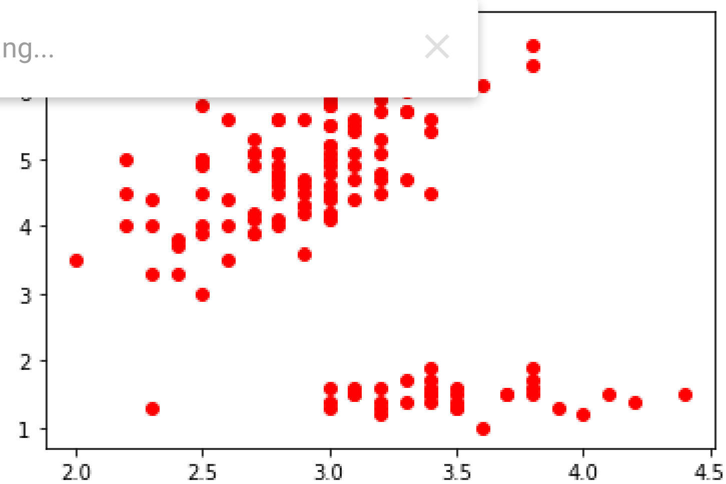

5
4
3
2
1
2.0
2.5
3.0
3.5
4.0
4.5

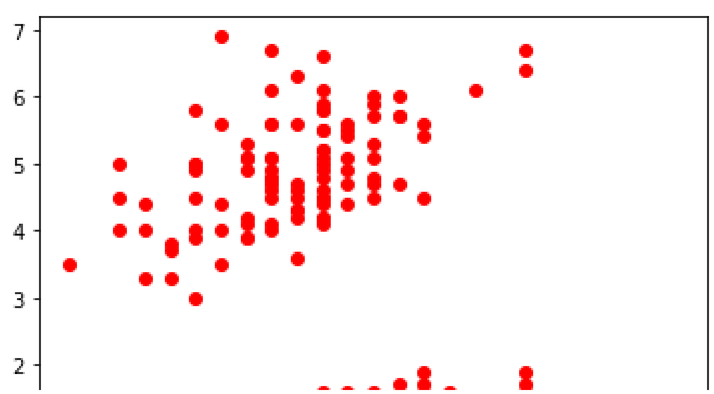

7
6
5
4
3
2

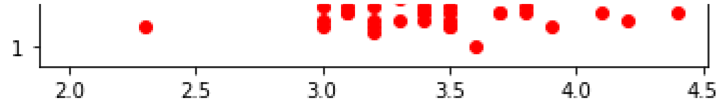

1
2.0
2.5
3.0
3.5
4.0
4.5

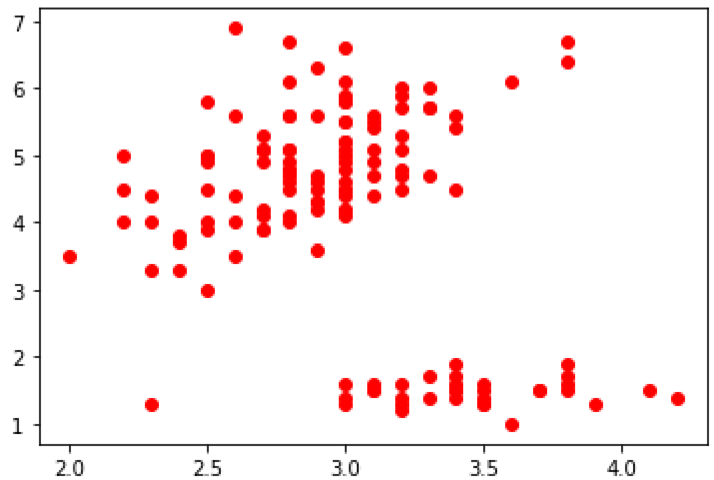

7
6
5
4
3
2
1
2.0
2.5
3.0
3.5
4.0
4.5

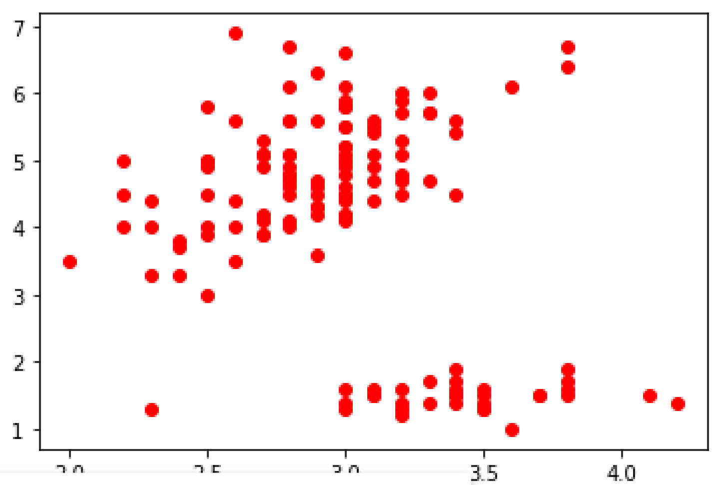

7
6
5
4
3
2
1
2.0
2.5
3.0
3.5
4.0
4.5


5
4
3
2
1
2.0
2.5
3.0
3.5
4.0
4.5

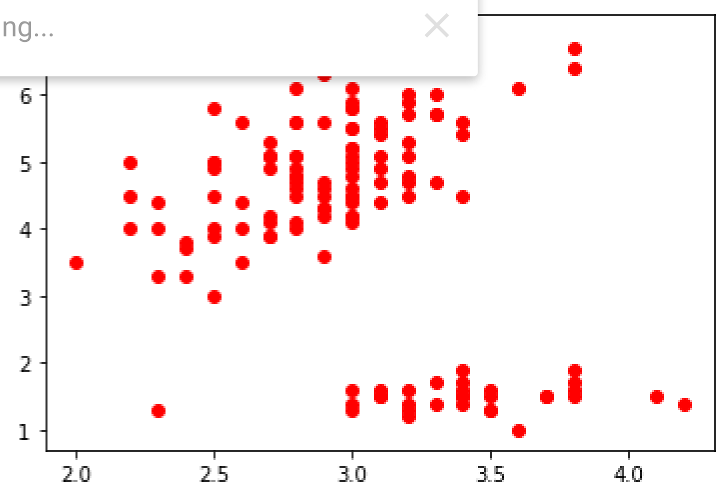

7
6
5
4
3
2

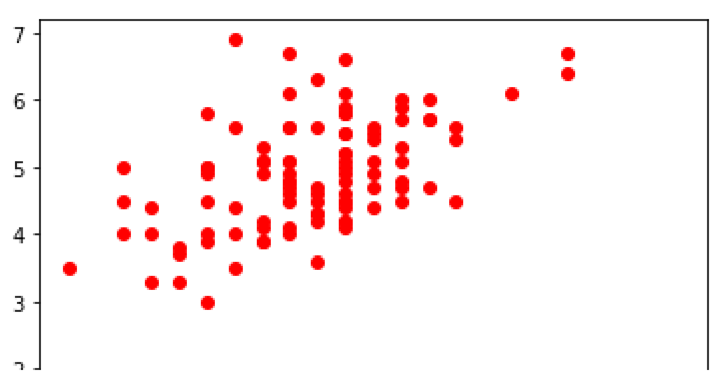

1
2.0
2.5
3.0
3.5
4.0
4.5

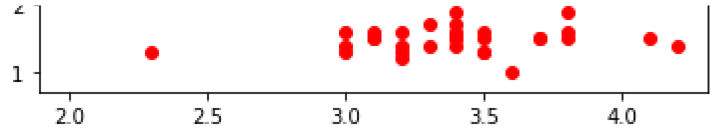

7
6
5
4
3
2
1
2.0
2.5
3.0
3.5
4.0

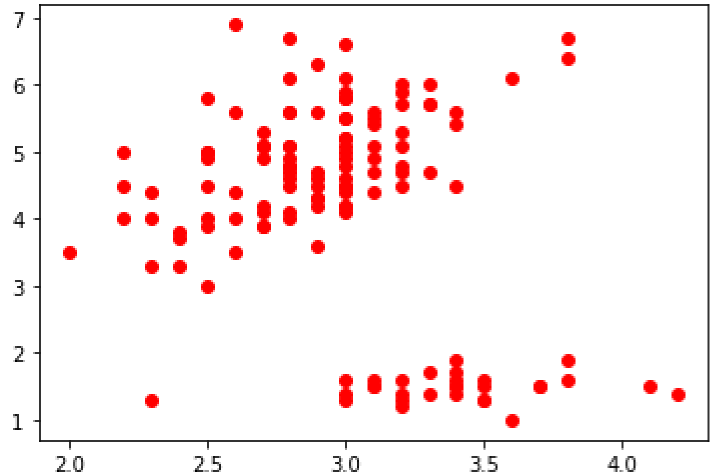

7
6
5
4
3
2
1
3.5
4.0

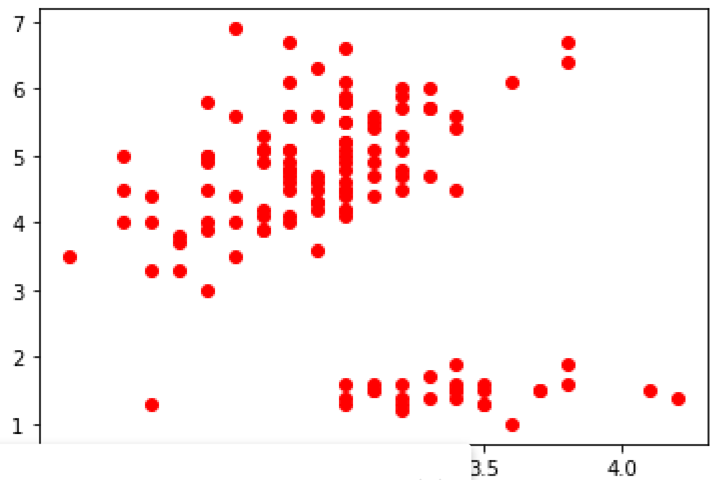
Saving...


6
5
4
3
2
1
2.0
2.5
3.0
3.5
4.0

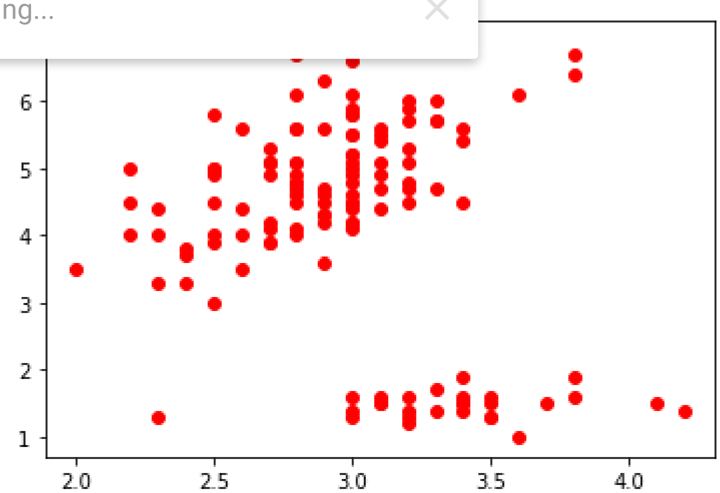

7
6
5
4
3

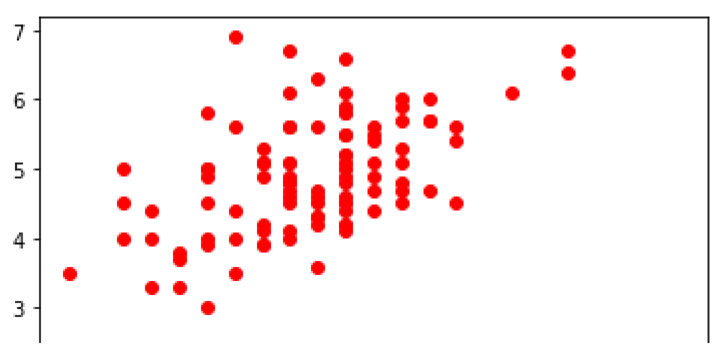


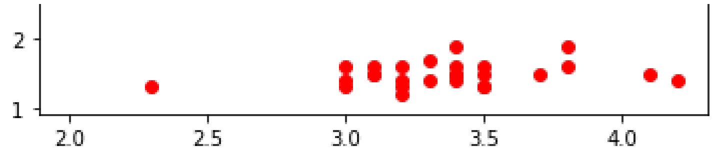


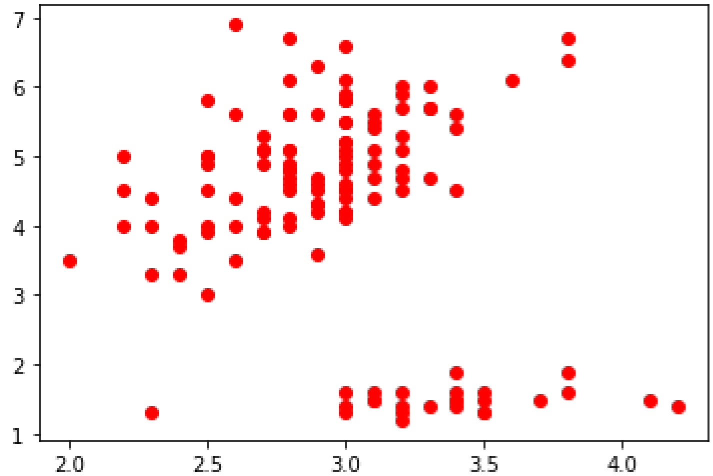


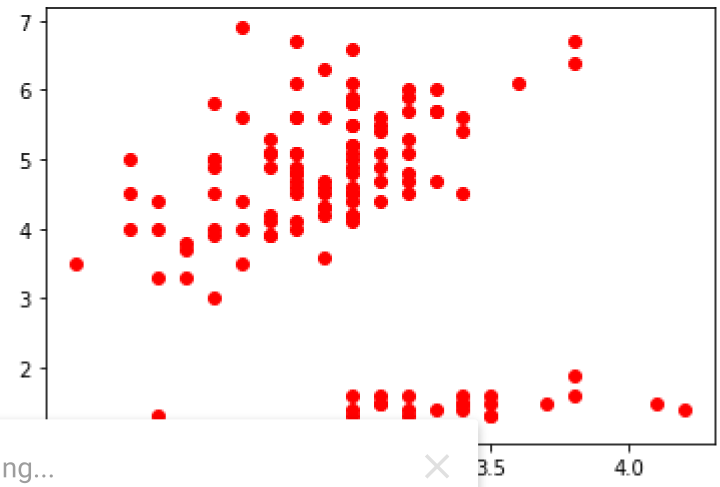
Saving...



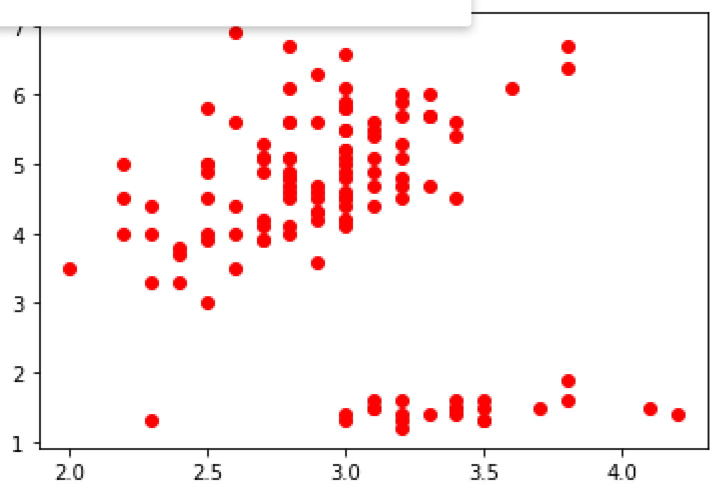


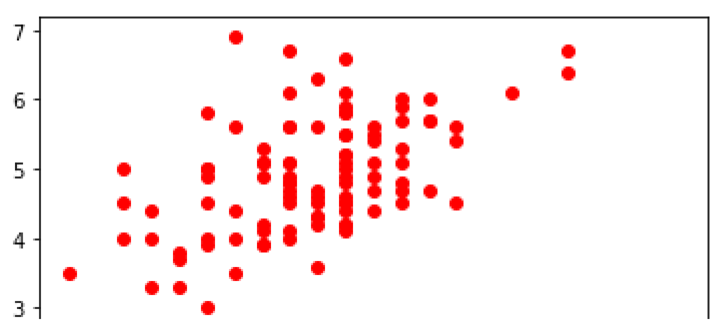

2
1
2.0
2.5
3.0
3.5
4.0

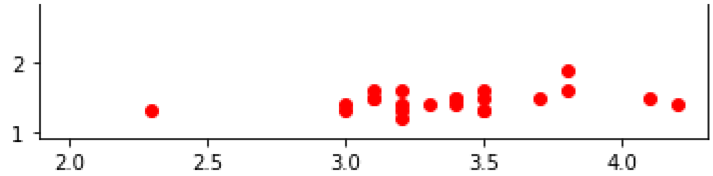

7
6
5
4
3
2
1
2.0
2.5
3.0
3.5
4.0

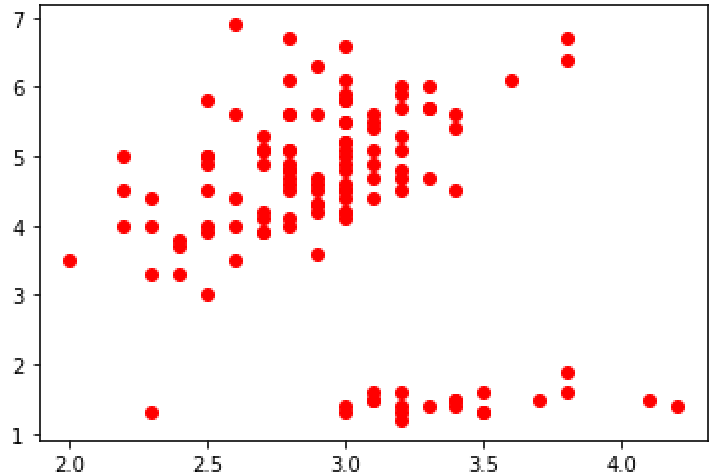

7
6
5
4
3
2
3.5
4.0

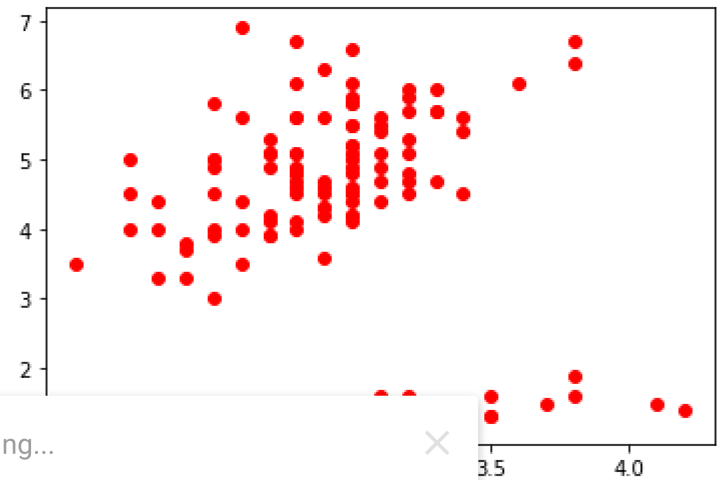
Saving...

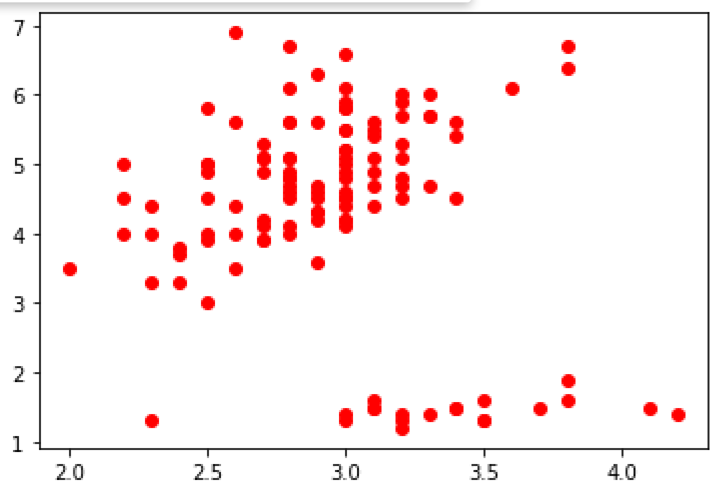

6
5
4
3
2
1
2.0
2.5
3.0
3.5
4.0

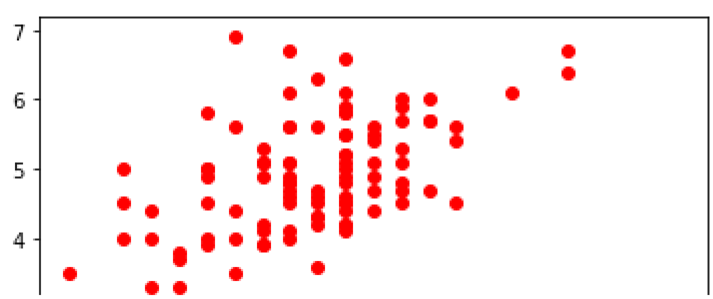

7
6
5
4
3

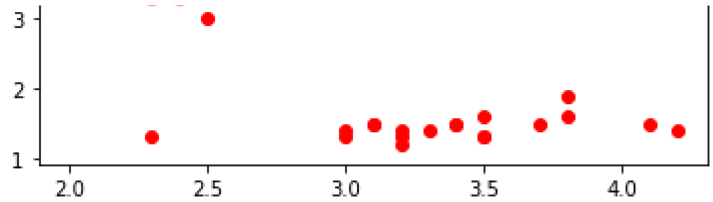

2
1
2.0
2.5
3.0
3.5
4.0

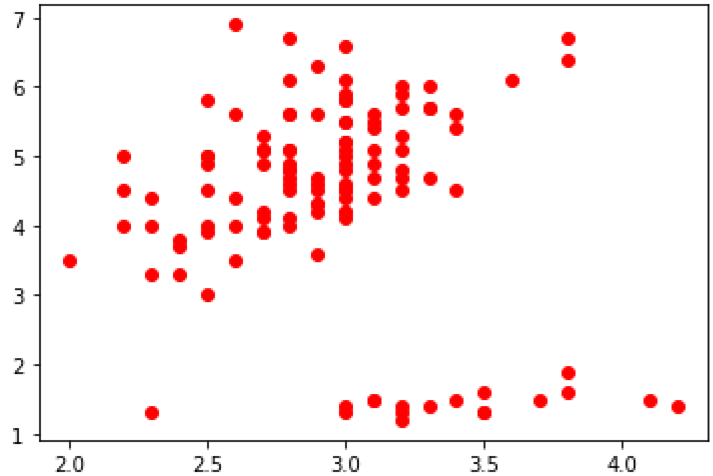

7
6
5
4
3
2
1
2.0
2.5
3.0
3.5
4.0

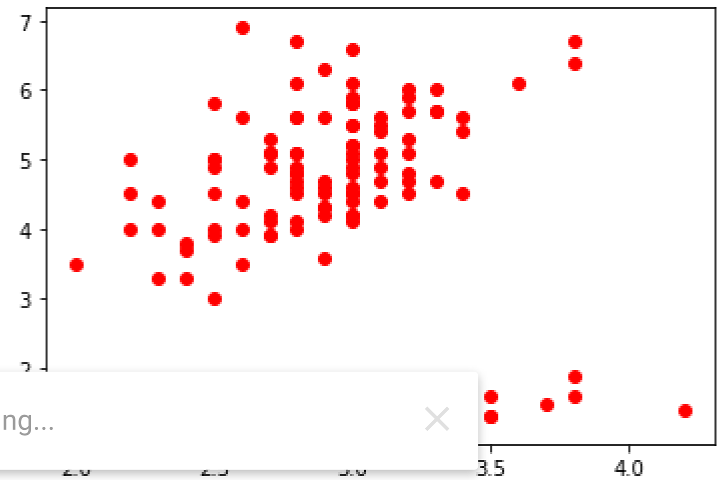

7
6
5
4
3
2
3.5
4.0

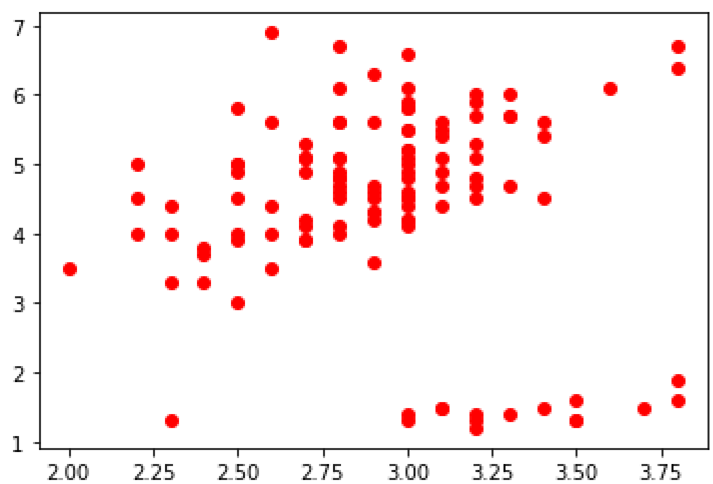

7
6
5
4
3
2
1
2.0
2.5
3.0
3.5
4.0

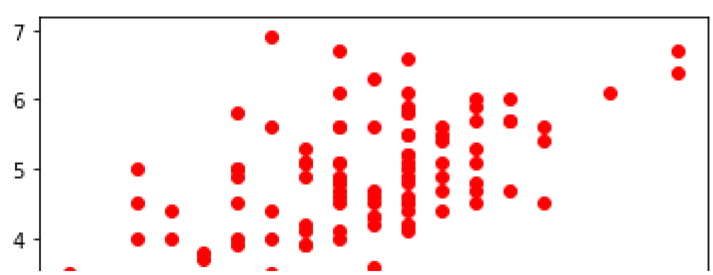

7
6
5
4

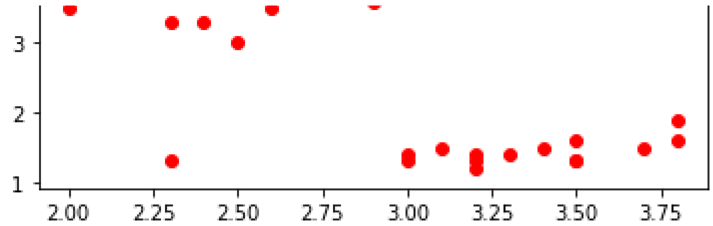

3
2
1
2.0
2.5
3.0
3.5
4.0

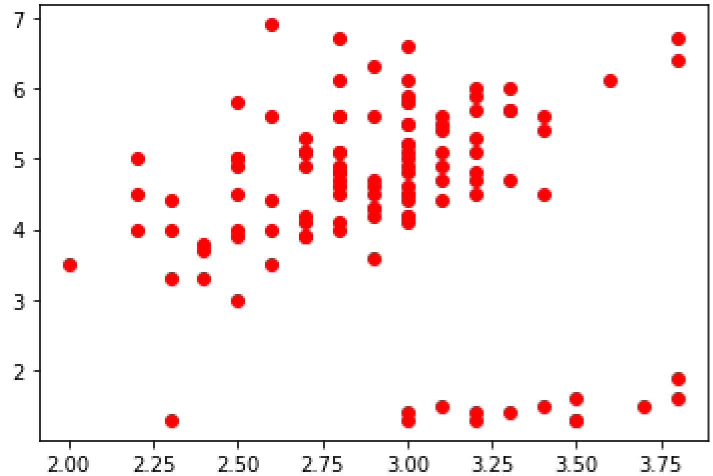

7
6
5
4
3
2
1
2.0
2.5
3.0
3.5
4.0

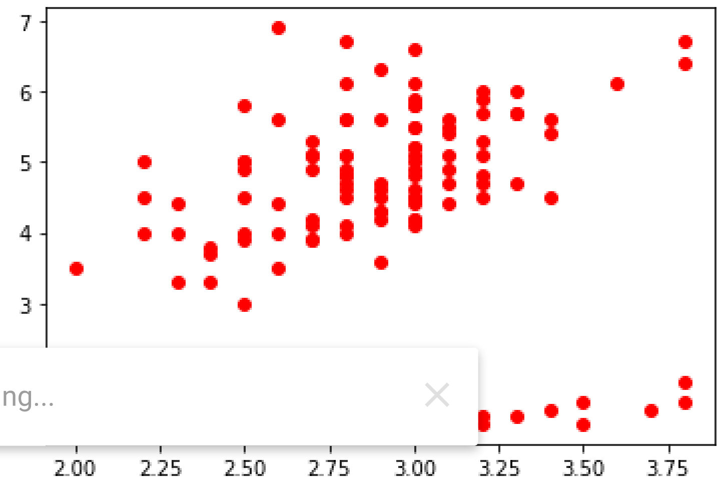

7
6
5
4
3
3.5
4.0


7
6
5
4
3
2
1
2.00
2.25
2.50
2.75
3.00
3.25
3.50
3.75

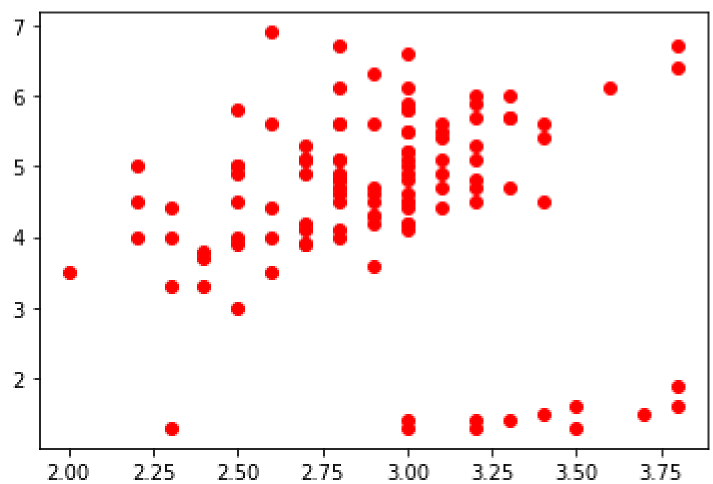

7
6
5
4

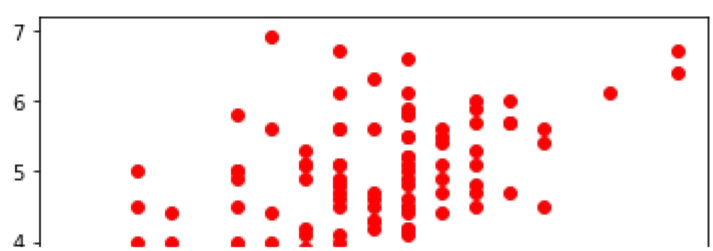

3
2
1
2.00 2.25 2.50 2.75 3.00 3.25 3.50 3.75

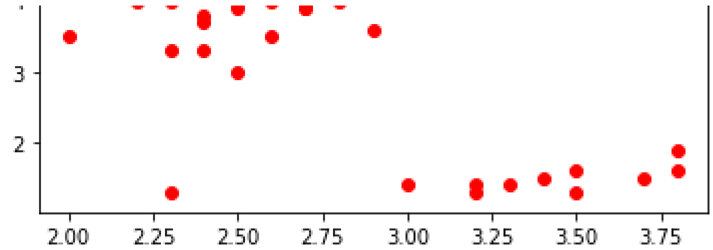

7
6
5
4
3
2
2.00 2.25 2.50 2.75 3.00 3.25 3.50 3.75

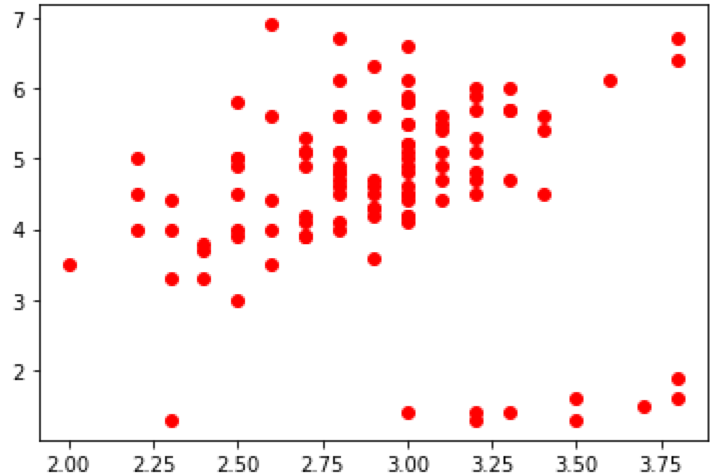

7
6
5
4
3
2.00 2.25 2.50 2.75 3.00 3.25 3.50 3.75

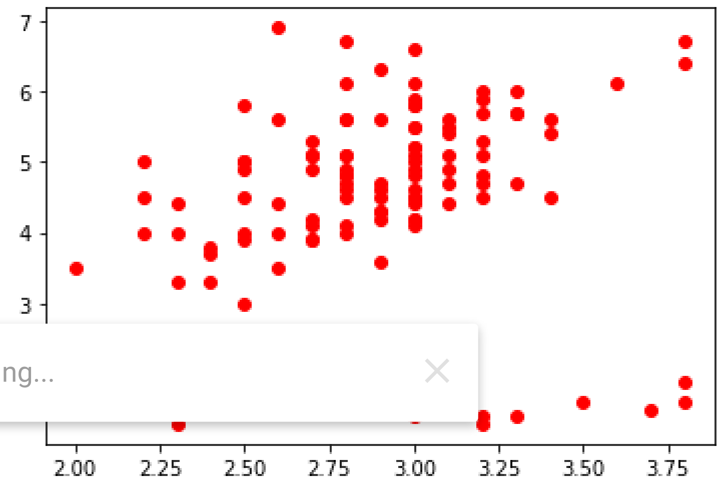
Saving...

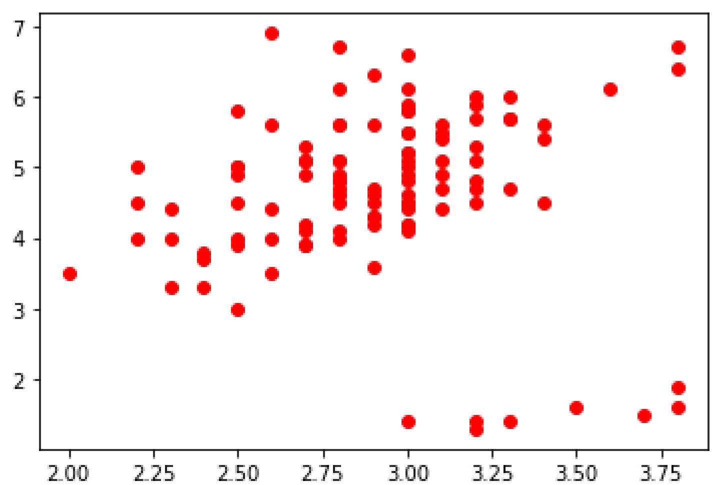

7
6
5
4
3
2
2.00 2.25 2.50 2.75 3.00 3.25 3.50 3.75

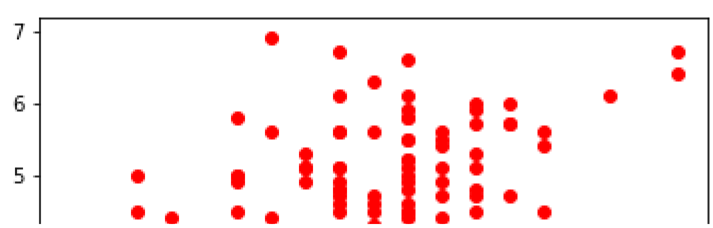

7
6
5
4

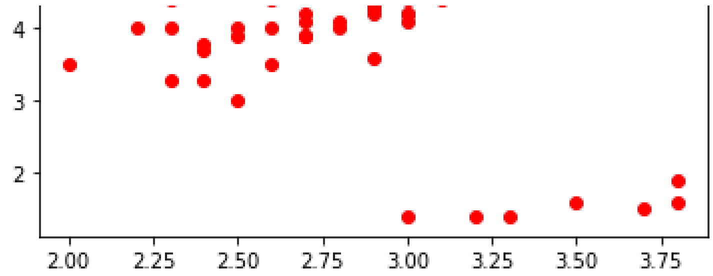

3
2
2.00
2.25
2.50
2.75
3.00
3.25
3.50
3.75

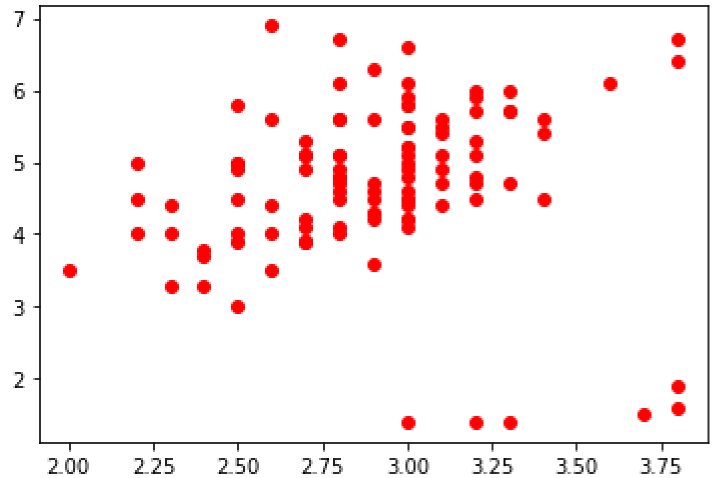

7
6
5
4
3
2
2.00
2.25
2.50
2.75
3.00
3.25
3.50
3.75

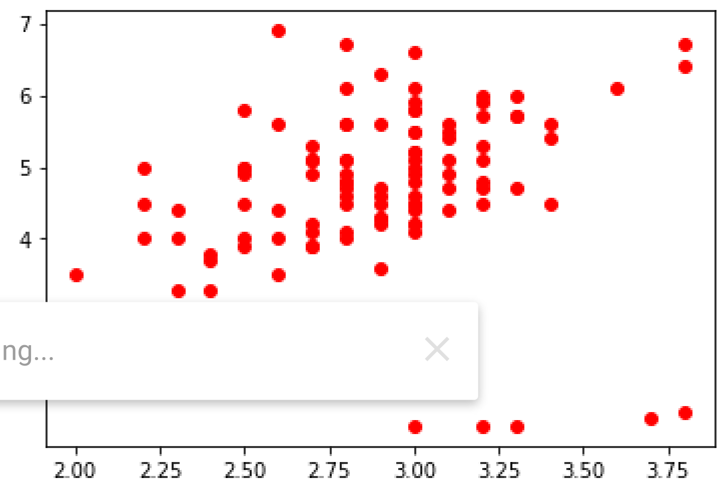

7
6
5
4
3
2.00
2.25
2.50
2.75
3.00
3.25
3.50
3.75

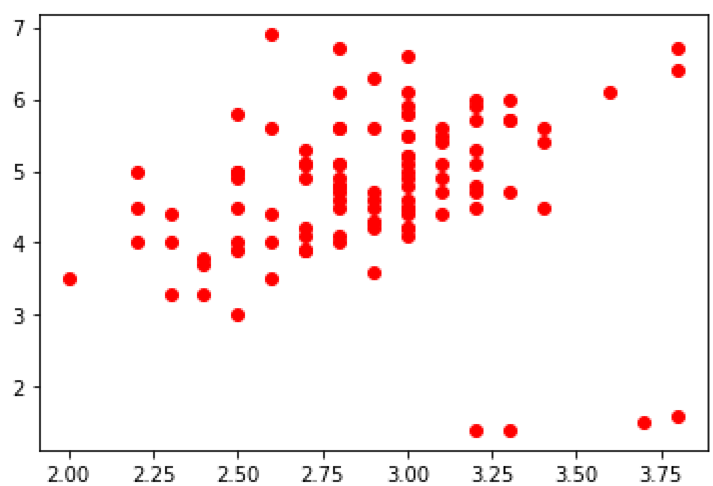

7
6
5
4
3
2
2.00
2.25
2.50
2.75
3.00
3.25
3.50
3.75

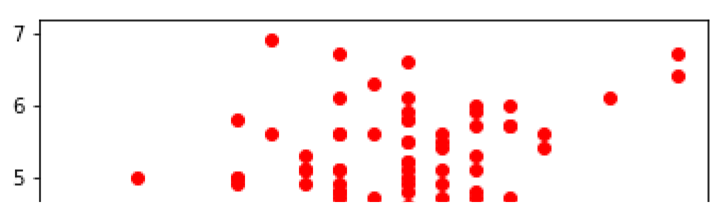

7
6
5

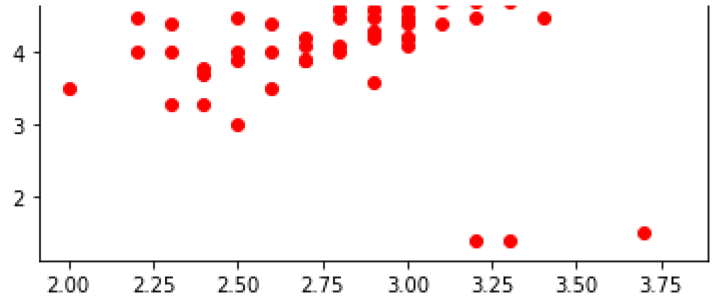

4
3
2
2.00 2.25 2.50 2.75 3.00 3.25 3.50 3.75

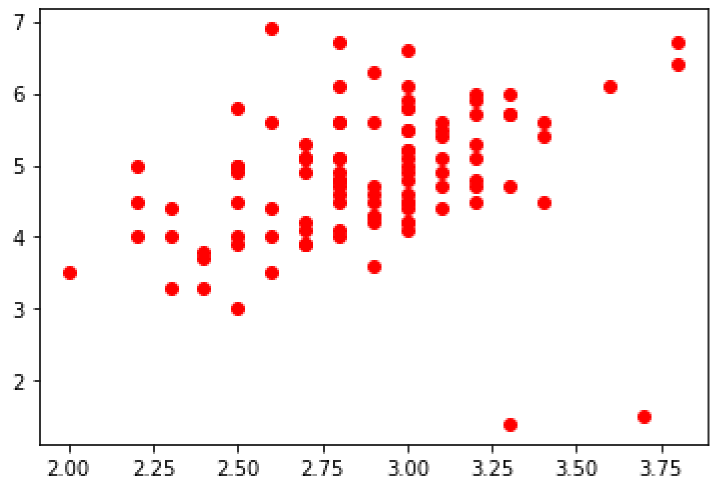

7
6
5
4
3
2
2.00 2.25 2.50 2.75 3.00 3.25 3.50 3.75

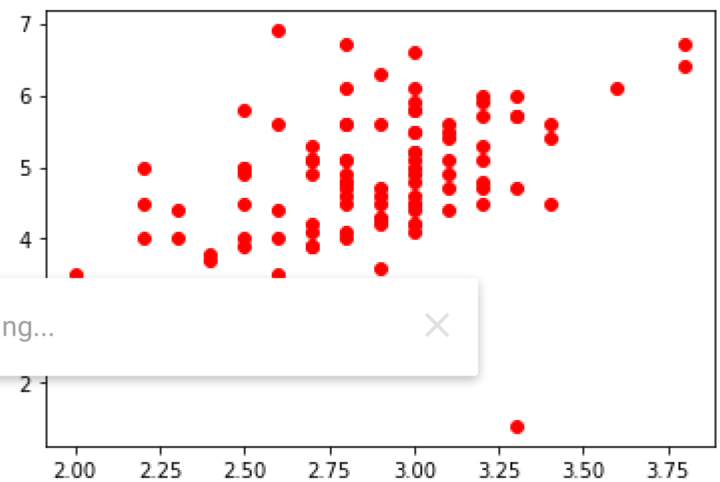

7
6
5
4
2.00 2.25 2.50 2.75 3.00 3.25 3.50 3.75


7
6
5
4
3
2
2.00 2.25 2.50 2.75 3.00 3.25 3.50 3.75

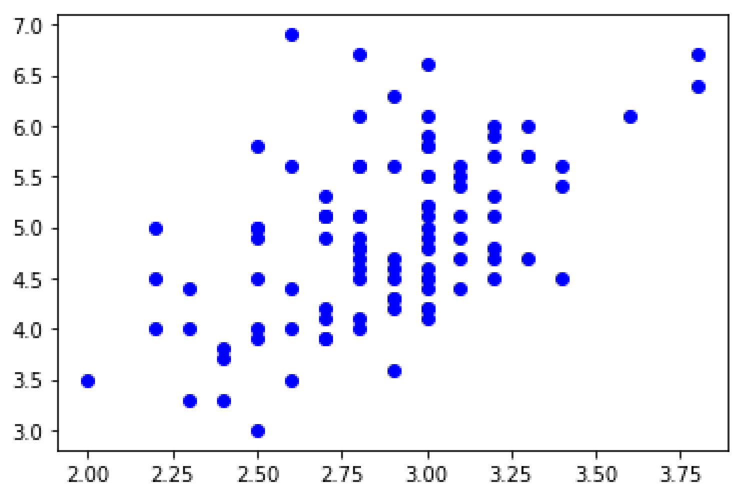

7
6
5

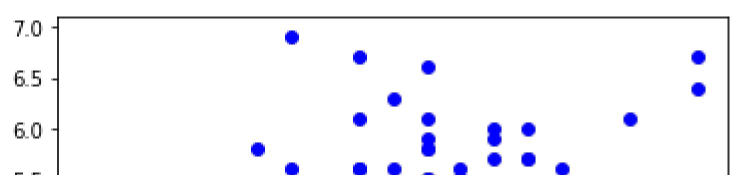

4
3
2
2.00
2.25
2.50
2.75
3.00
3.25
3.50
3.75

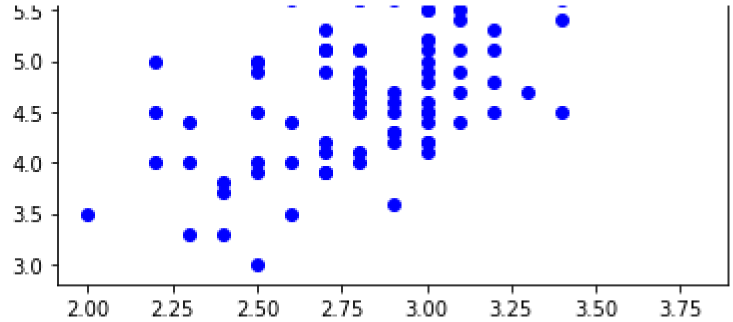

7
6
5
4
3
2
2.00
2.25
2.50
2.75
3.00
3.25
3.50
3.75

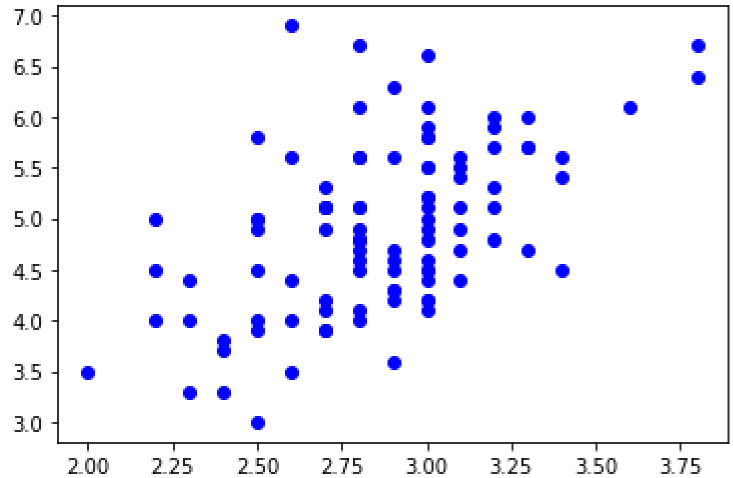

7
6
5
4
2
2.00
2.25
2.50
2.75
3.00
3.25
3.50
3.75

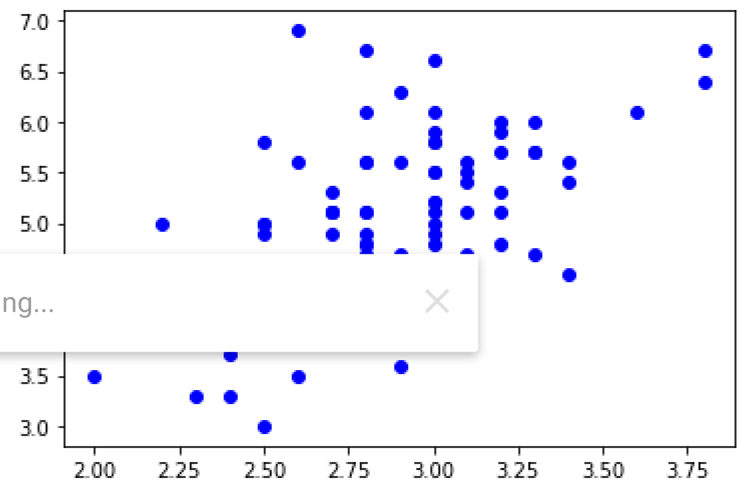
Saving...

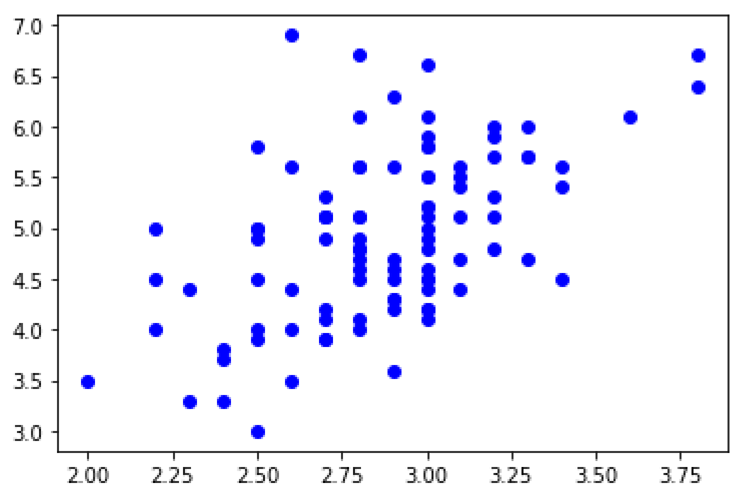

7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.00
2.25
2.50
2.75
3.00
3.25
3.50
3.75

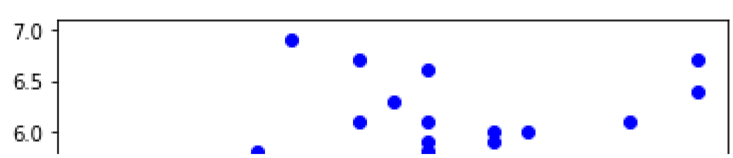

7.0
6.5
6.0

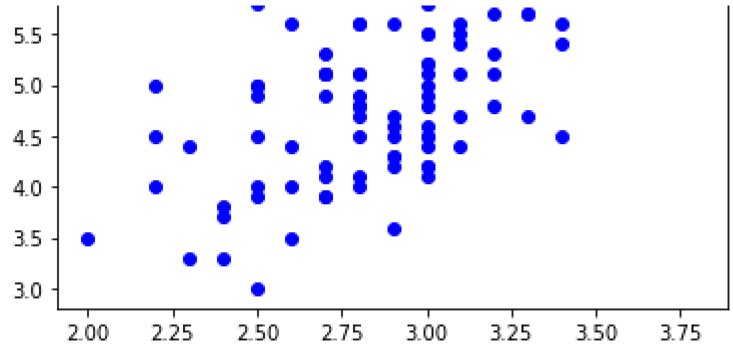

5.5
5.0
4.5
4.0
3.5
3.0
2.00 2.25 2.50 2.75 3.00 3.25 3.50 3.75

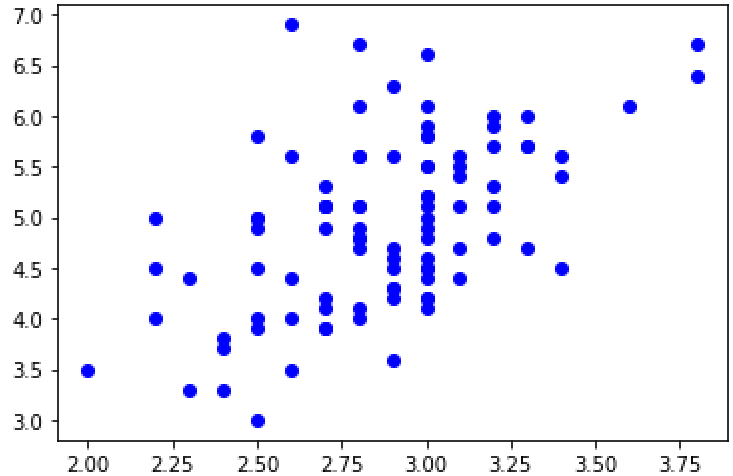

7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.00 2.25 2.50 2.75 3.00 3.25 3.50 3.75

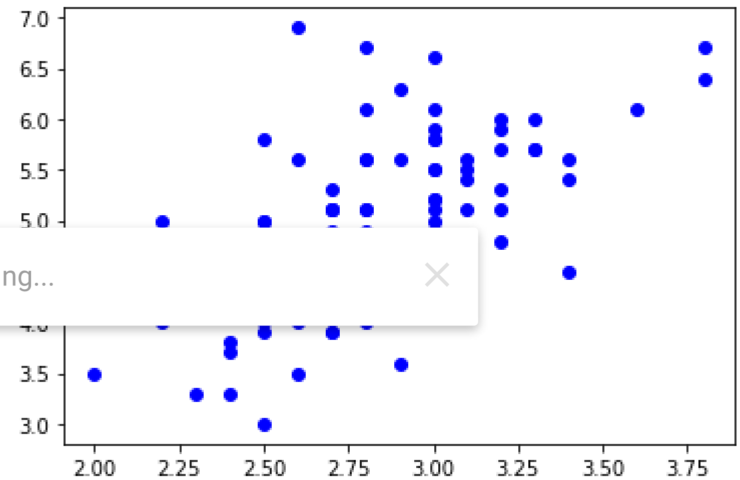

7.0
6.5
6.0
5.5
5.0
3.5
3.0
2.00 2.25 2.50 2.75 3.00 3.25 3.50 3.75


7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.00 2.25 2.50 2.75 3.00 3.25 3.50 3.75

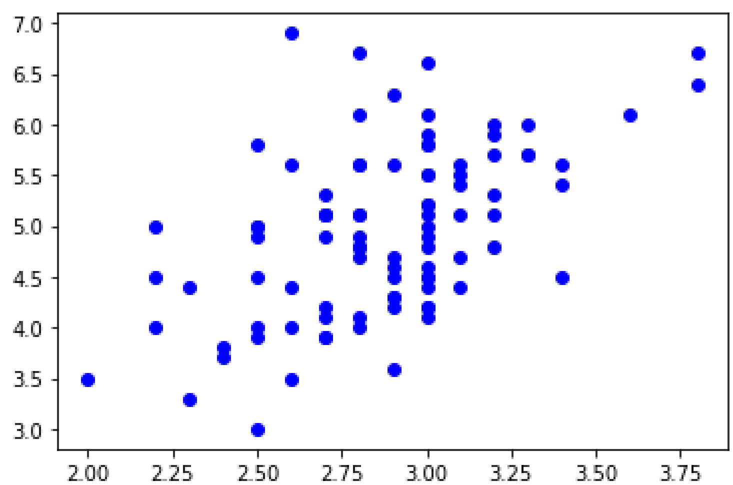

7.0
6.5
6.0

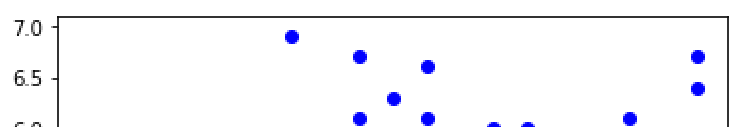

5.5
5.0
4.5
4.0
3.5
3.0
2.00 2.25 2.50 2.75 3.00 3.25 3.50 3.75

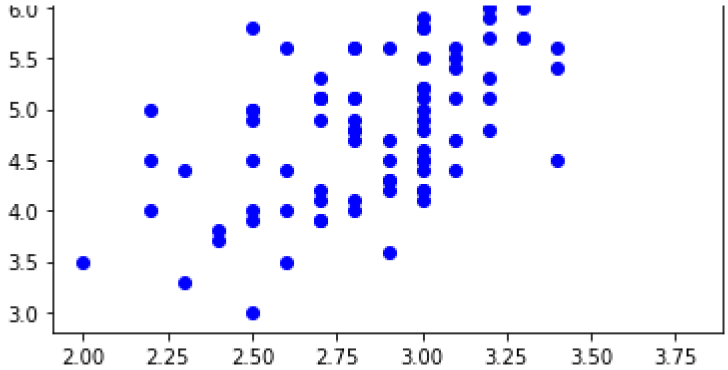

7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.00 2.25 2.50 2.75 3.00 3.25 3.50 3.75

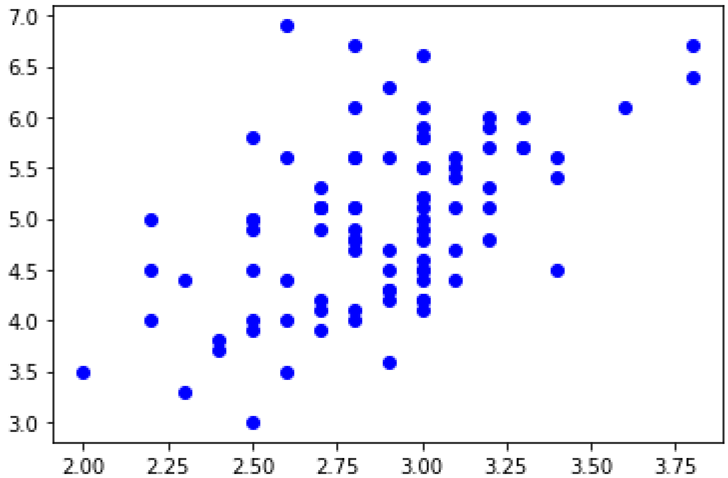

7.0
6.5
6.0
5.5
5.0
3.5
3.0
2.00 2.25 2.50 2.75 3.00 3.25 3.50 3.75

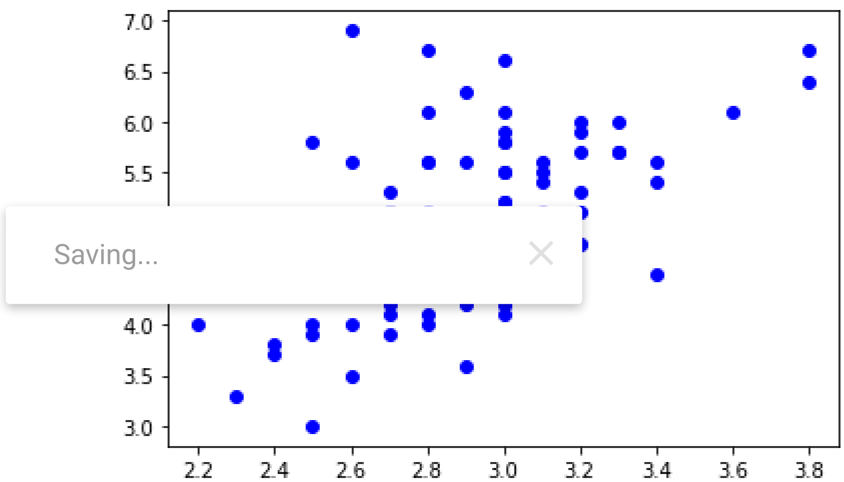
Saving...

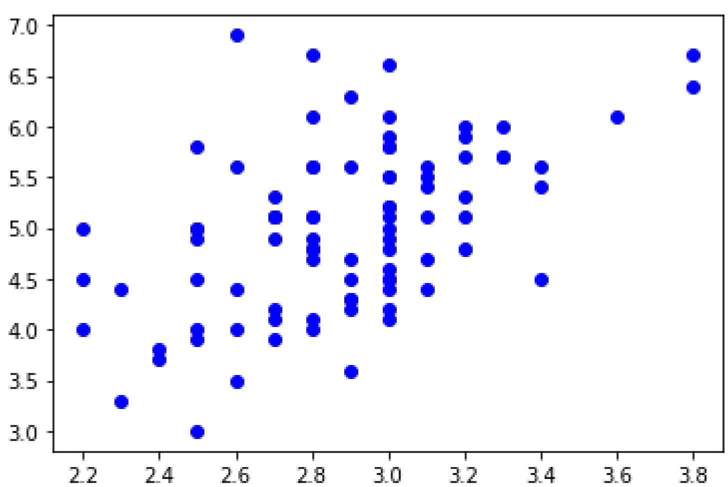

7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.00 2.25 2.50 2.75 3.00 3.25 3.50 3.75

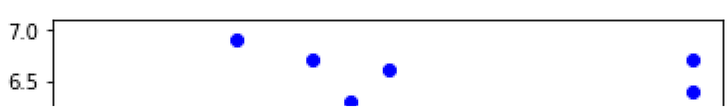

7.0
6.5

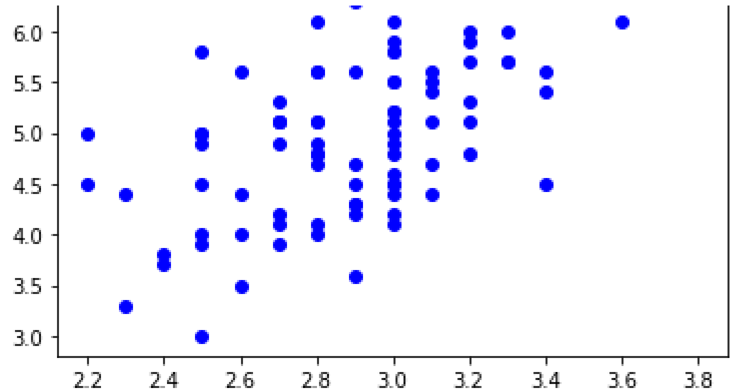

6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.00 2.25 2.50 2.75 3.00 3.25 3.50 3.75

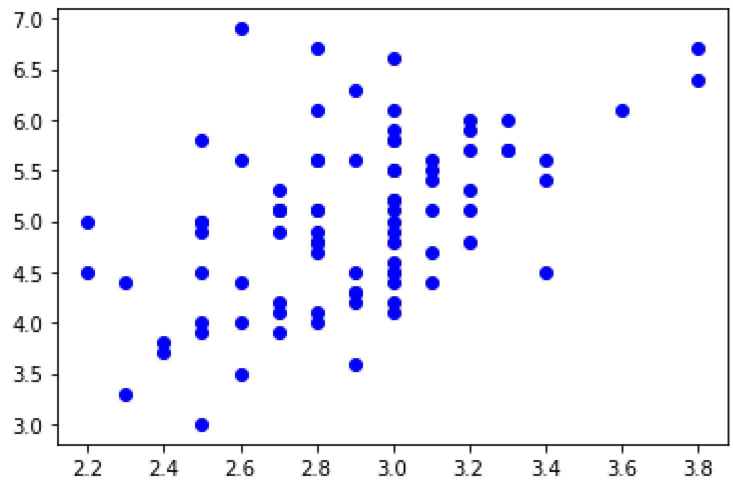

7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.00 2.25 2.50 2.75 3.00 3.25 3.50 3.75

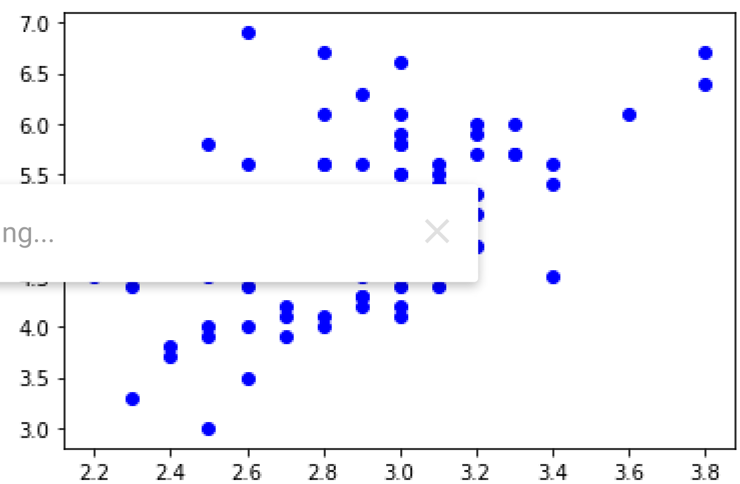

7.0
6.5
6.0
5.5
Saving...
4.0
3.5
3.0
2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8

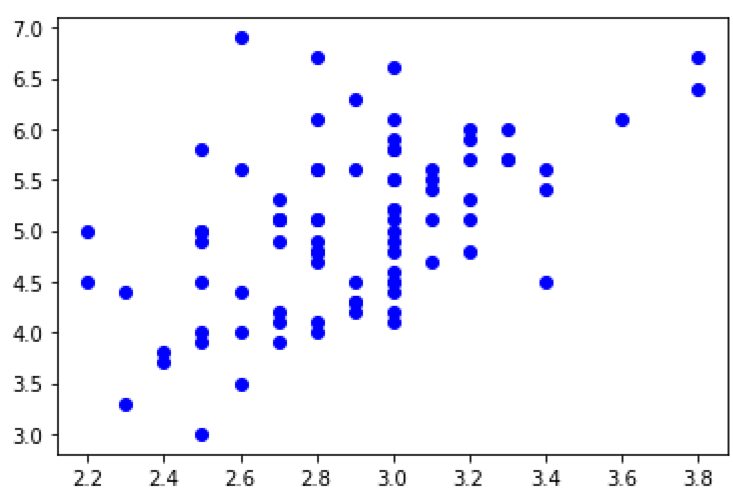

7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8

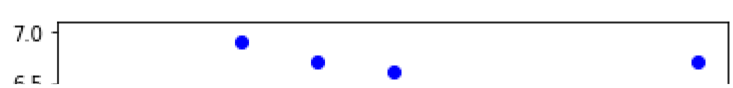

7.0
6.5

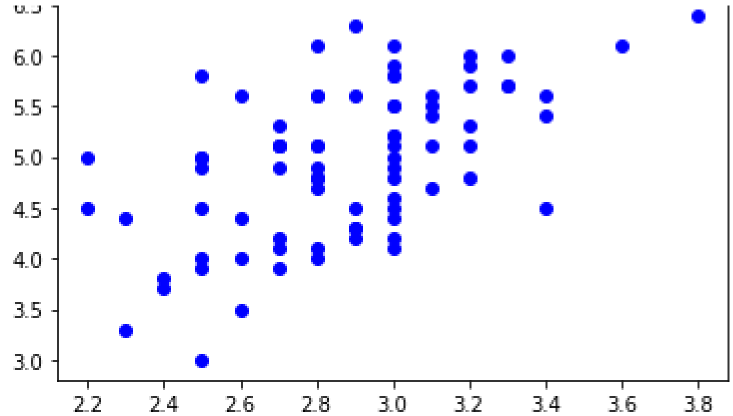

6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8

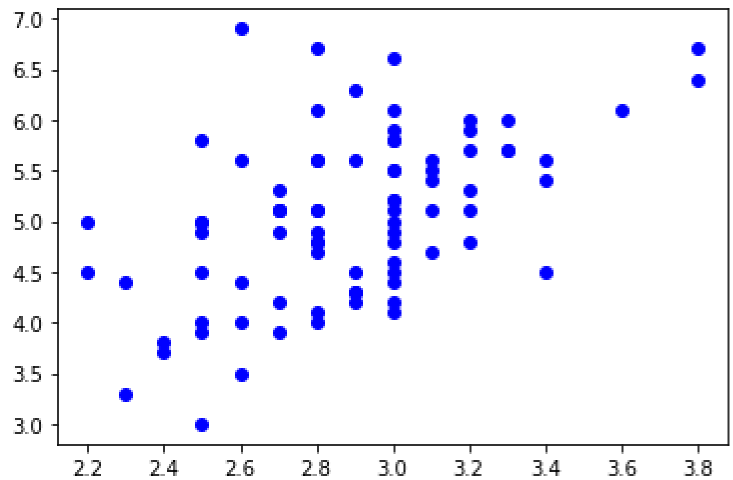

7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8

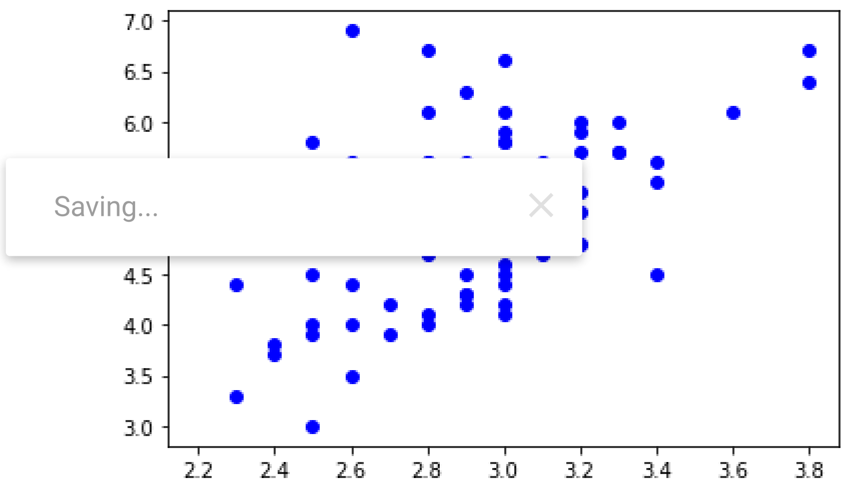

7.0
6.5
6.0
5.5
4.0
3.5
3.0
2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8

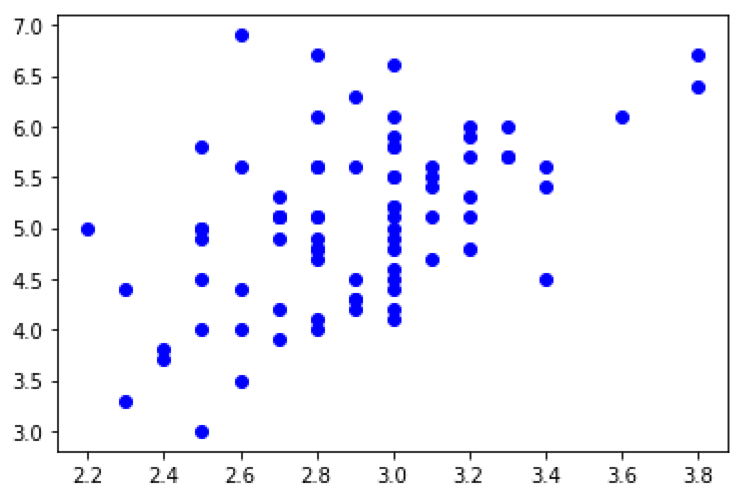

7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8


7.0

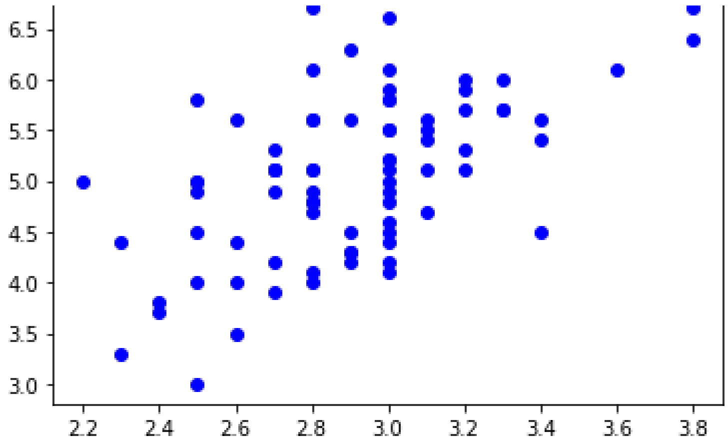

6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8

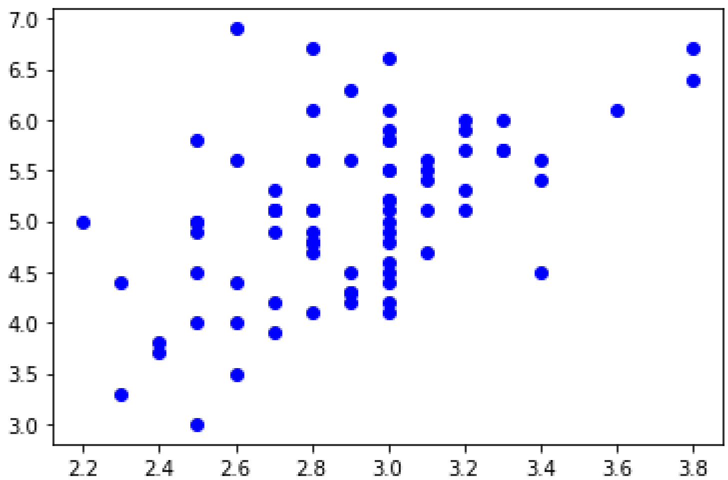

7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8

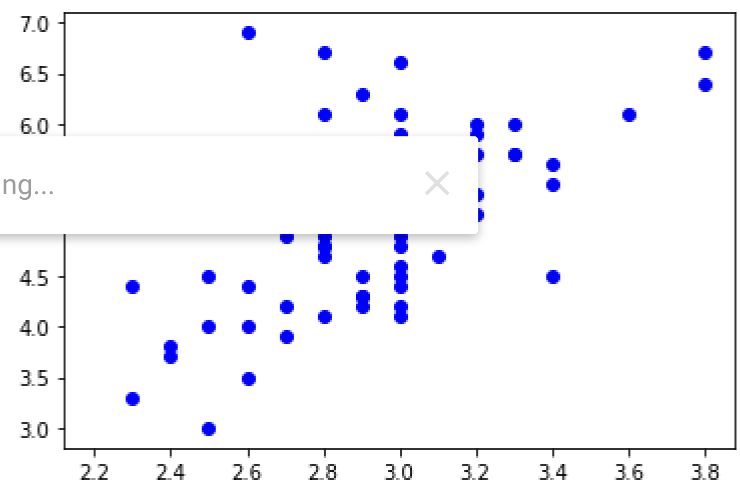

7.0
6.5
6.0
Saving...
4.5
4.0
3.5
3.0
2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8


7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8

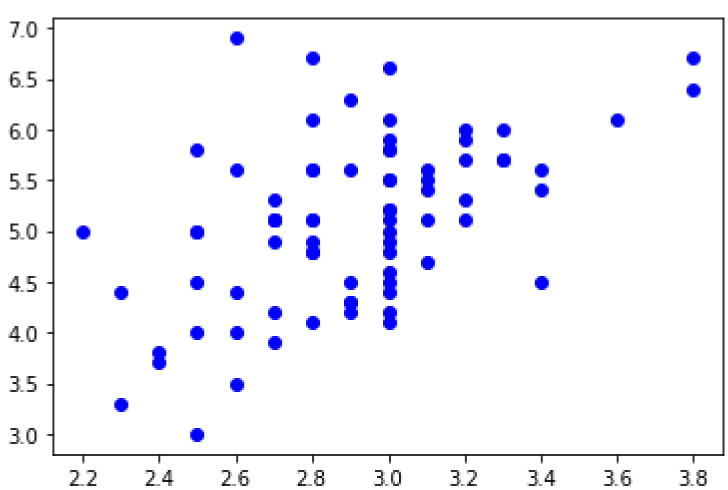

7.0

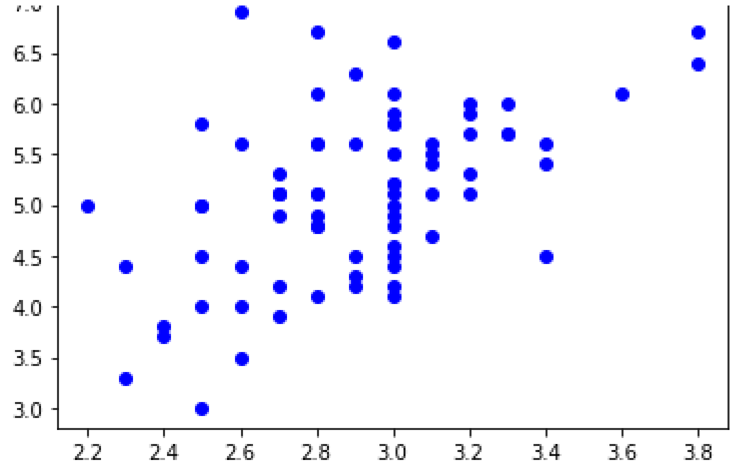

6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8

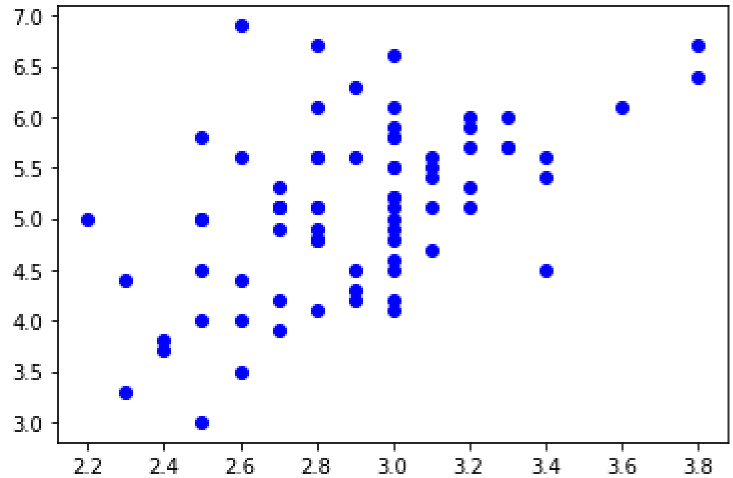

7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8

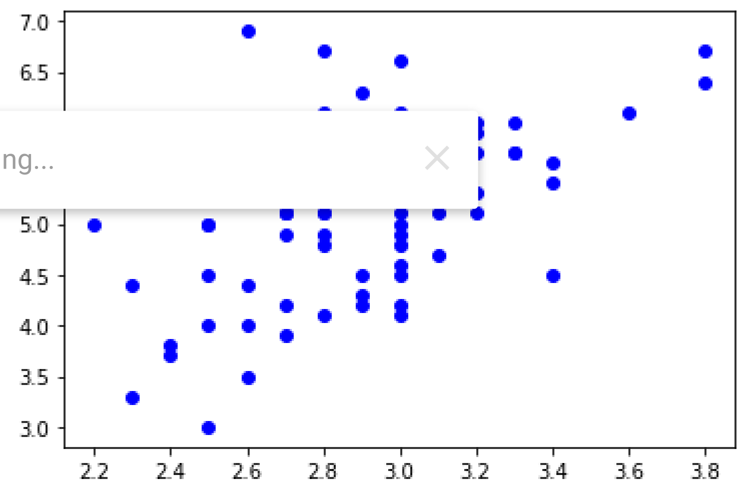

7.0
6.5
6.0
4.5
4.0
3.5
3.0
2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8

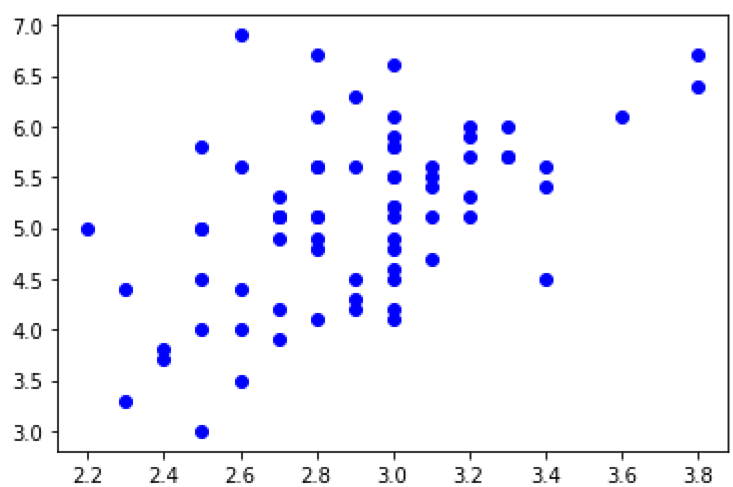
Saving...

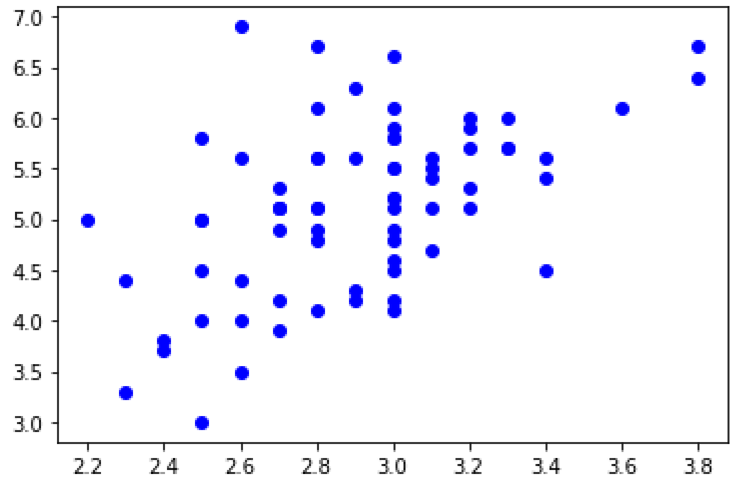

7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8

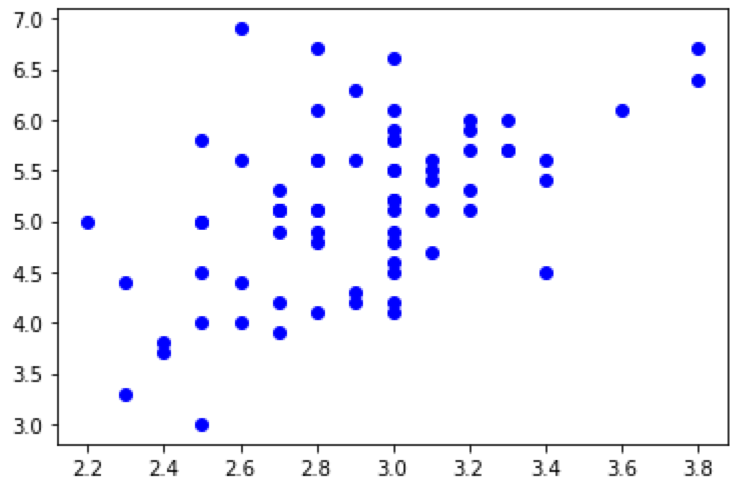


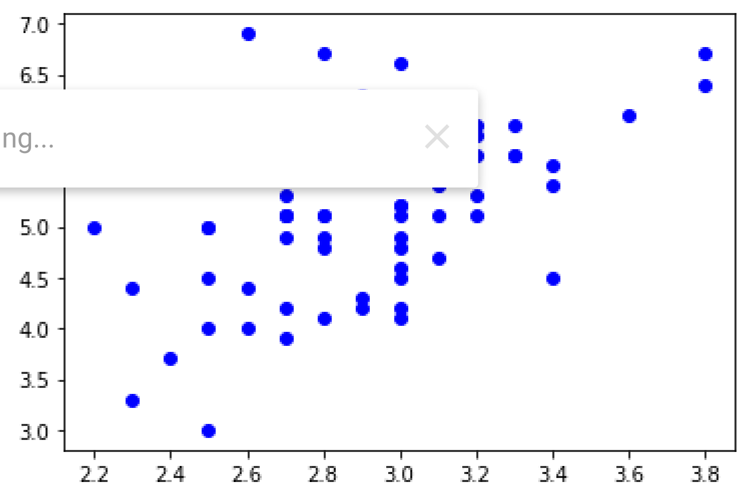


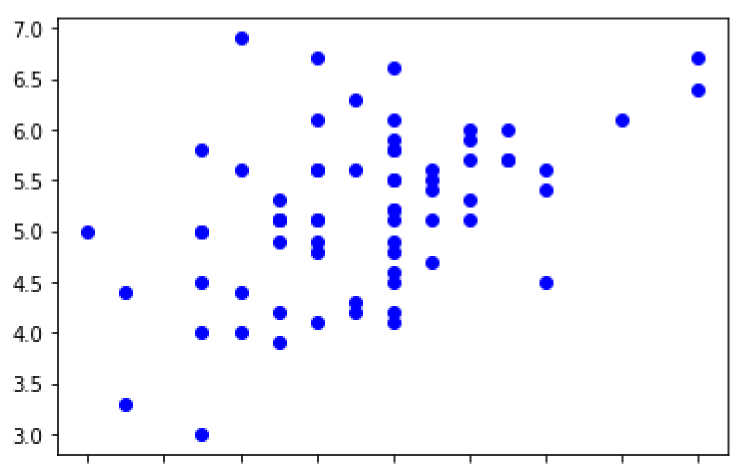


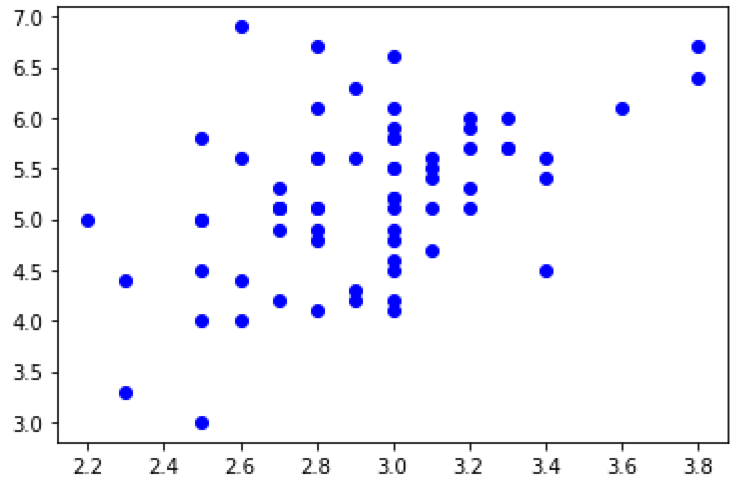


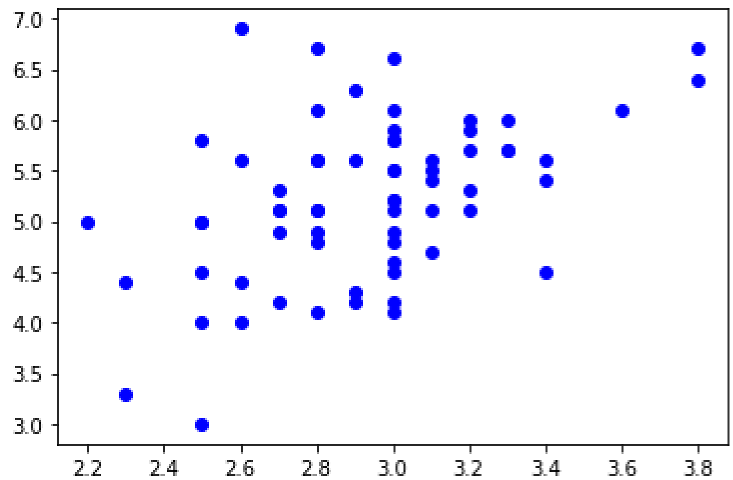

7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8

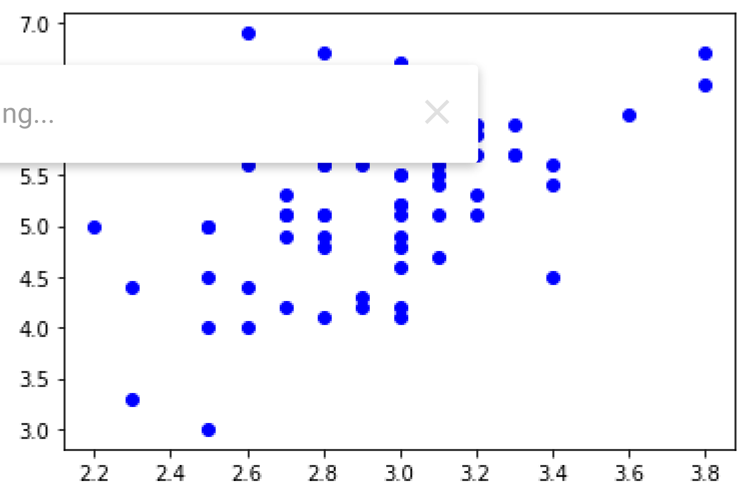

7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8

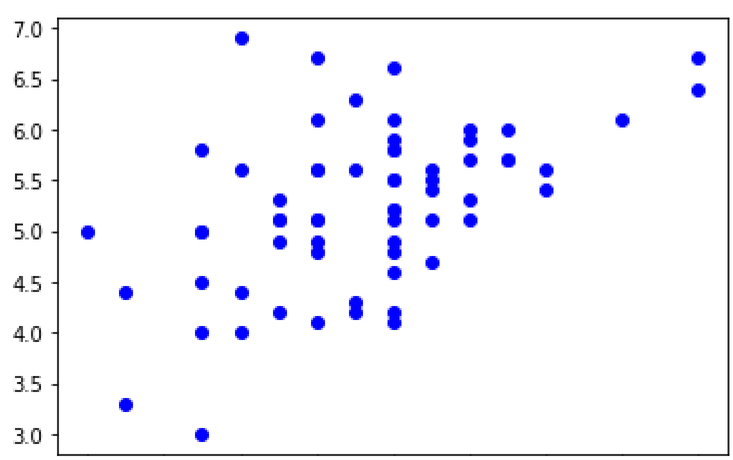

7.0
6.5
5.0
4.5
4.0
3.5
3.0
2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8


7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0

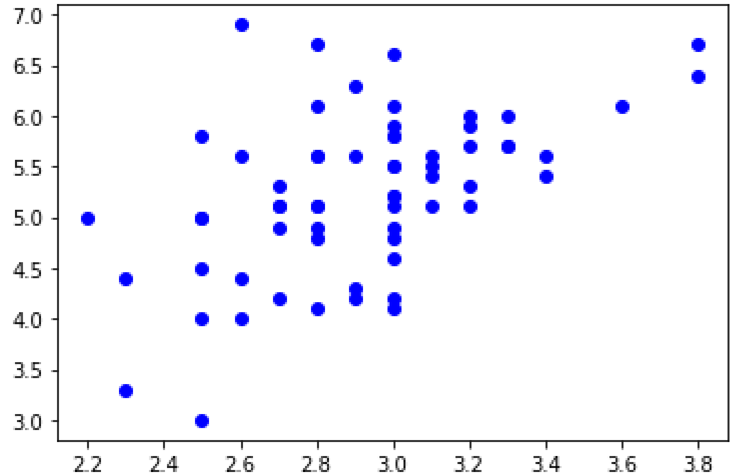

7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.2
2.4
2.6
2.8
3.0
3.2
3.4
3.6
3.8

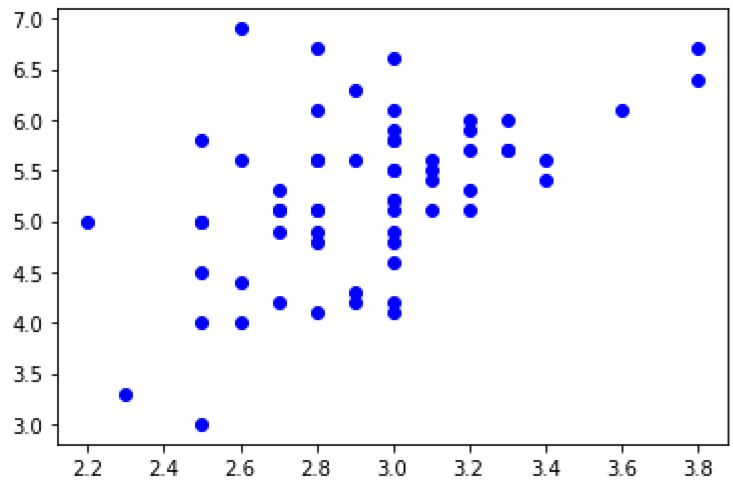

7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.2
2.4
2.6
2.8
3.0
3.2
3.4
3.6
3.8

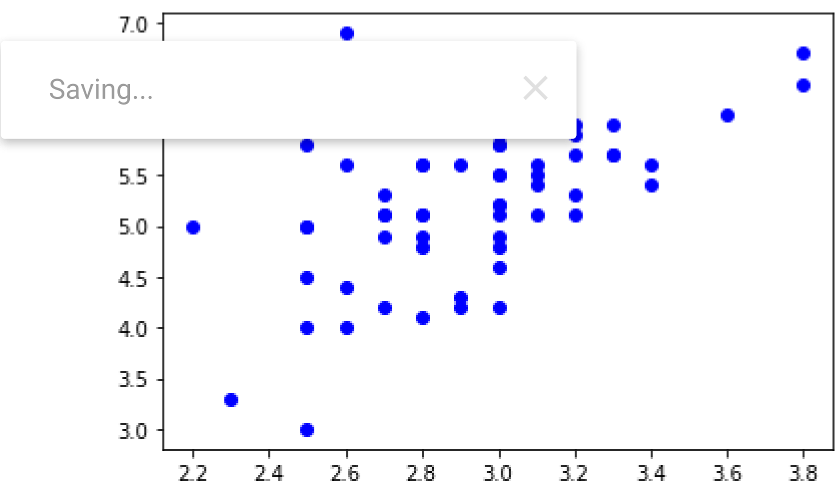

7.0
5.5
5.0
4.5
4.0
3.5
3.0
2.2
2.4
2.6
2.8
3.0
3.2
3.4
3.6
3.8

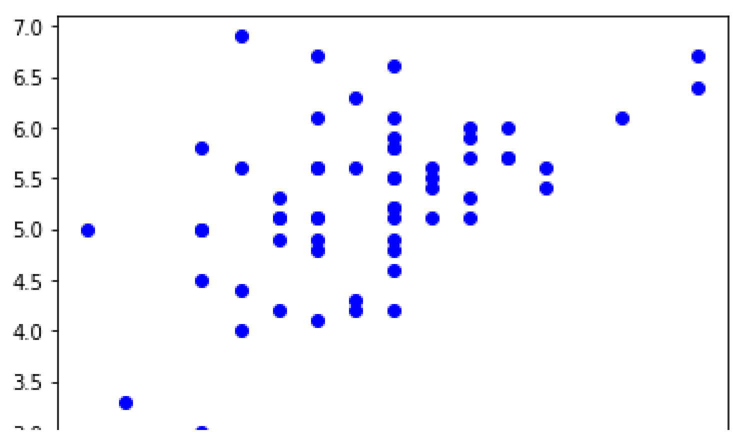

7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0


2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8

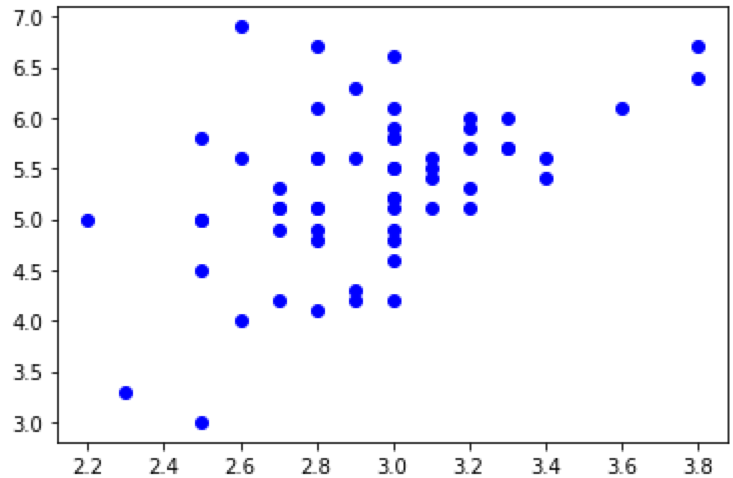

7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0
2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8

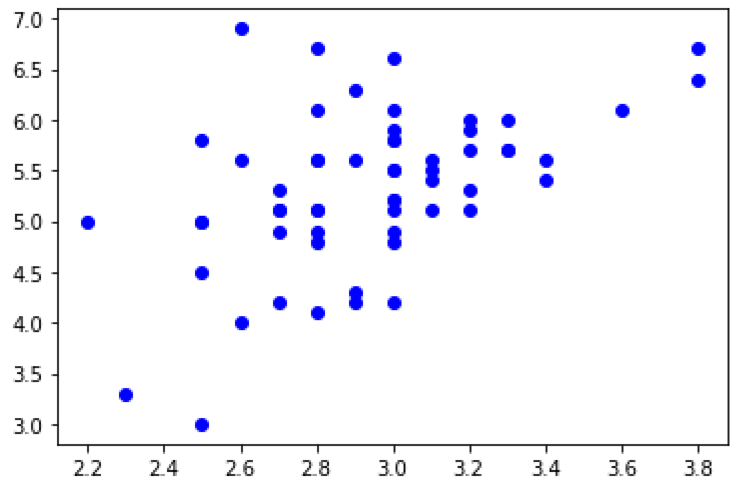

7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0
2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8


7.0 5.5 5.0 4.5 4.0 3.5 3.0
2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8

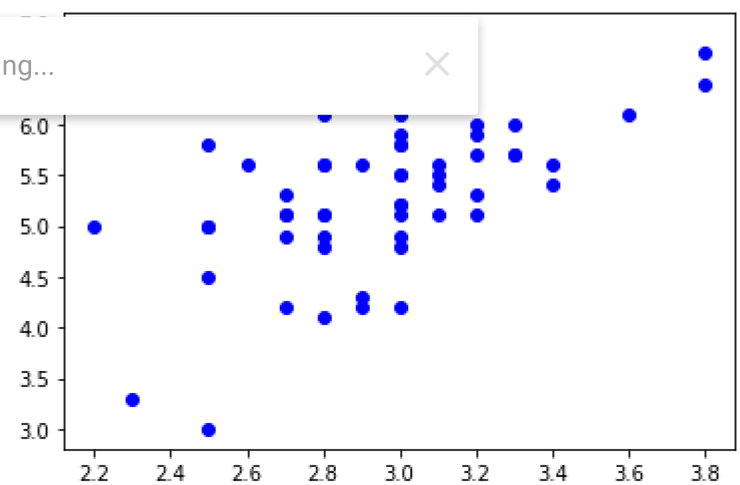

7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5

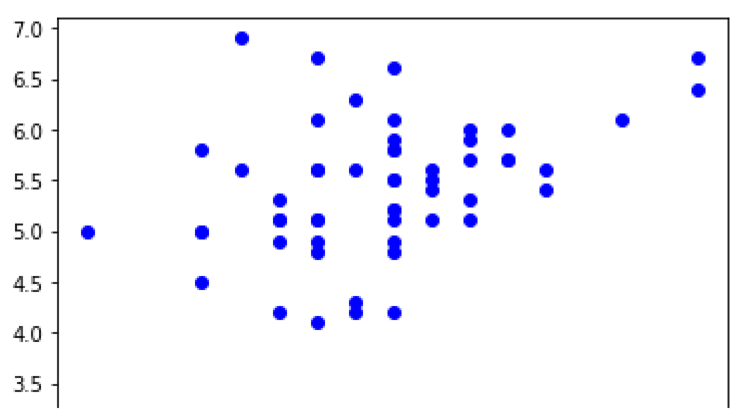

3.0
2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8

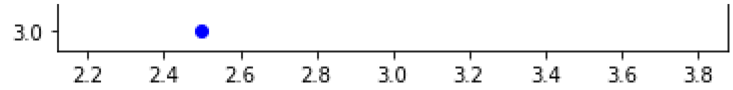

7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0
2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8

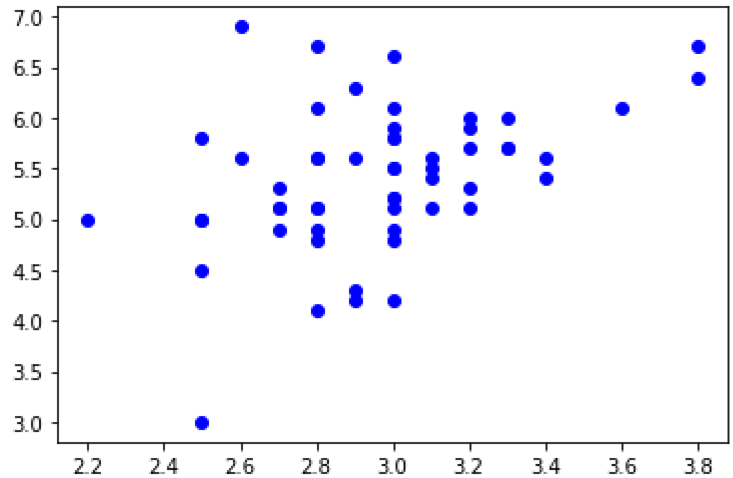

7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0
2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8

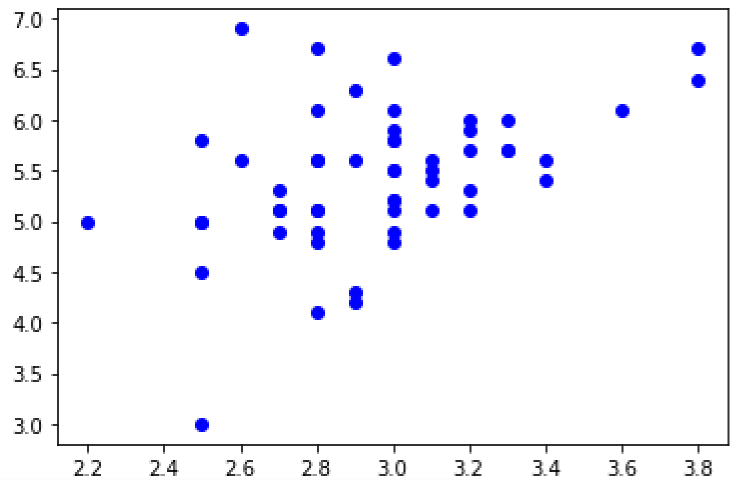
Saving...


6.0 5.5 5.0 4.5 4.0 3.5 3.0
2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8

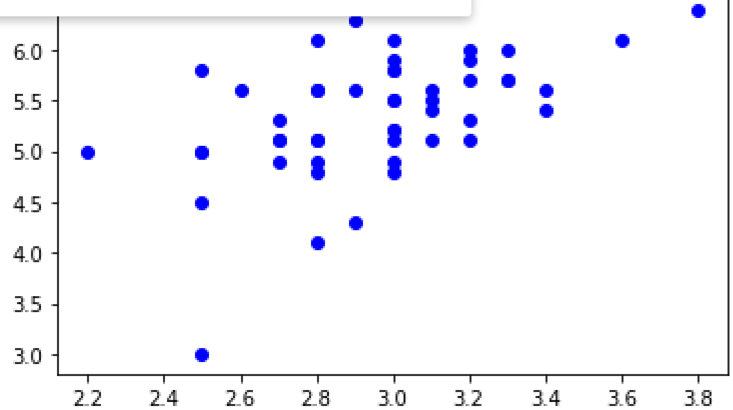

7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5

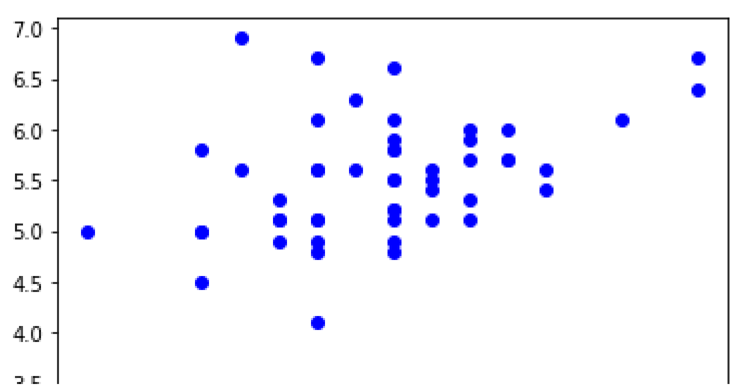

3.0
2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8

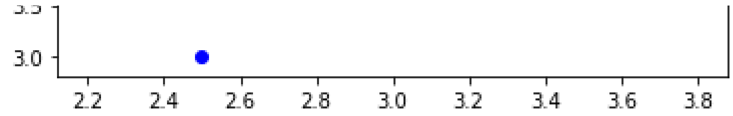

7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0
2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8

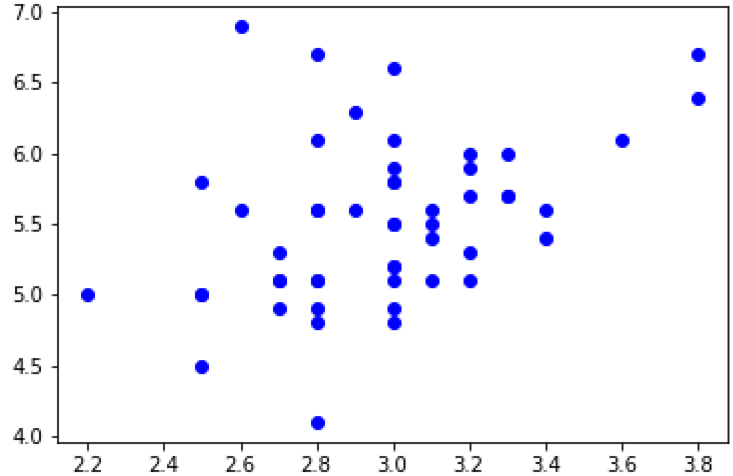

7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0
2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8

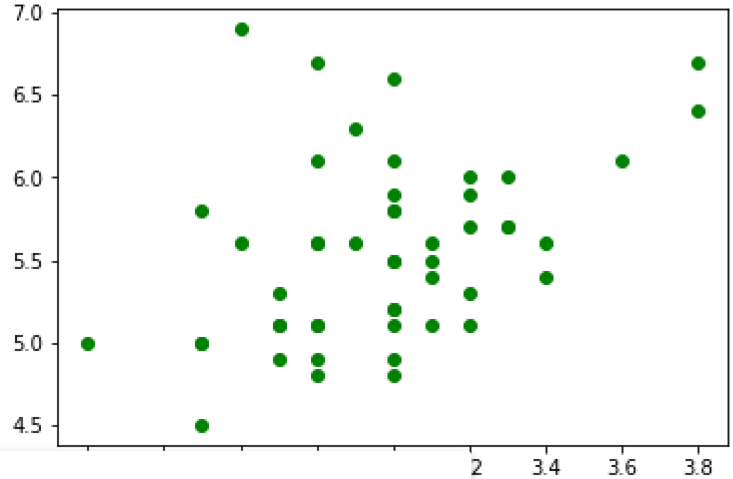
Saving...


6.0 5.5 5.0 4.5 4.0 3.5 3.0
2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8

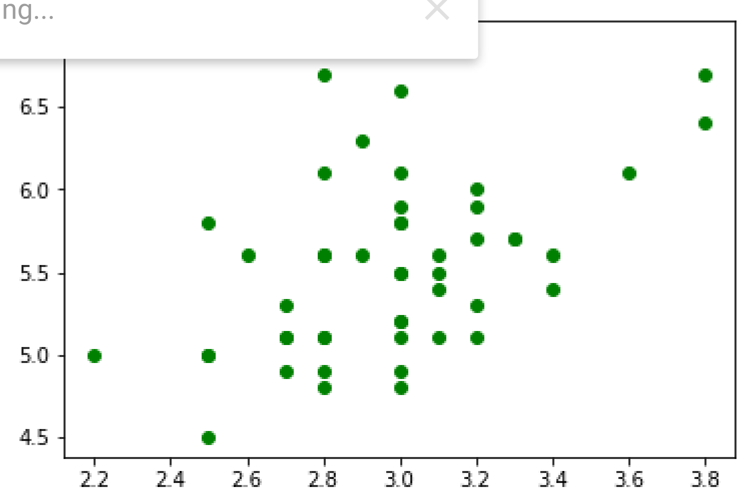

7.0 6.5 6.0 5.5 5.0 4.5 4.0

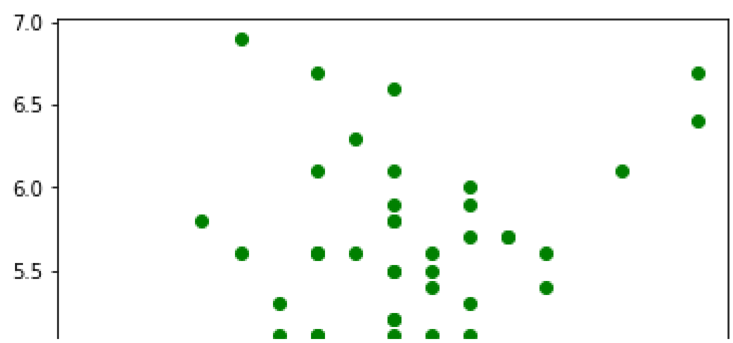

3.0
2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8

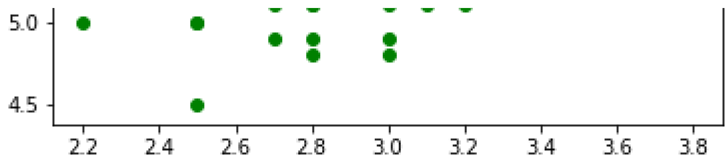

7.0 6.5 6.0 5.5 5.0 4.5 4.0
2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8

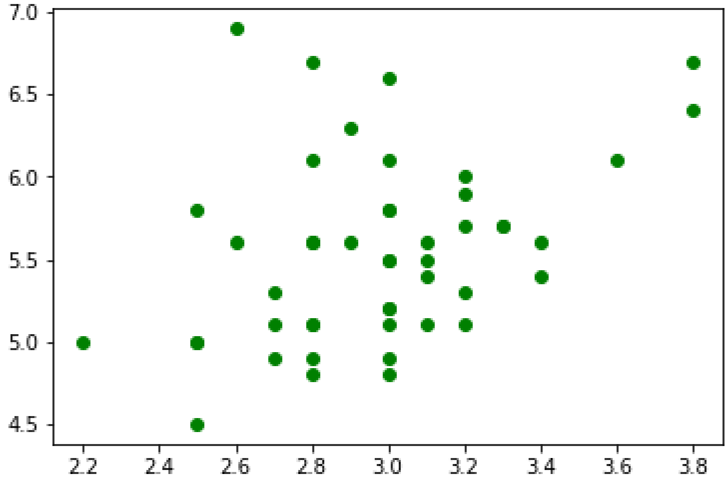

7.0 6.5 6.0 5.5 5.0 4.5
3.4 3.6 3.8

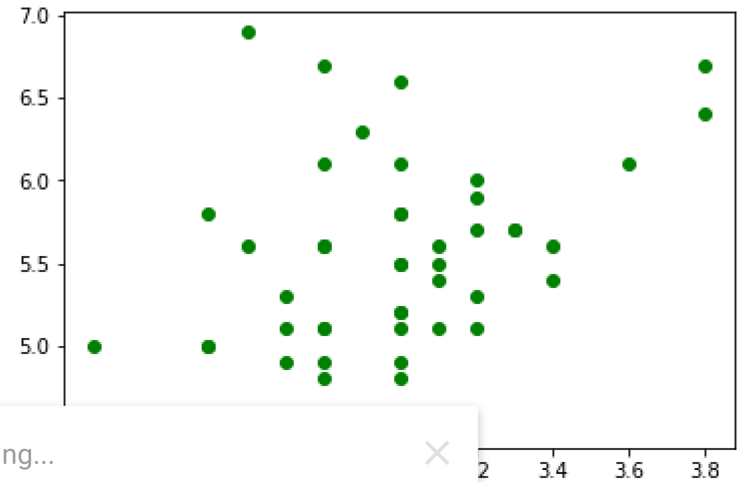
Saving...

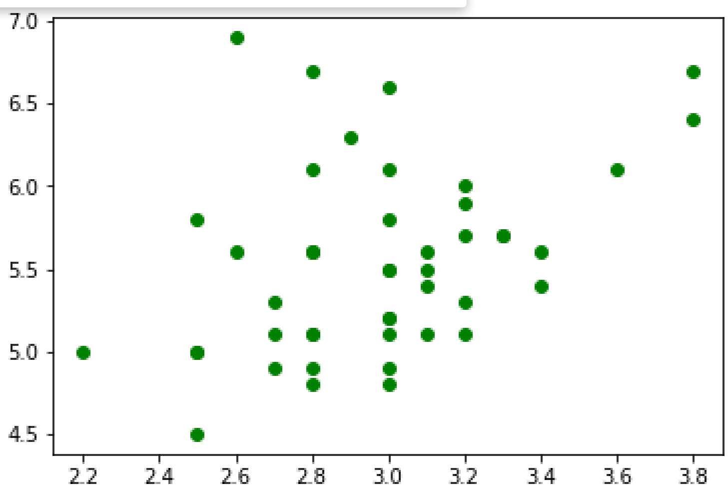

6.5 6.0 5.5 5.0 4.5
2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8

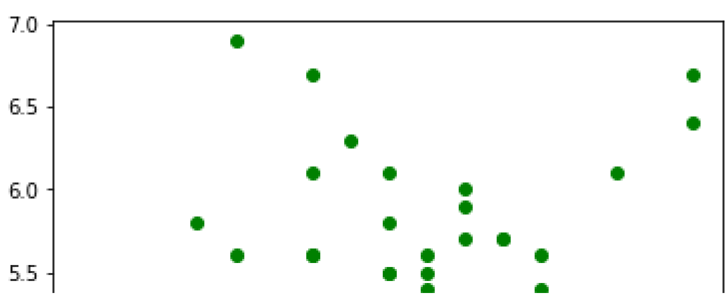

7.0 6.5 6.0 5.5

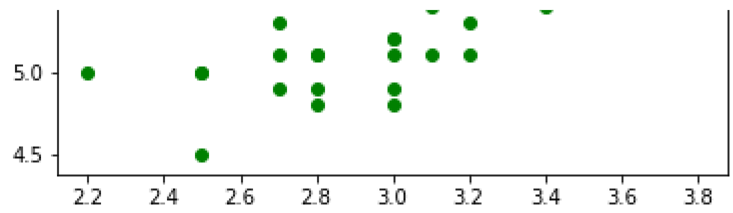

5.0
4.5
2.2
2.4
2.6
2.8
3.0
3.2
3.4
3.6
3.8

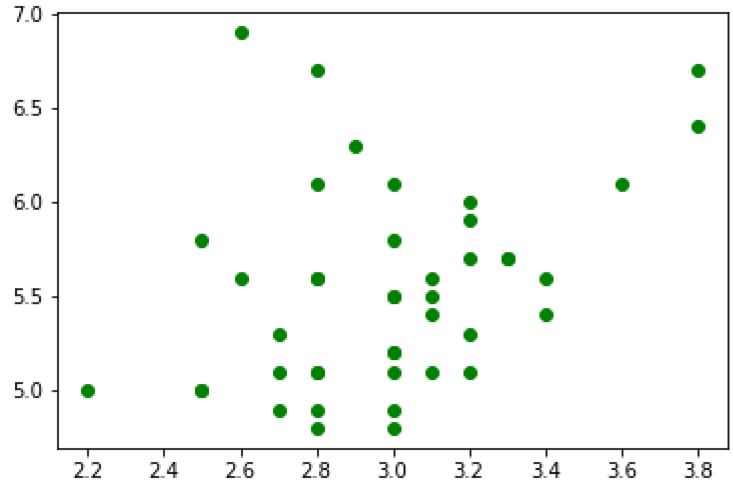

7.0
6.5
6.0
5.5
5.0
4.5
2.2
2.4
2.6
2.8
3.0
3.2
3.4
3.6
3.8

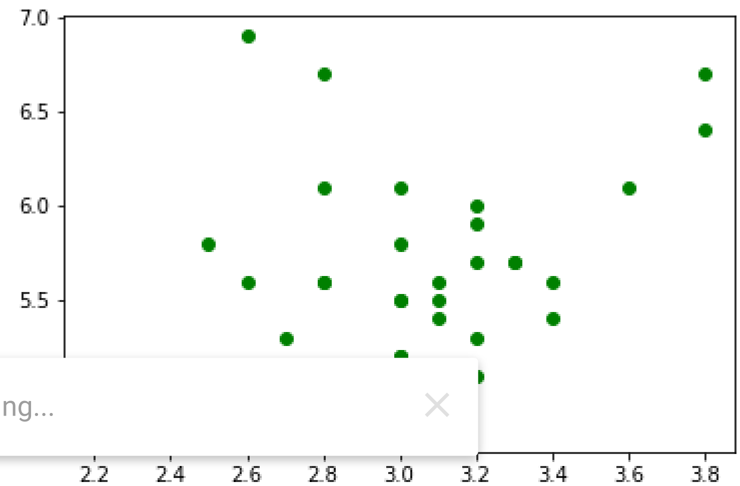

7.0
6.5
6.0
5.5
5.0
3.4
3.6
3.8


7.0
6.5
6.0
5.5
5.0
4.5
2.2
2.4
2.6
2.8
3.0
3.2
3.4
3.6
3.8

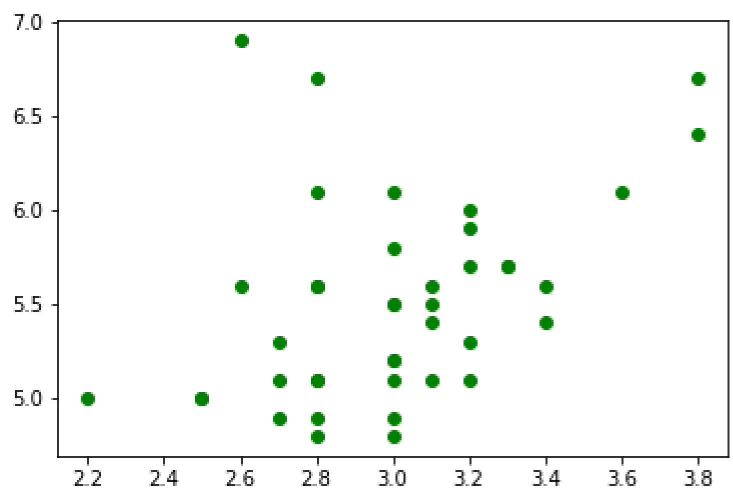

7.0
6.5
6.0
5.5

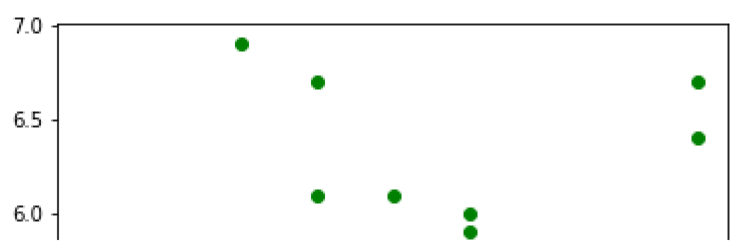

5.0
4.5
2.2
2.4
2.6
2.8
3.0
3.2
3.4
3.6
3.8

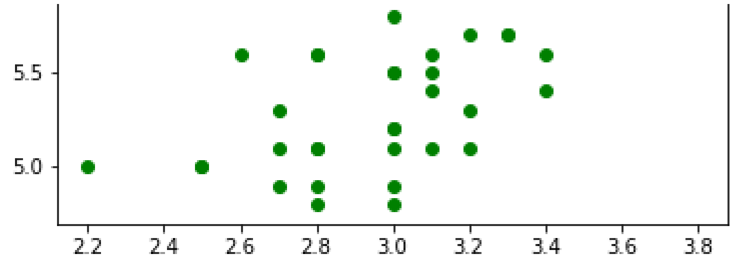

7.0
6.5
6.0
5.5
5.0
2.2
2.4
2.6
2.8
3.0
3.2
3.4
3.6
3.8

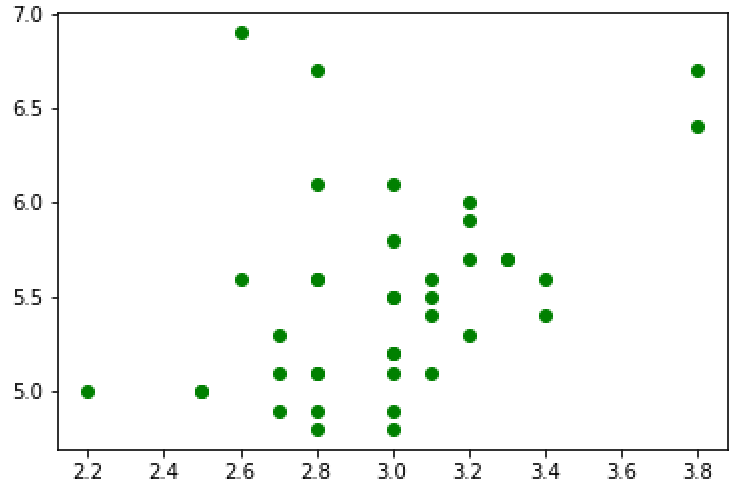

7.0
6.5
6.0
5.5
2.2
2.4
2.6
2.8
3.0
3.2
3.4
3.6
3.8

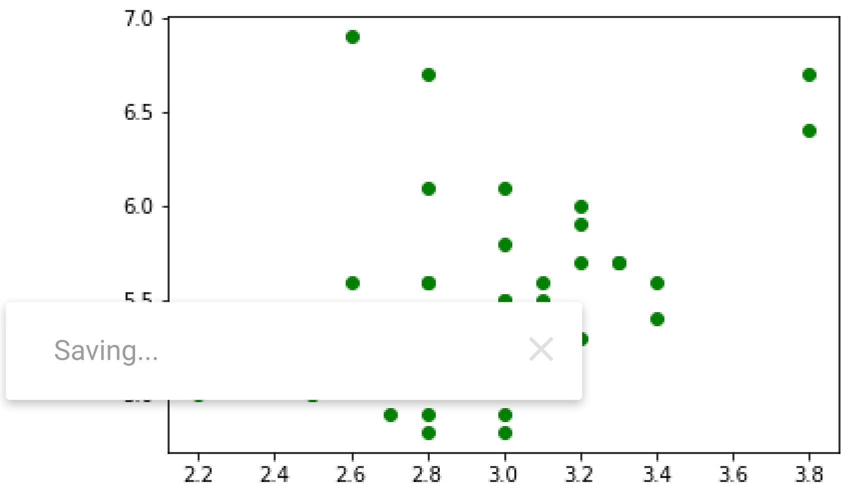
Saving...

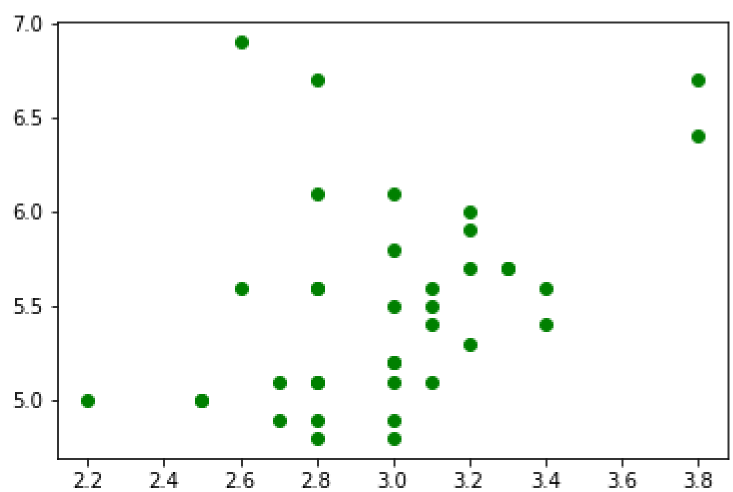

7.0
6.5
6.0
5.5
5.0
2.2
2.4
2.6
2.8
3.0
3.2
3.4
3.6
3.8

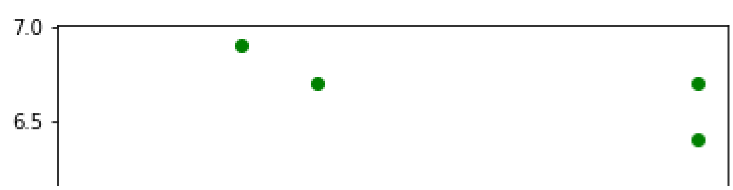

7.0
6.5
6.0

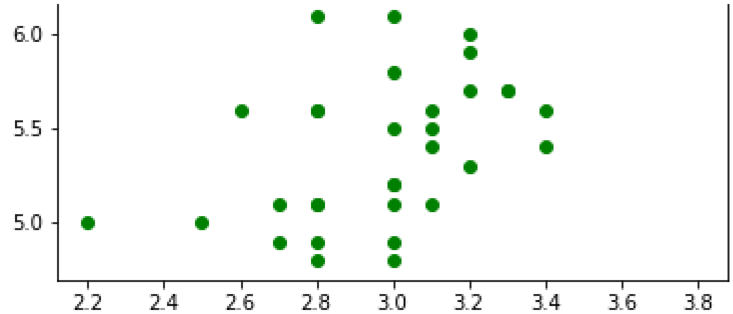

5.5
5.0
2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8

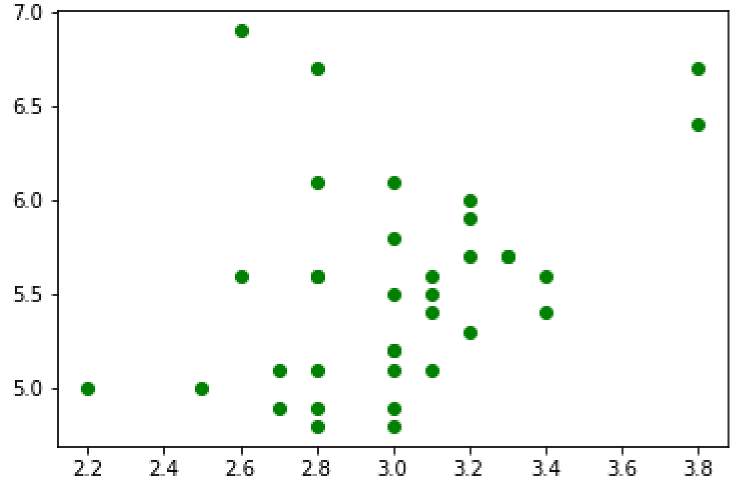

7.0
6.5
6.0
5.5
5.0
2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8

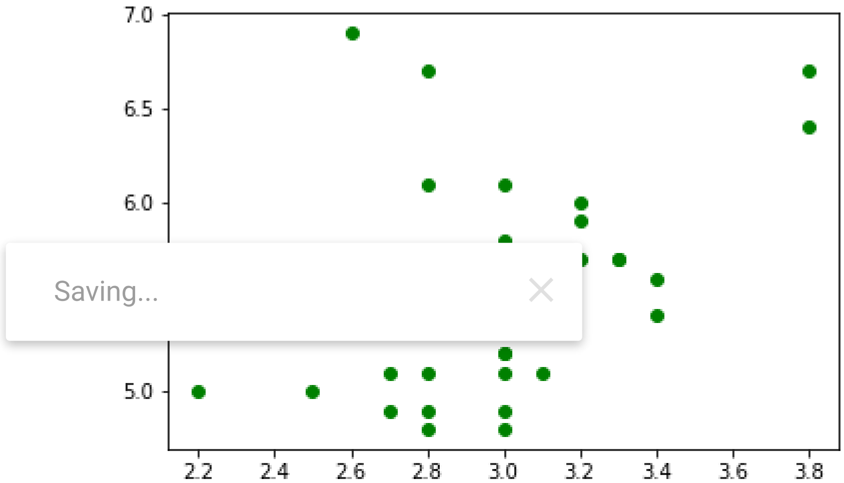

7.0
6.5
6.0
Saving...
2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8

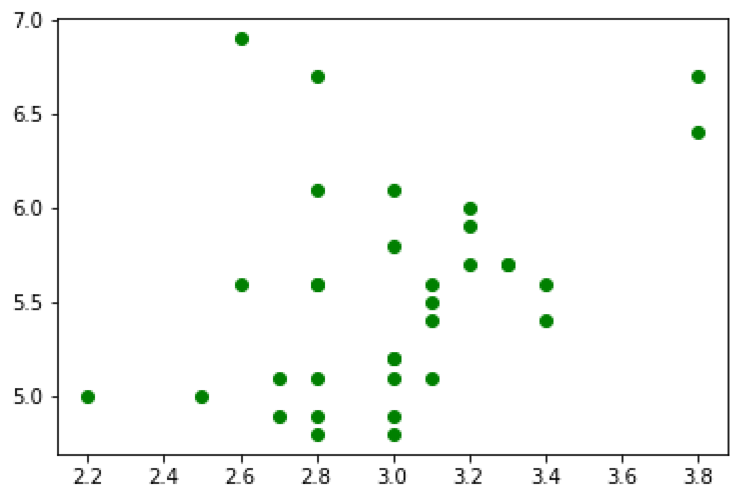

7.0
6.5
6.0
5.5
5.0
2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8

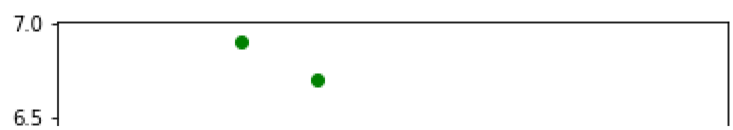

7.0
6.5

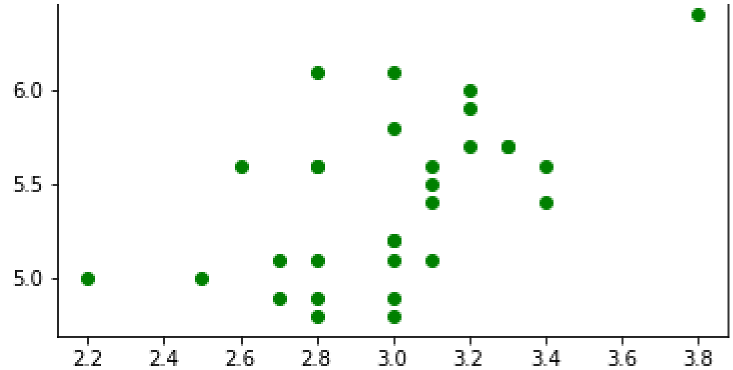

6.0
5.5
5.0
2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8

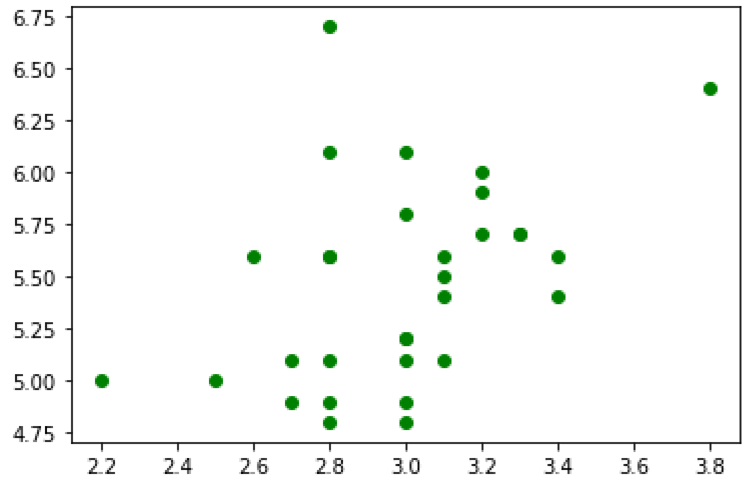

7.0
6.5
6.0
5.5
5.0
2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8

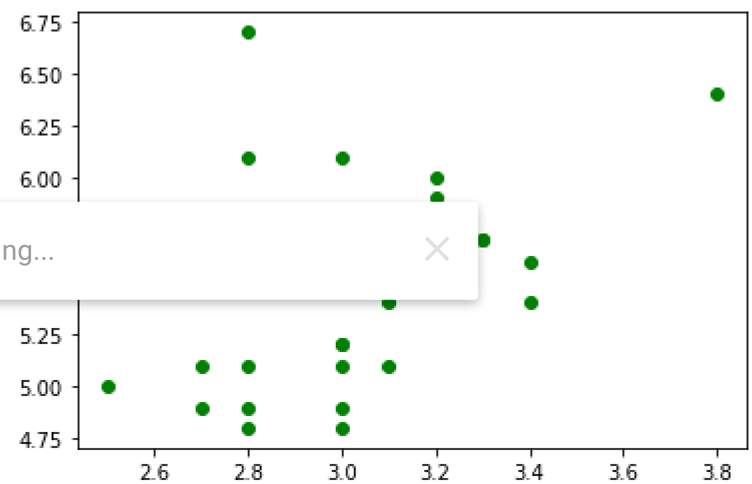

7.0
6.5
6.0
Saving...
5.0
2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8


7.0
6.5
6.0
5.5
5.0
2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8

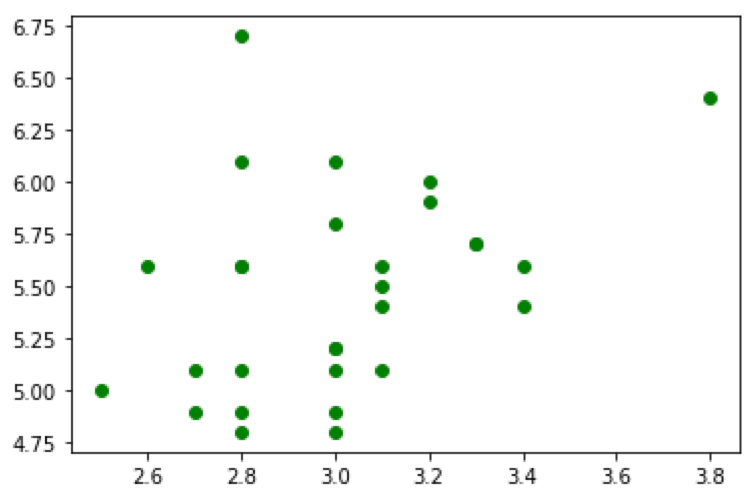

7.0
6.5


6.0
5.5
5.0
2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8

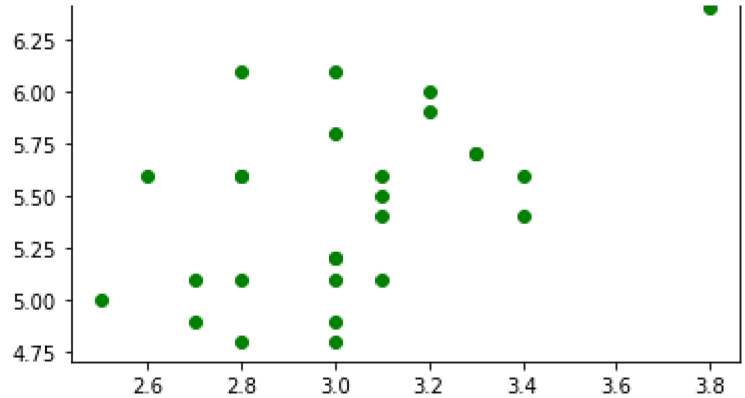

6.75
6.50
6.25
6.00
5.75
5.50
5.25
5.00
4.75
2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8

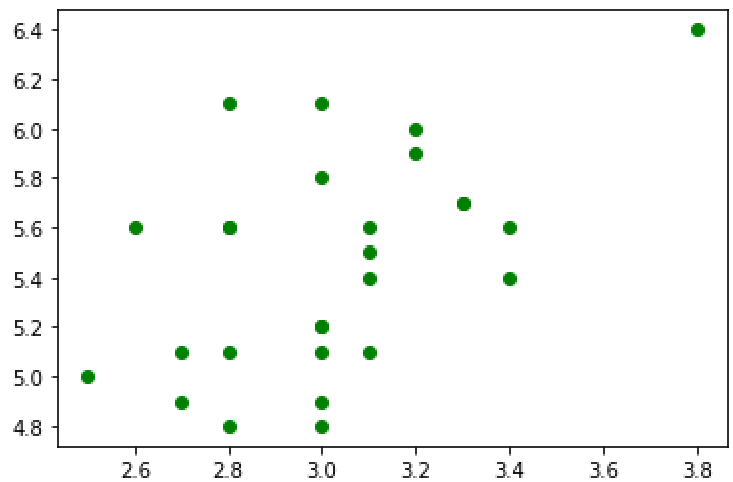

6.75
6.50
6.25
6.00
5.25
5.00
4.75
2.6 2.8 3.0 3.2 3.4 3.6 3.8

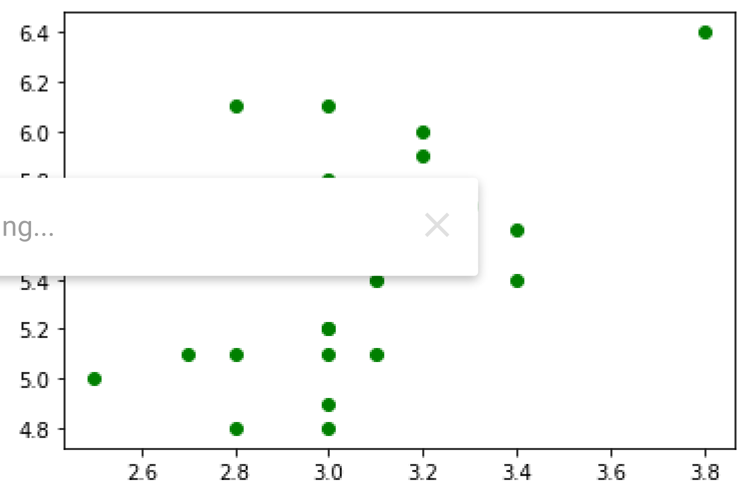
Saving...

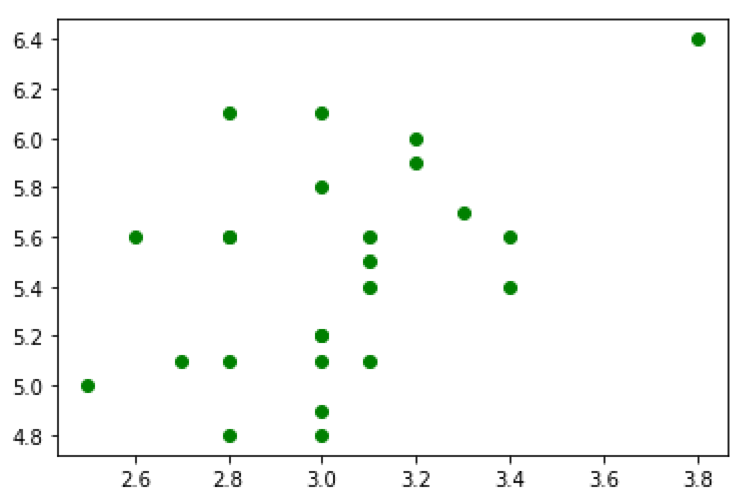

6.75
6.50
6.25
6.00
5.75
5.50
5.25
5.00
4.75
2.6 2.8 3.0 3.2 3.4 3.6 3.8


6.75
6.50

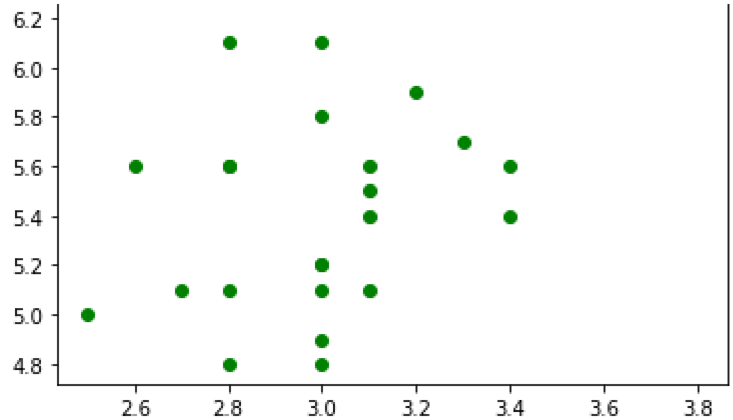

6.25
6.00
5.75
5.50
5.25
5.00
4.75
2.6
2.8
3.0
3.2
3.4
3.6
3.8

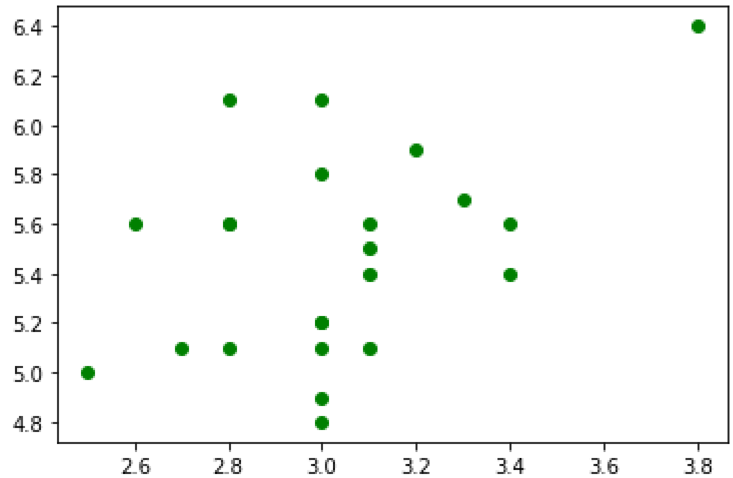

6.4
6.2
6.0
5.8
5.6
5.4
5.2
5.0
4.8
2.6
2.8
3.0
3.2
3.4
3.6
3.8

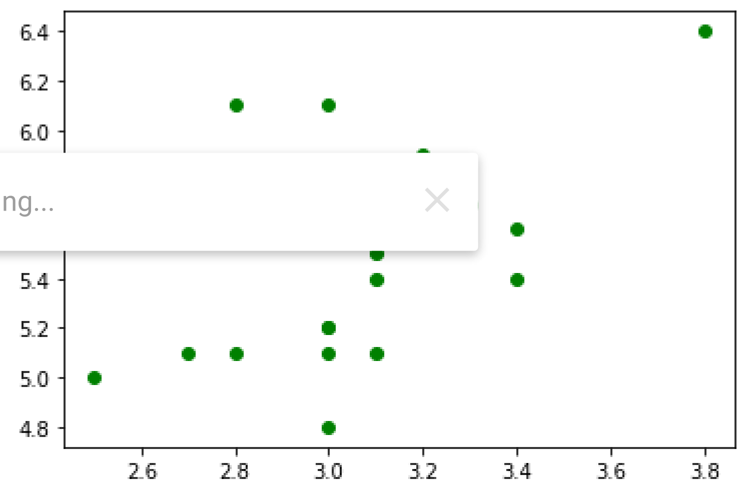

6.4
6.2
6.0
5.2
5.0
4.8
2.6
2.8
3.0
3.2
3.4
3.6
3.8

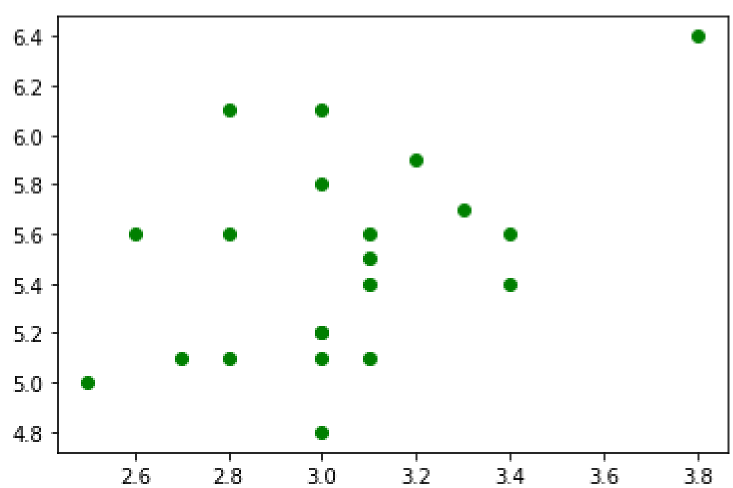

6.4
6.2
6.0
5.8
5.6
5.4
5.2
5.0
4.8
2.6
2.8
3.0
3.2
3.4
3.6
3.8


6.4

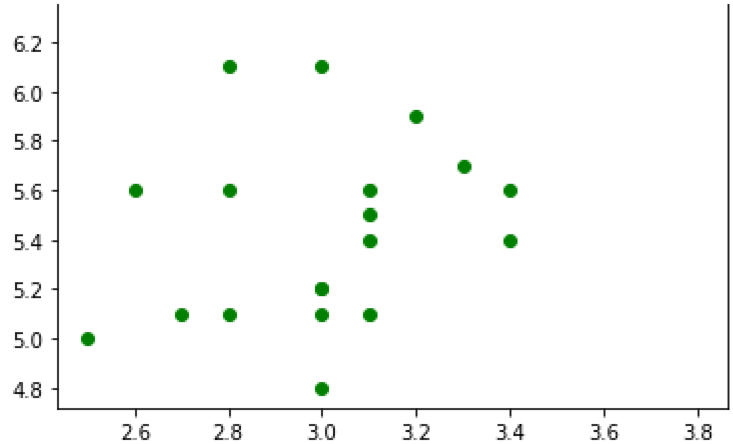

6.2
6.0
5.8
5.6
5.4
5.2
5.0
4.8
2.6
2.8
3.0
3.2
3.4
3.6
3.8

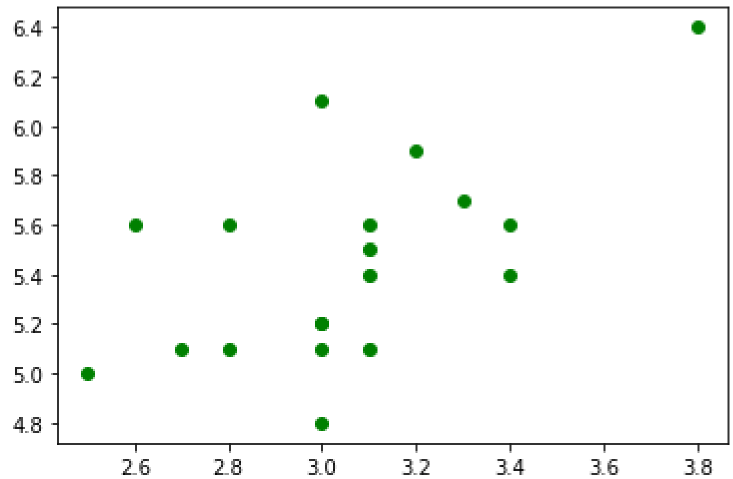

6.4
6.2
6.0
5.8
5.6
5.4
5.2
5.0
4.8
2.6
2.8
3.0
3.2
3.4
3.6
3.8

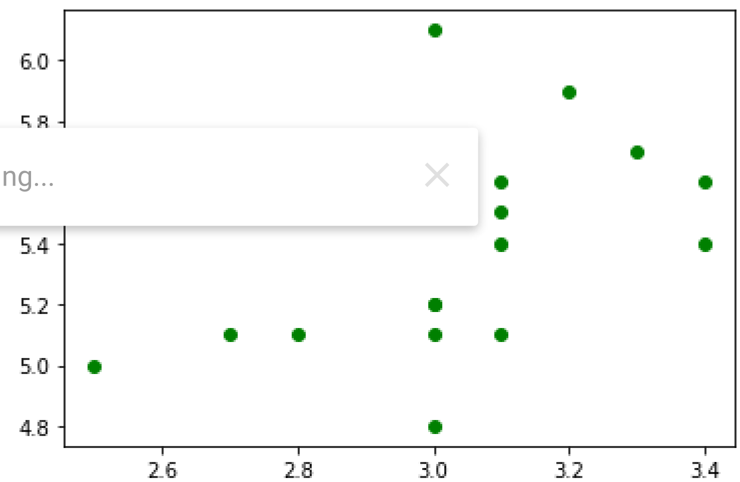

6.4
6.2
6.0
5.4
5.2
5.0
4.8
2.6
2.8
3.0
3.2
3.4
3.6
3.8

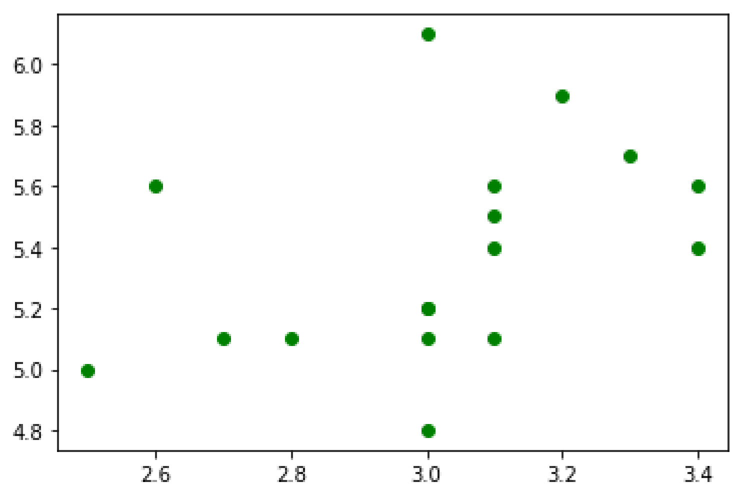

6.4
6.2
6.0
5.8
5.6
5.4
5.2
5.0
4.8
2.6
2.8
3.0
3.2
3.4
3.6
3.8

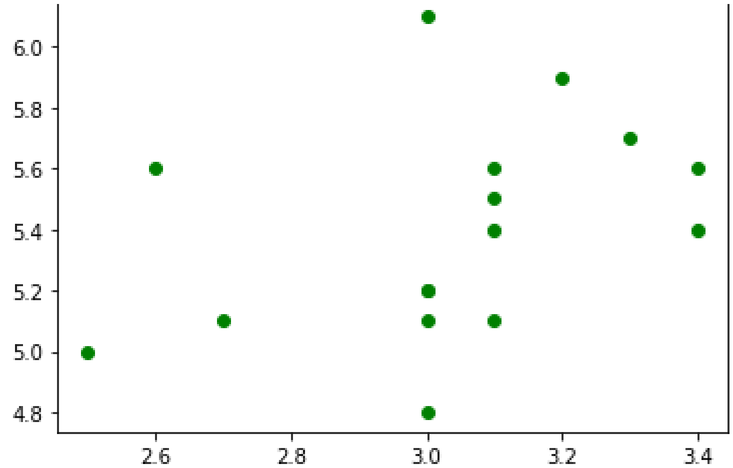

6.4

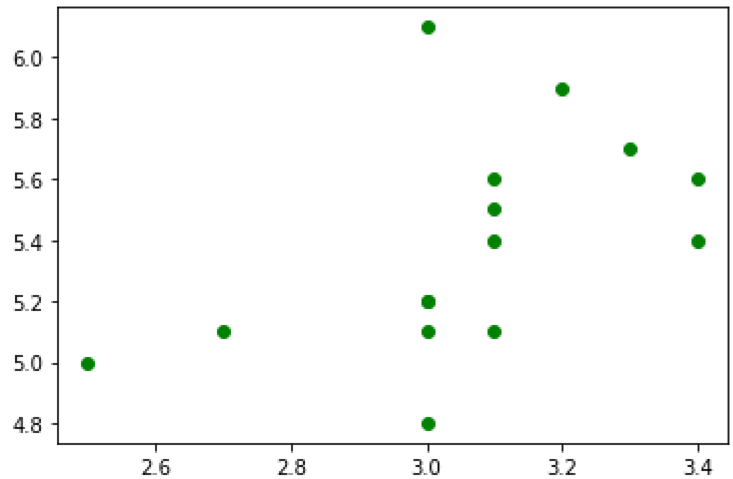

6.2
6.0
5.8
5.6
5.4
5.2
5.0
4.8
2.6
2.8
3.0
3.2
3.4
3.6
3.8

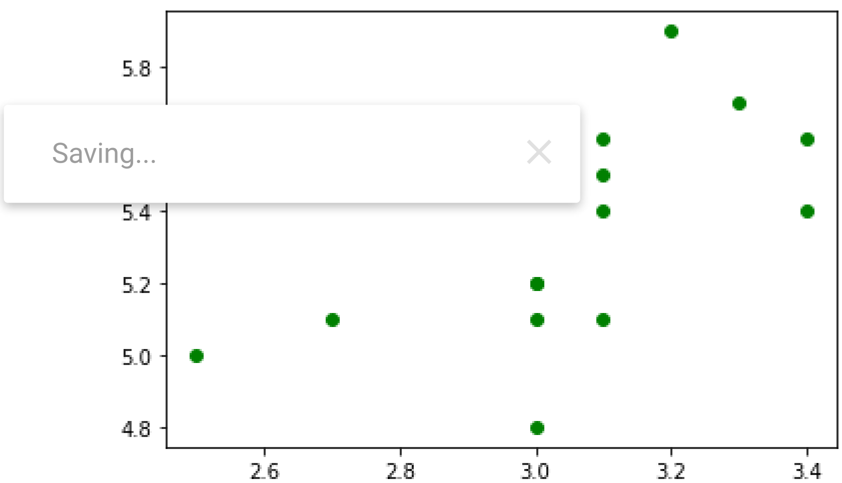

6.4
6.2
6.0
5.8
5.6
5.4
5.2
5.0
4.8
2.6
2.8
3.0
3.2
3.4
3.6
3.8

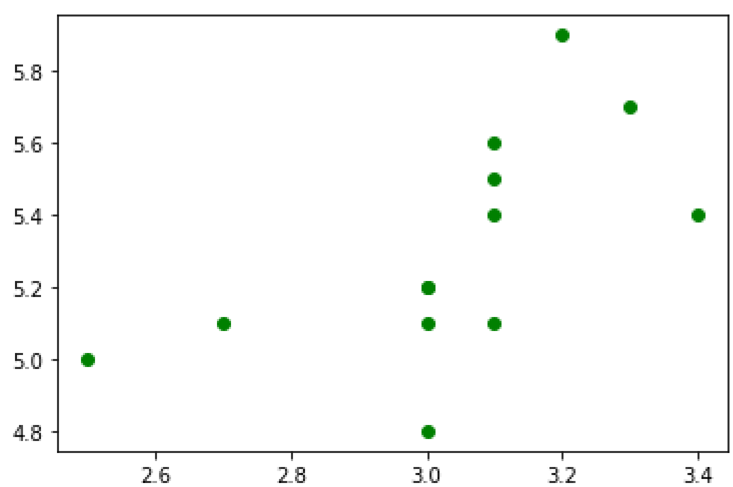

6.0
5.4
5.2
5.0
4.8
2.6
2.8
3.0
3.2
3.4

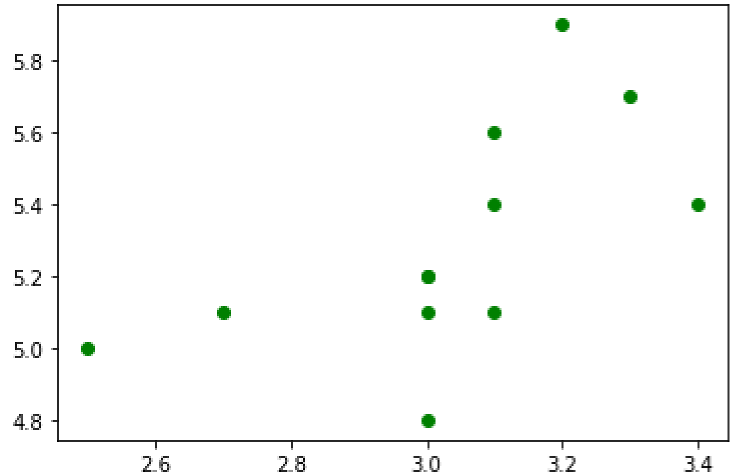

6.0
5.8
5.6
5.4
5.2
5.0
4.8
2.6
2.8
3.0
3.2
3.4

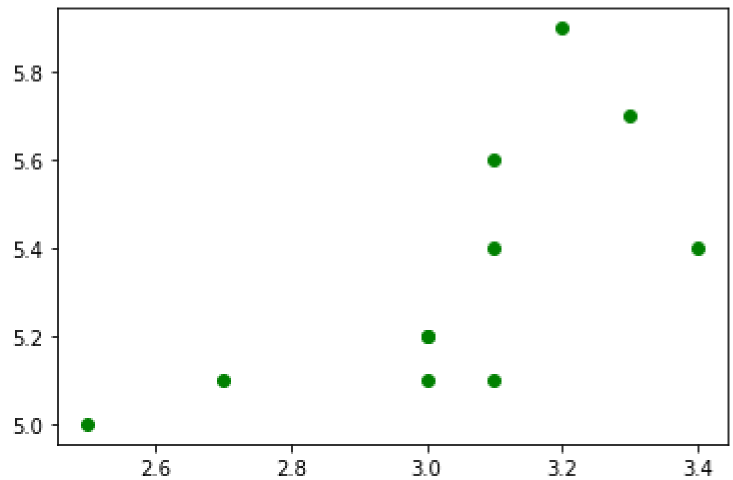

6.0
5.8
5.6
5.4
5.2
5.0
4.8
2.6
2.8
3.0
3.2
3.4

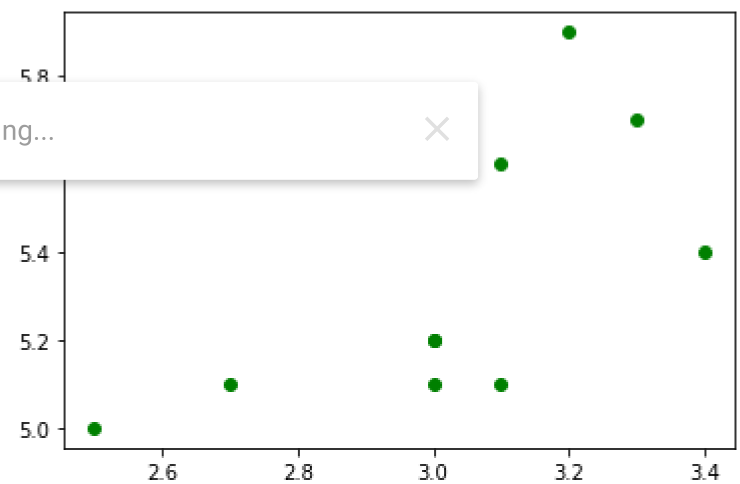

6.0
5.8
5.6
5.4
5.2
5.0
4.8
2.6
2.8
3.0
3.2
3.4


5.8
Saving...
5.4
5.2
5.0
4.8
2.6
2.8
3.0
3.2
3.4

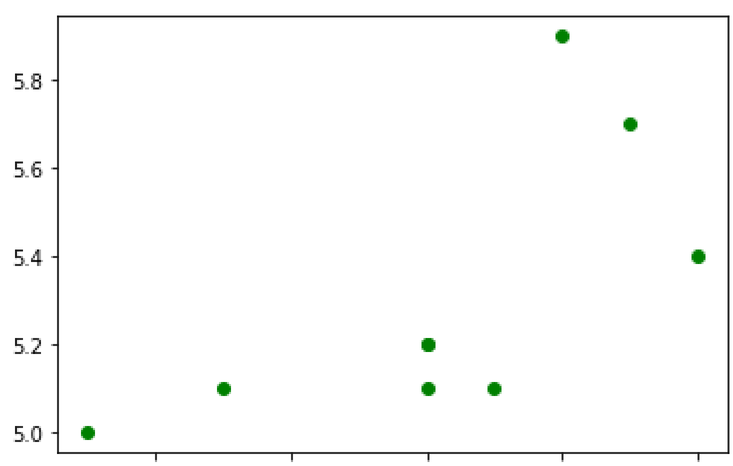

5.8
5.6
5.4
5.2
5.0
4.8
2.6
2.8
3.0
3.2
3.4


5.8
5.6
5.4
5.2
5.0
4.8
2.6
2.8
3.0
3.2
3.4

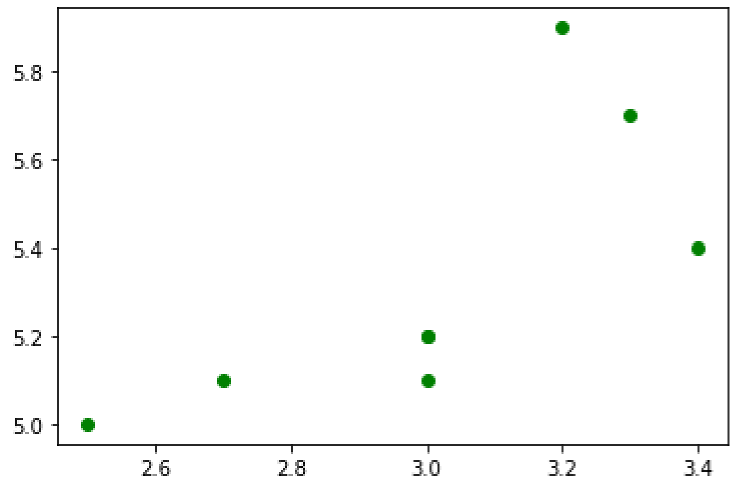

5.8
5.6
5.4
5.2
5.0
2.6
2.8
3.0
3.2
3.4

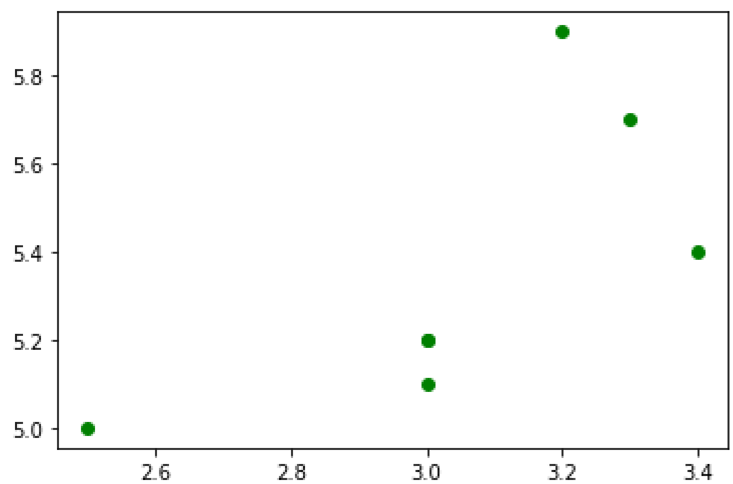

5.4
5.2
5.0
2.6
2.8
3.0
3.2
3.4

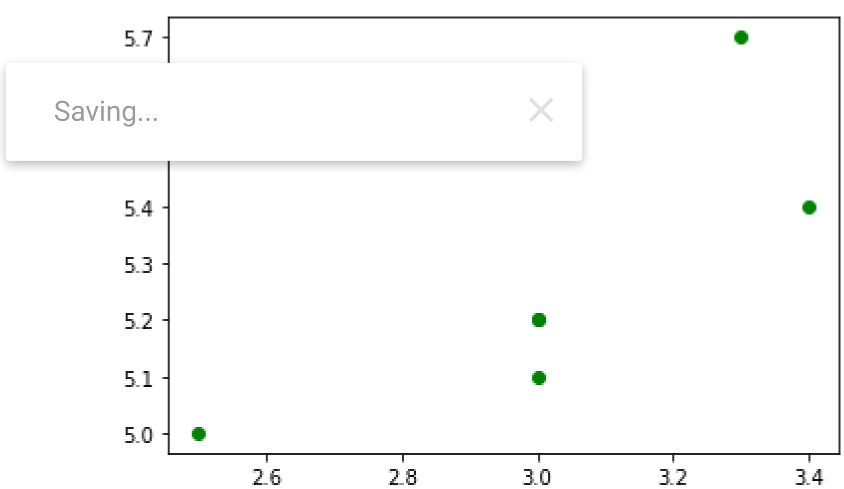
Saving...

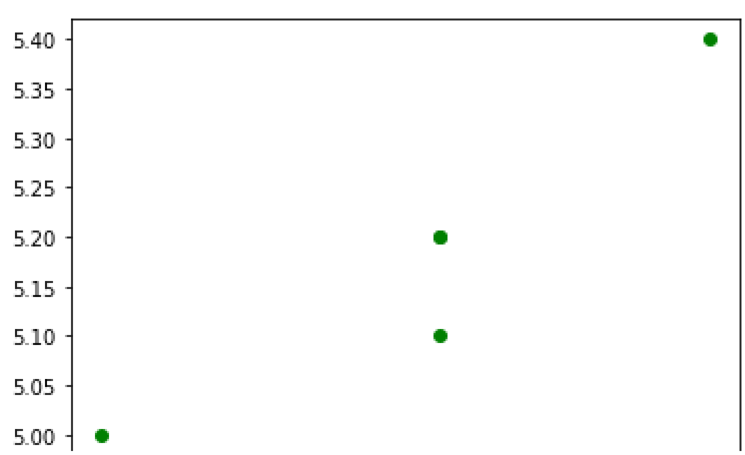

5.8
5.6
5.4
5.2
5.0

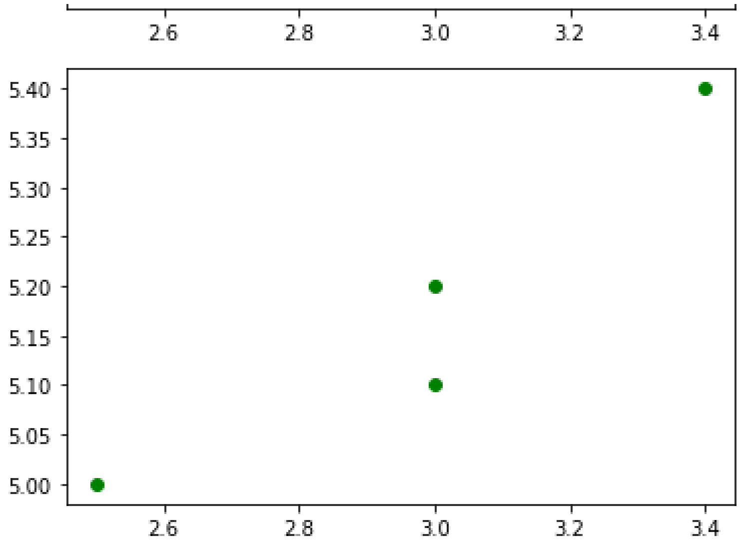
2.6
2.8
3.0
3.2
3.4


5.8
5.6
5.4
5.2
5.0
2.6
2.8
3.0
3.2
3.4


5.8
5.6
5.4
5.2
5.0
2.6
2.8
3.0
3.2
3.4

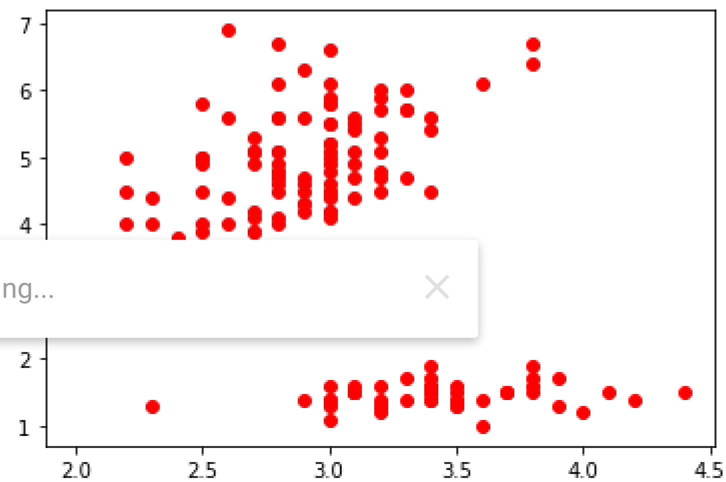

5.7
Saving...
5.4
5.3
5.2
5.1
5.0
2.6
2.8
3.0
3.2
3.4


5.40
5.35
5.30
5.25
5.20
5.15
5.10
5.05
5.00



Plotting unlabelized iris data set

```
plt.plot(iris.values[:,1],iris.values[:,2],'ro')
plt.show()
```



Clustering using KMeans Clustering Algorithm

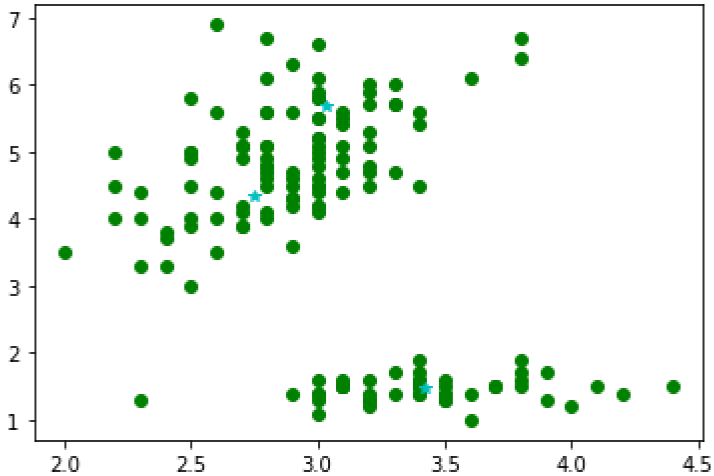
```
estimate1 = KMeans(n_clusters=3)
estimate1.fit(iris.values[:,1:3])
```

```
KMeans(algorithm='auto', copy_x=True, init='k-means++', max_iter=300,
       n_clusters=3, n_init=10, n_jobs=None, precompute_distances='auto',
       random_state=None, tol=0.0001, verbose=0)
```

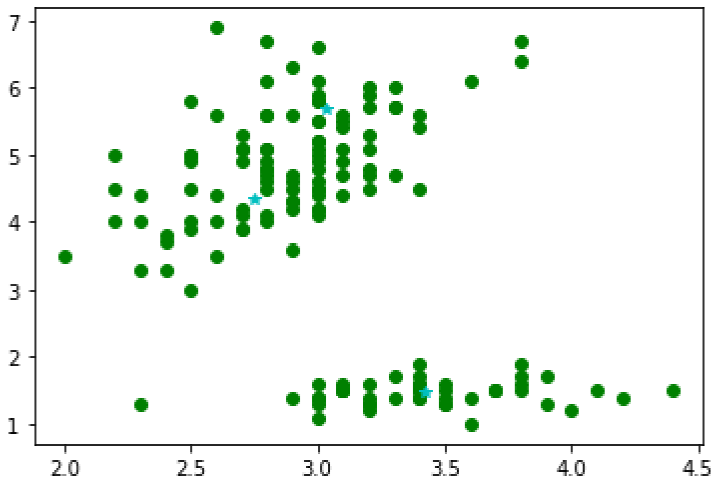
Plotting Clustered data points using K_Means with 3 clusters

```
for i in range(150):
  if estimate1.labels [i]==0:
```

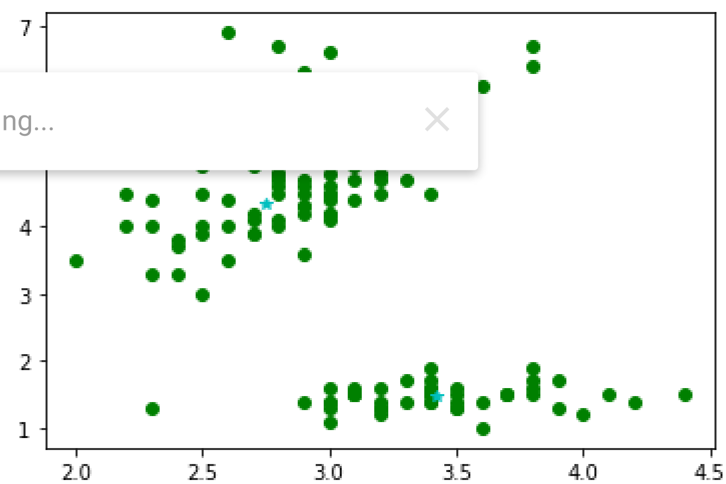
```
    plt.plot(iris.values[i:,1],iris.values[i:,2],'go')
    plt.plot(estimate1.cluster_centers_[:,0],estimate1.cluster_centers_[:,1],'c*')
  elif estimate1.labels_[i]==1:
    plt.plot(iris.values[i:,1],iris.values[i:,2],'ro')
    plt.plot(estimate1.cluster_centers_[:,0],estimate1.cluster_centers_[:,1],'c*')
  elif estimate1.labels_[i]==2:
    plt.plot(iris.values[i:,1],iris.values[i:,2],'bo')
    plt.plot(estimate1.cluster_centers_[:,0],estimate1.cluster_centers_[:,1],'c*')
  plt.show()
```



7
6
5
4
3
2
1
2.0
2.5
3.0
3.5
4.0
4.5

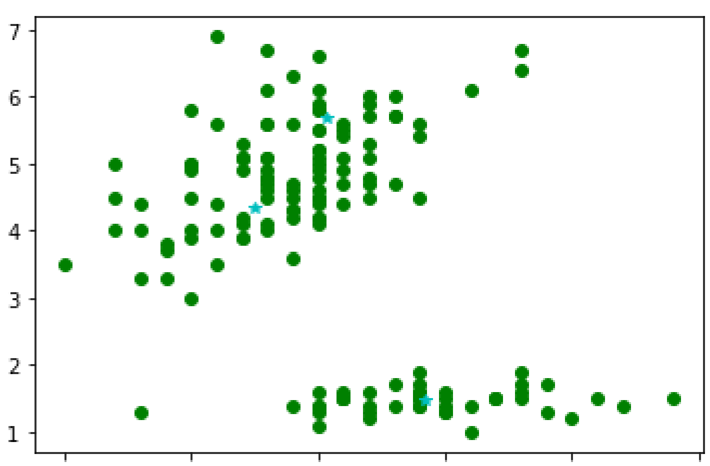


7
6
5
4
3
2
1
2.0
2.5
3.0
3.5
4.0
4.5

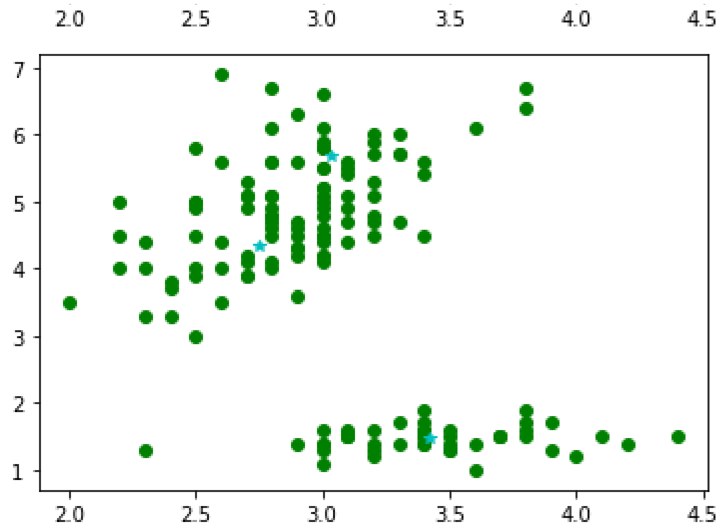


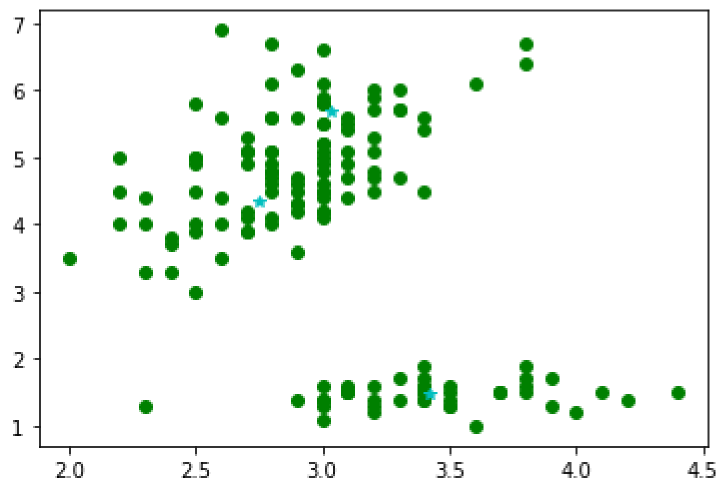
7
4
3
2
1
2.0
2.5
3.0
3.5
4.0
4.5

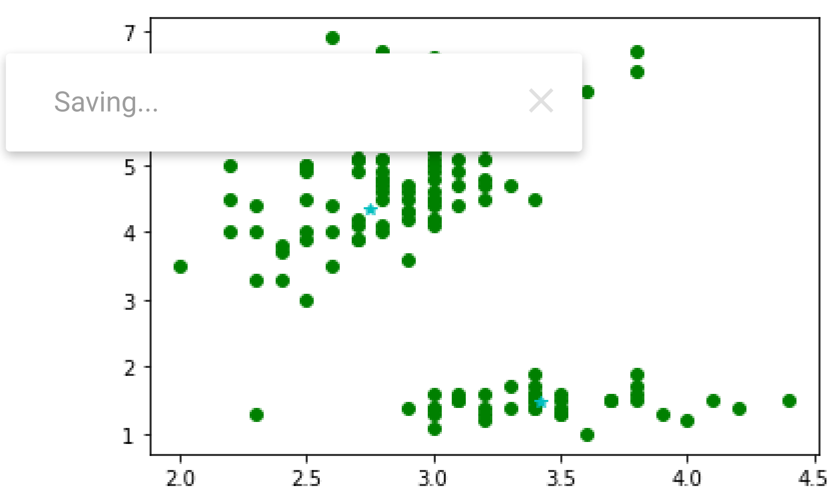
Saving...

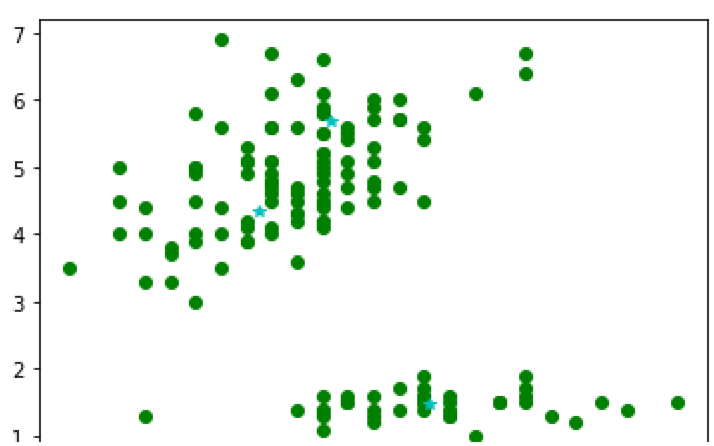


7
6
5
4
3
2
1

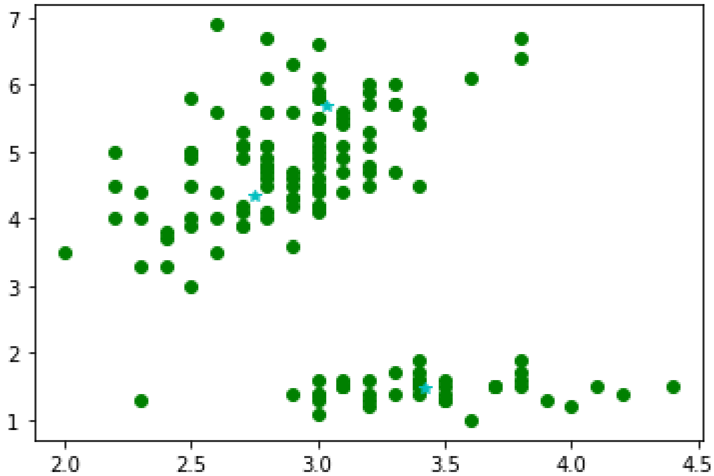

2.0
2.5
3.0
3.5
4.0
4.5
7
6
5
4
3
2
1
2.0
2.5
3.0
3.5
4.0
4.5

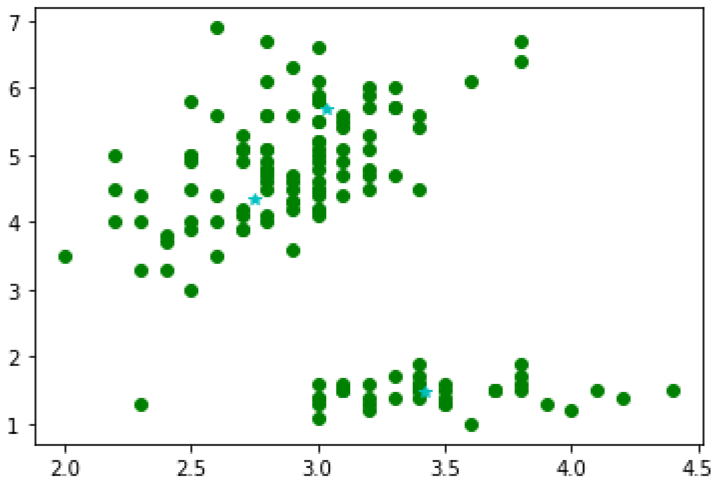

7
6
5
4
3
2
1
2.0
2.5
3.0
3.5
4.0
4.5

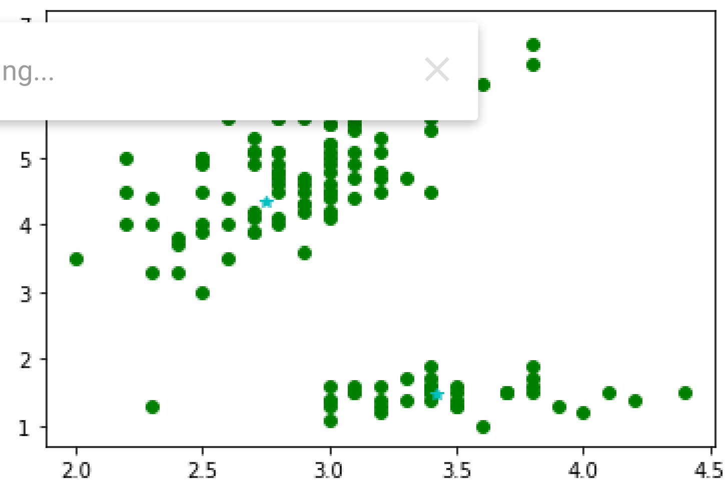

7
Saving...
5
4
3
2
1
2.0
2.5
3.0
3.5
4.0
4.5


7
6
5
4
3
2
1

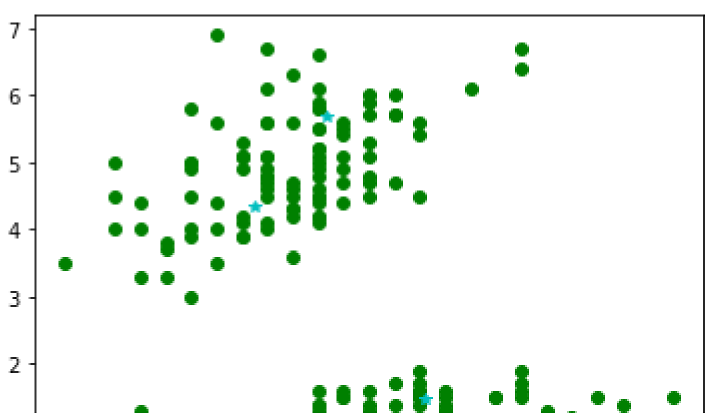

2.0
2.5
3.0
3.5
4.0
4.5

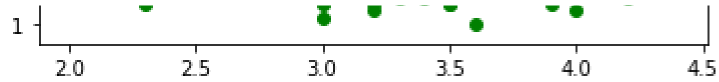

7
6
5
4
3
2
1
2.0
2.5
3.0
3.5
4.0
4.5

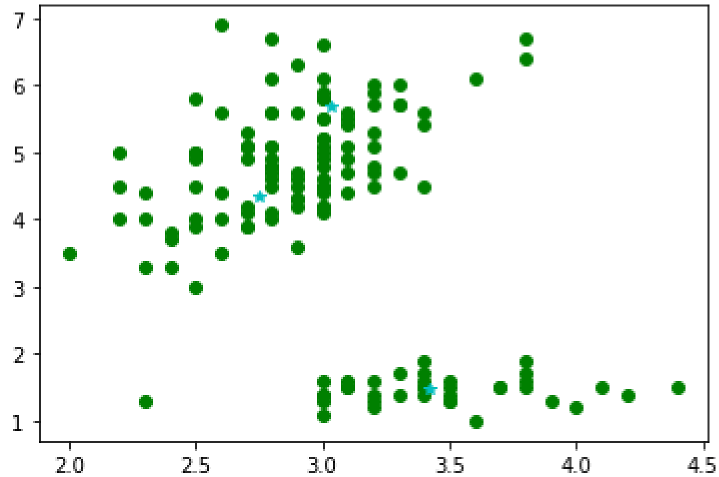

7
6
5
4
3
2
1
2.0
2.5
3.0
3.5
4.0
4.5

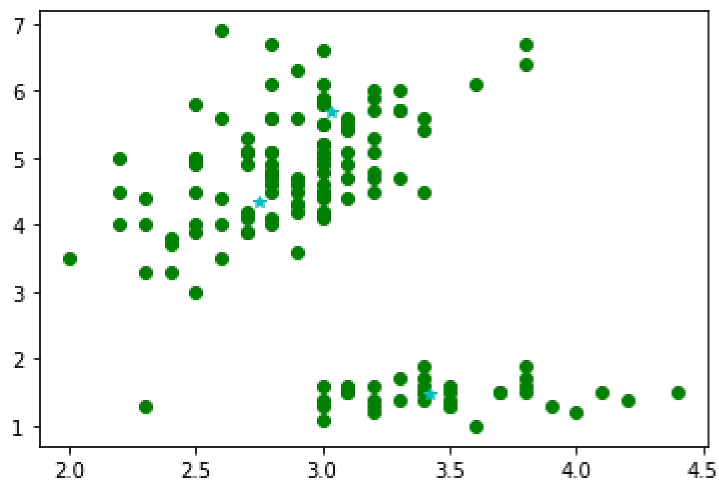

5
4
3
2
1
2.0
2.5
3.0
3.5
4.0
4.5

Saving...

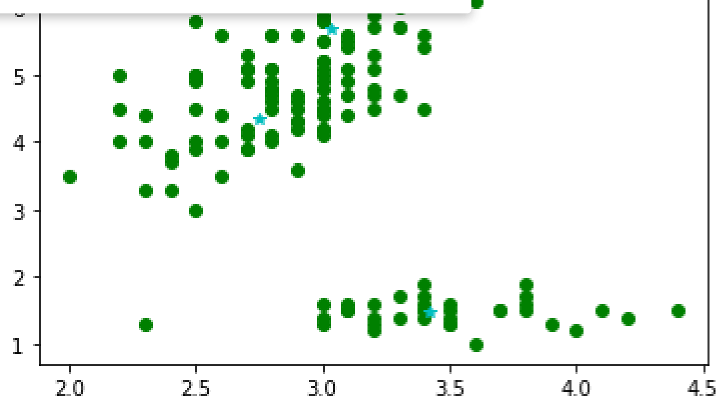

7
6
5
4
3
2

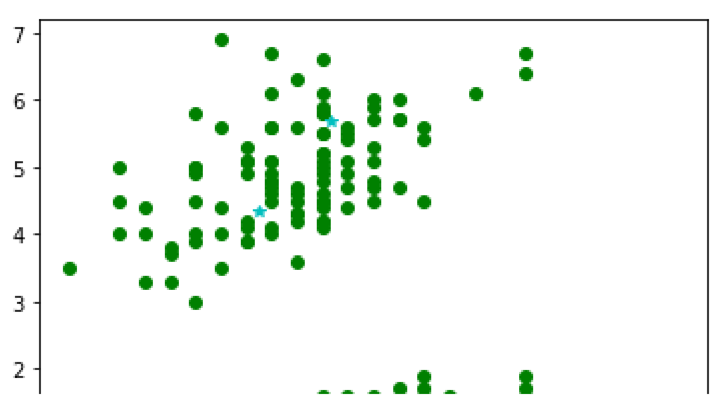

1
2.0
2.5
3.0
3.5
4.0
4.5

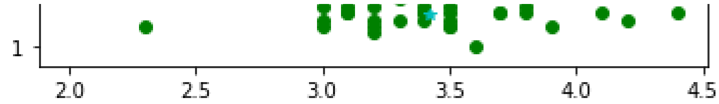

7
6
5
4
3
2
1
2.0
2.5
3.0
3.5
4.0
4.5

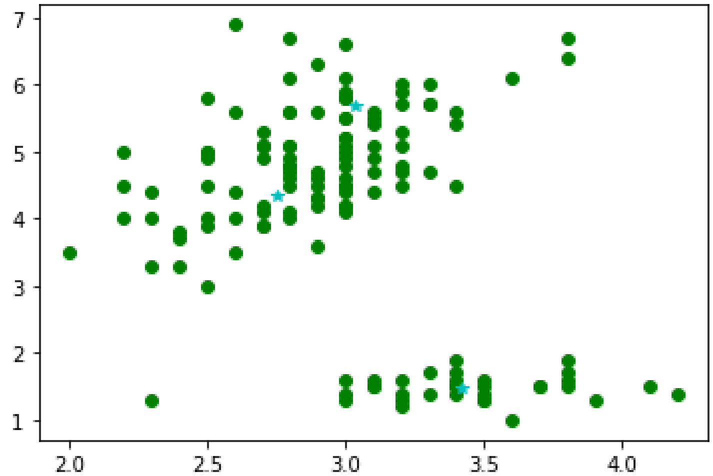

7
6
5
4
3
2
1
2.0
2.5
3.0
3.5
4.0
4.5

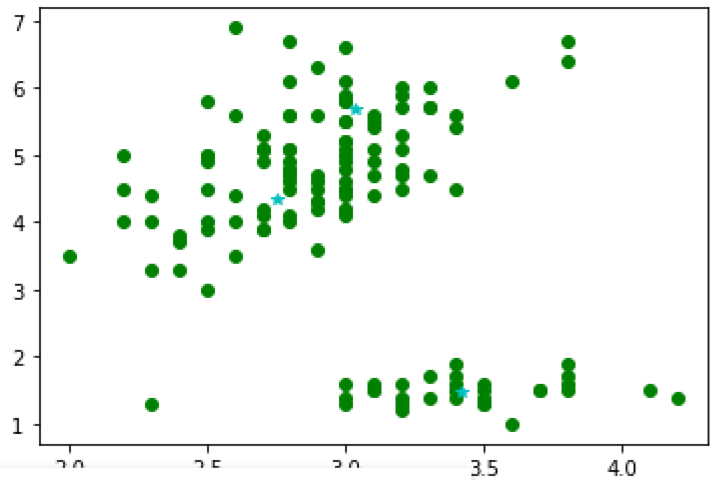
Saving...

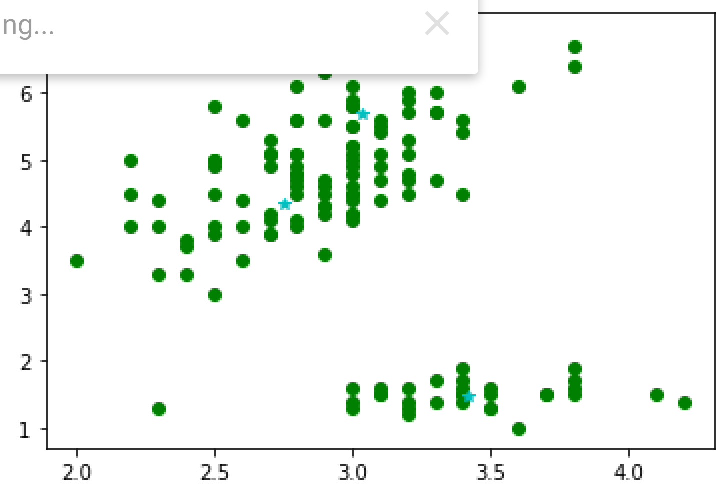

5
4
3
2
1
2.0
2.5
3.0
3.5
4.0
4.5

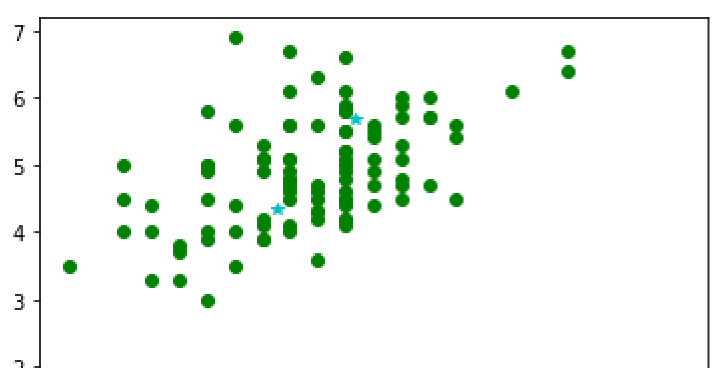

7
6
5
4
3
2

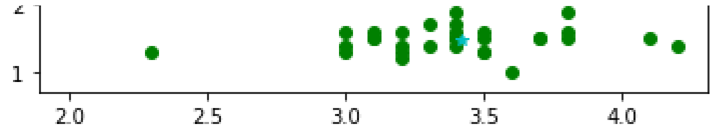

1
2.0
2.5
3.0
3.5
4.0
4.5

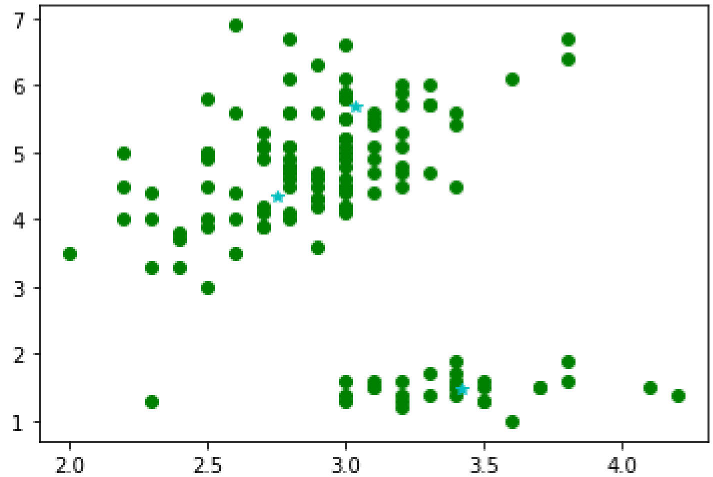

7
6
5
4
3
2
1
2.0
2.5
3.0
3.5
4.0

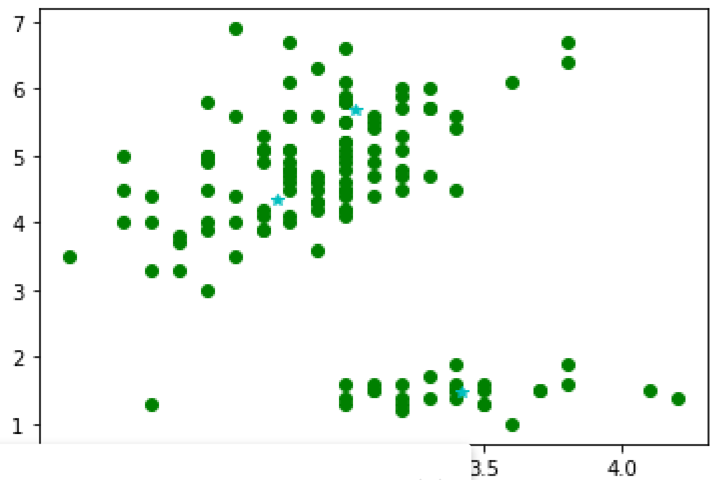

7
6
5
4
3
2
1
2.0
2.5
3.0
3.5
4.0


6
5
4
3
2
1
2.0
2.5
3.0
3.5
4.0

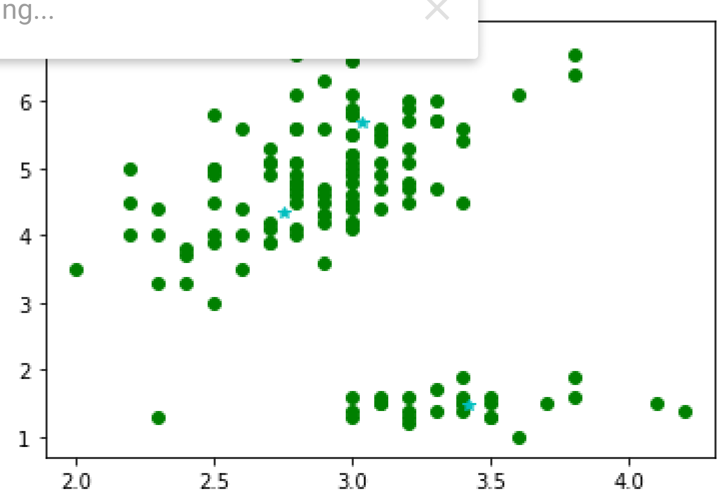

7
6
5
4
3

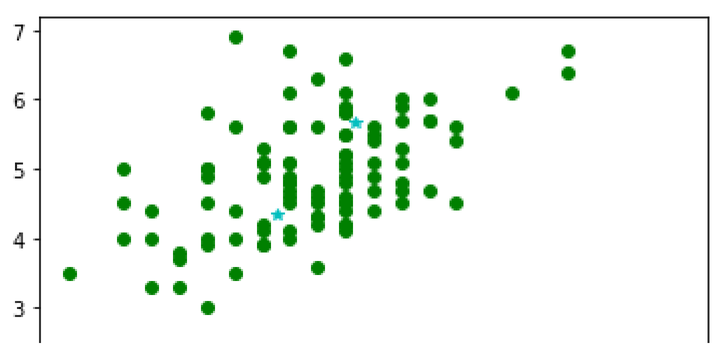

1
2.0
2.5
3.0
3.5
4.0

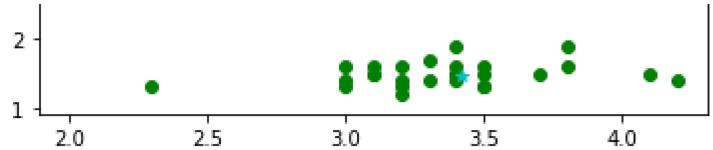

1
2
3
4
5
6
7
2.0
2.5
3.0
3.5
4.0

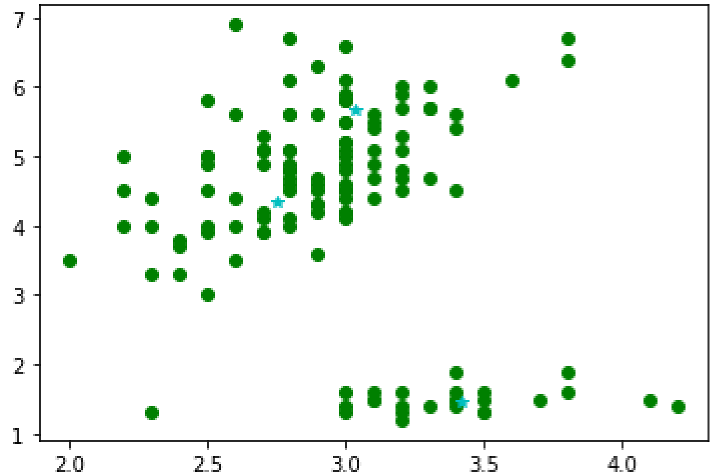

1
2
3
4
5
6
7
3.5
4.0

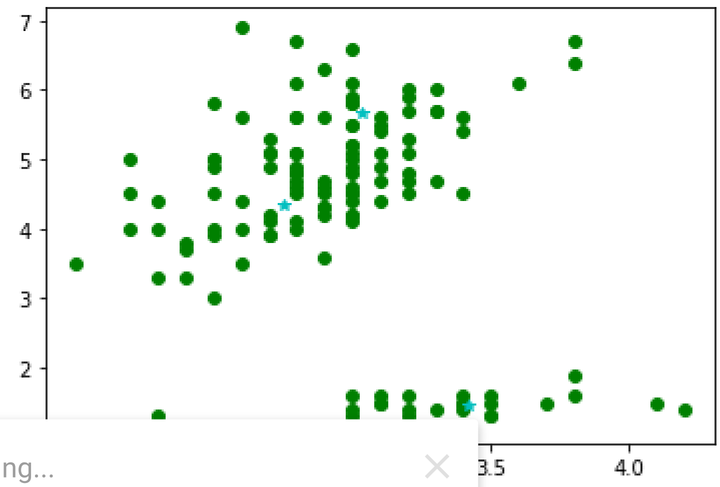
Saving...


1
2
3
4
5
6
2.0
2.5
3.0
3.5
4.0

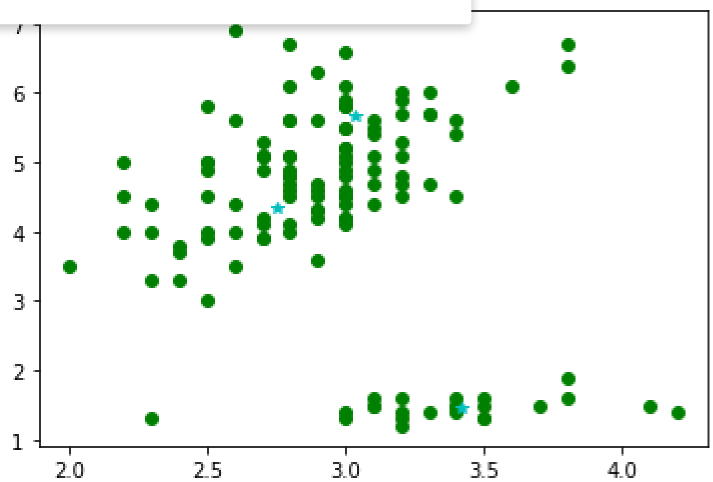

3
4
5
6
7

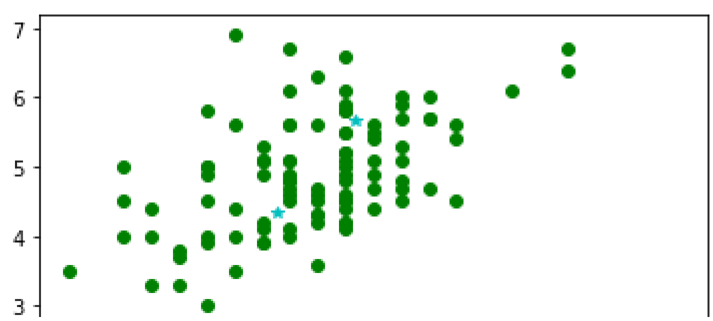

1
2
2.0
2.5
3.0
3.5
4.0

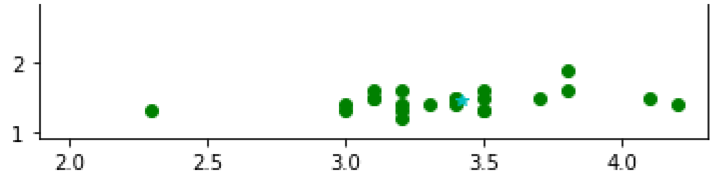

1
2
3
4
5
6
7
2.0
2.5
3.0
3.5
4.0

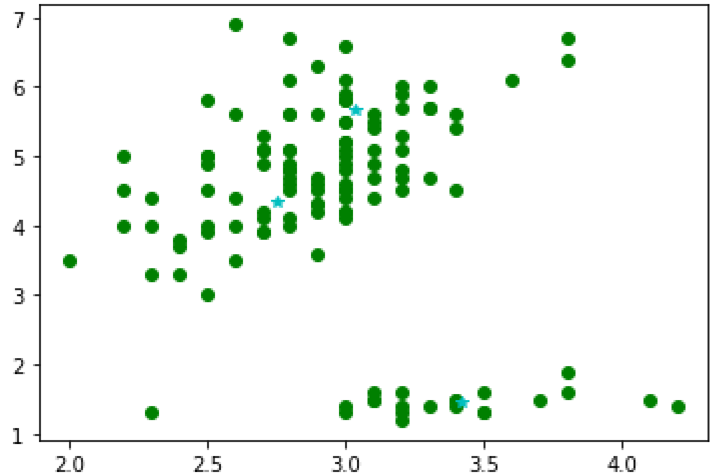

2
3
4
5
6
7
3.5
4.0

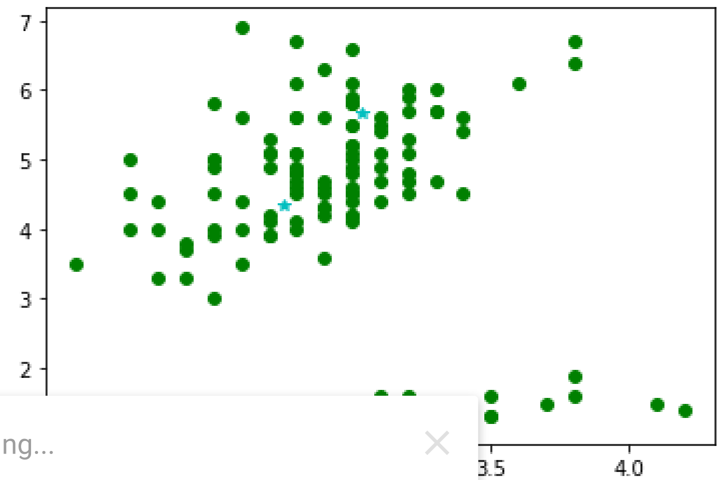
Saving...


1
2
3
4
5
6
2.0
2.5
3.0
3.5
4.0

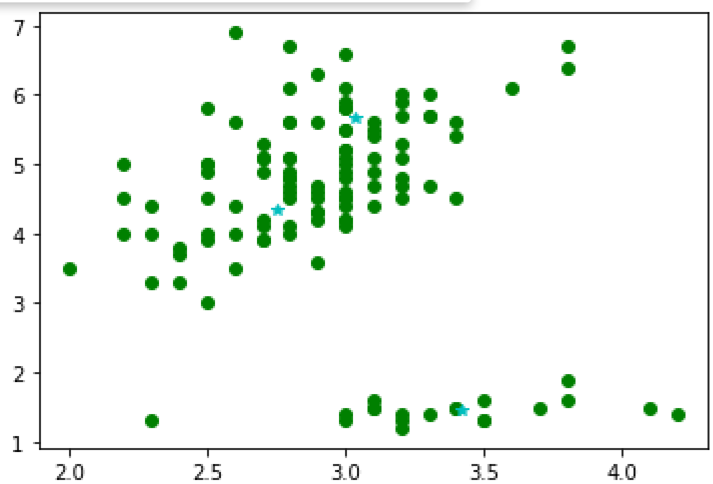

3
4
5
6
7

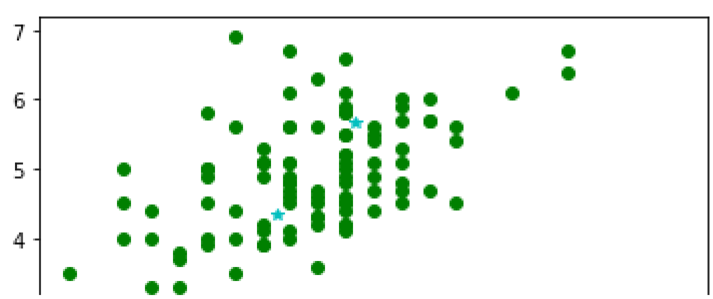

2
1
2.0
2.5
3.0
3.5
4.0

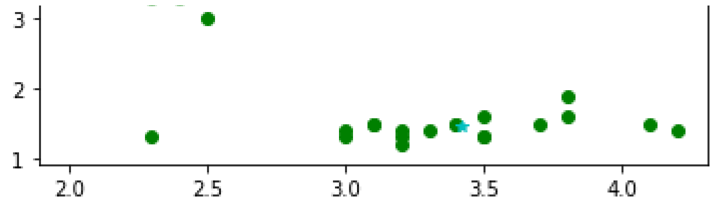

7
6
5
4
3
2
1
2.0
2.5
3.0
3.5
4.0

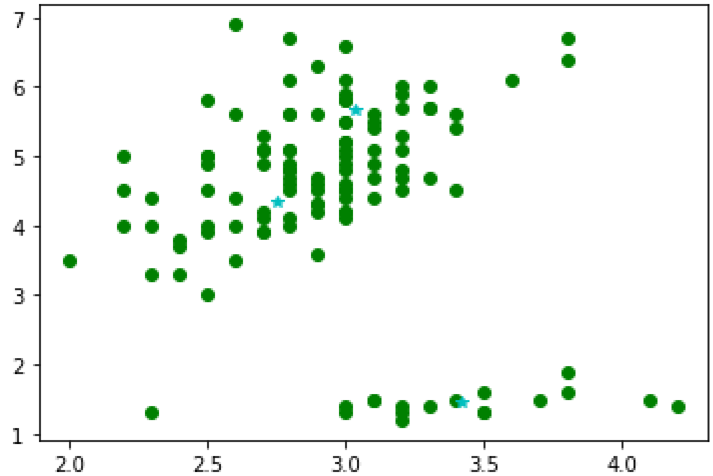

7
6
5
4
3
2
3.5
4.0

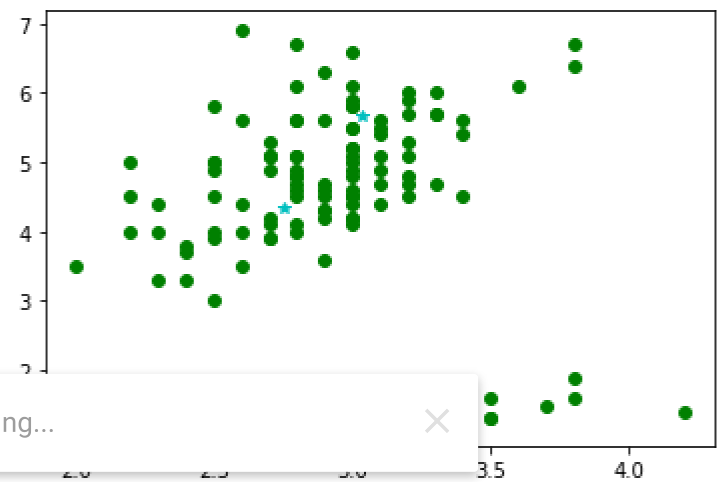
Saving...


7
6
5
4
3
2
1
2.0
2.5
3.0
3.5
4.0

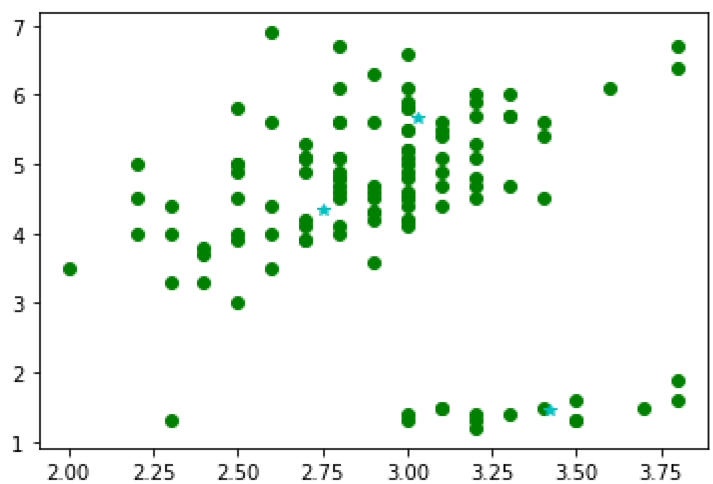

7
6
5
4

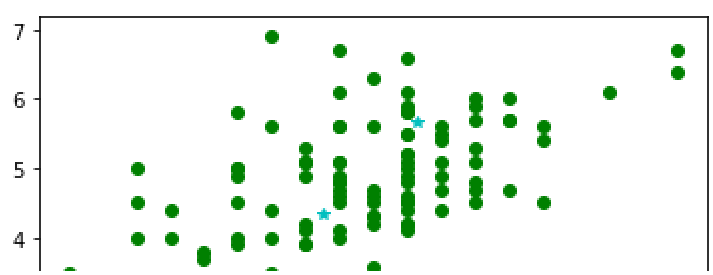

3
2
1
2.0
2.5
3.0
3.5
4.0

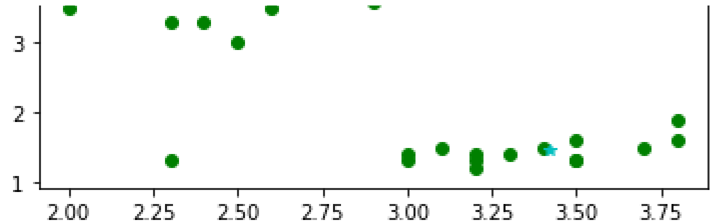

7
6
5
4
3
2
1
2.0
2.5
3.0
3.5
4.0

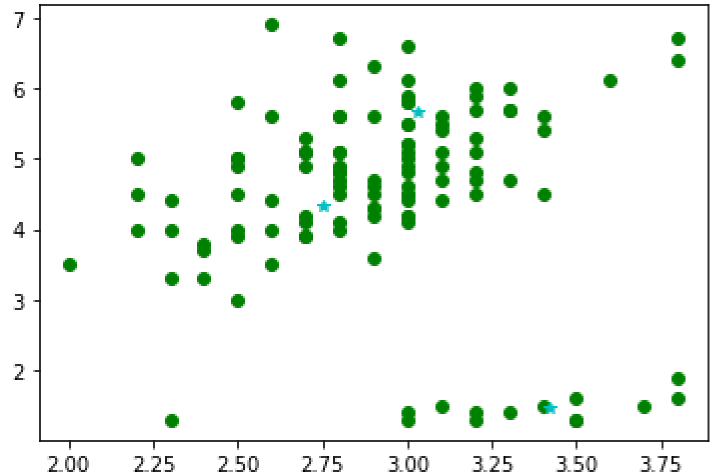

7
6
5
4
3
3.5
4.0

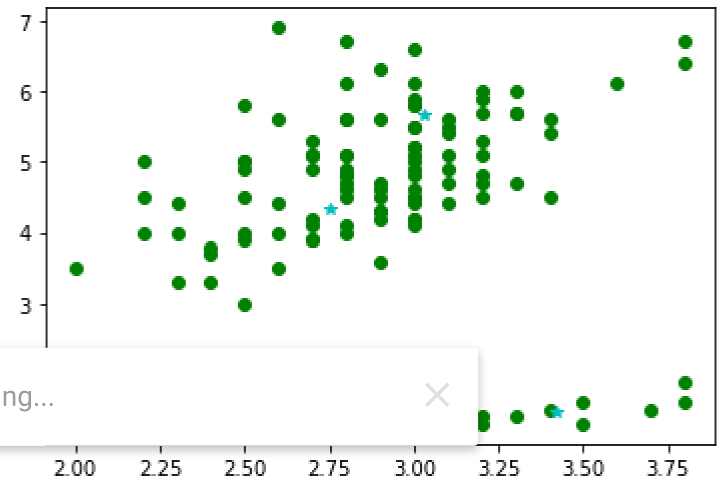
Saving...

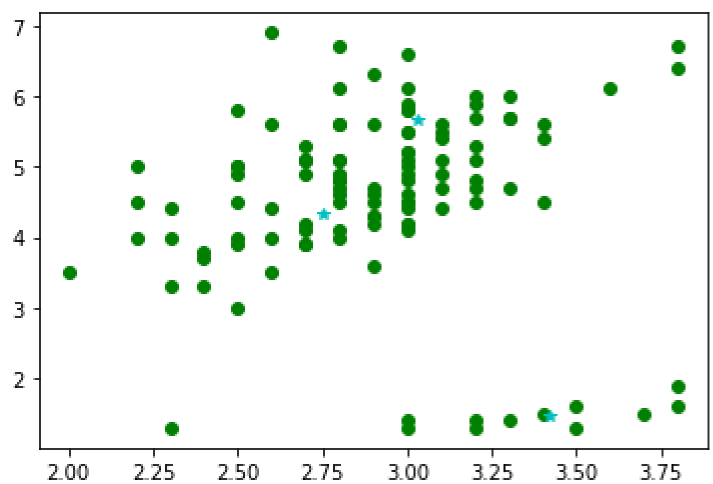

7
6
5
4
3
2
1
2.00
2.25
2.50
2.75
3.00
3.25
3.50
3.75

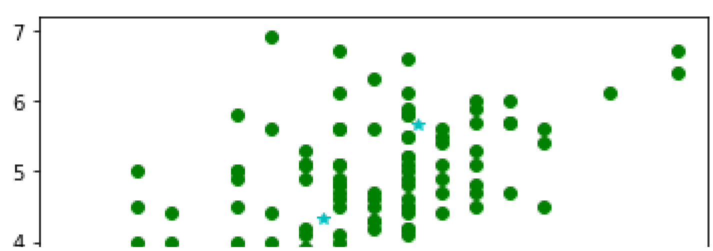

7
6
5
4

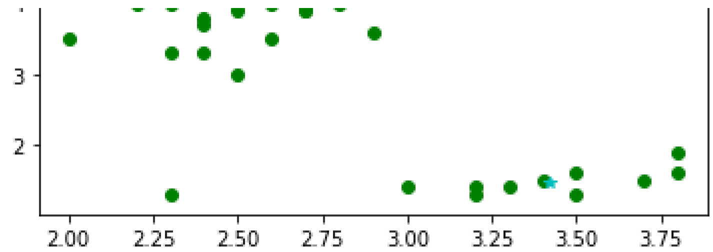

1
2
3
2.00 2.25 2.50 2.75 3.00 3.25 3.50 3.75

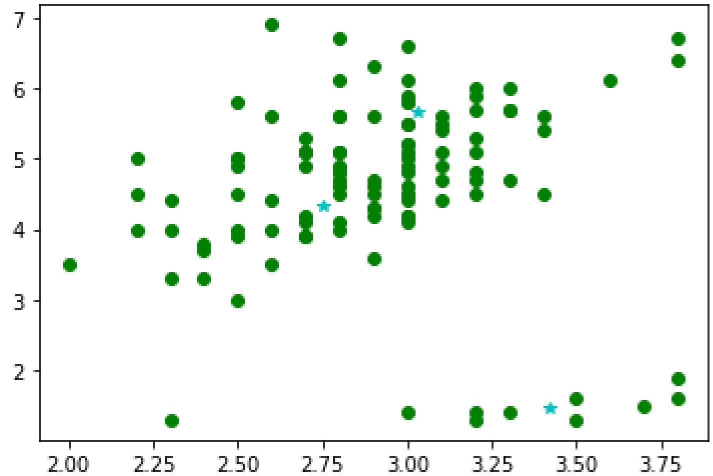

2
3
4
5
6
7
2.00 2.25 2.50 2.75 3.00 3.25 3.50 3.75

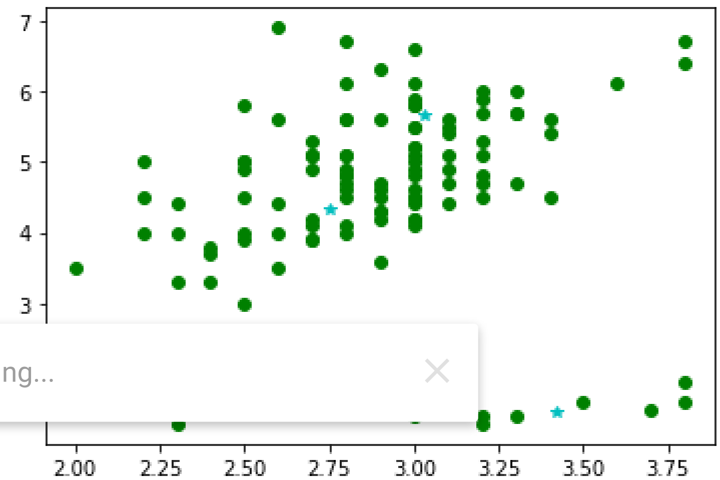

3
4
5
6
7
2.00 2.25 2.50 2.75 3.00 3.25 3.50 3.75


2
3
4
5
6
7
2.00 2.25 2.50 2.75 3.00 3.25 3.50 3.75

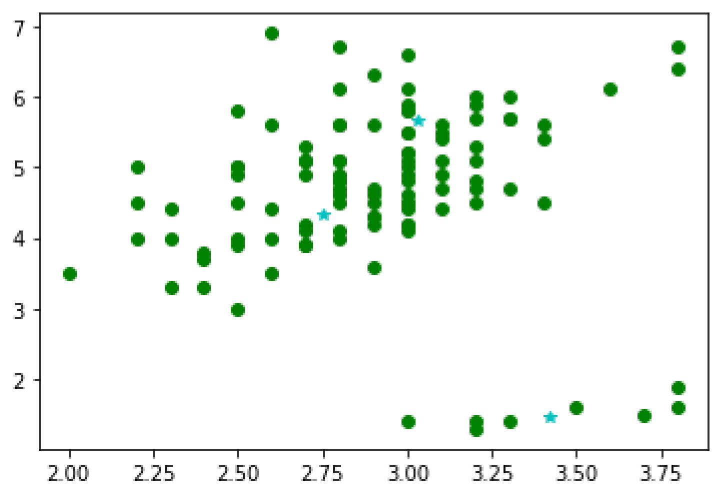

4
5
6
7

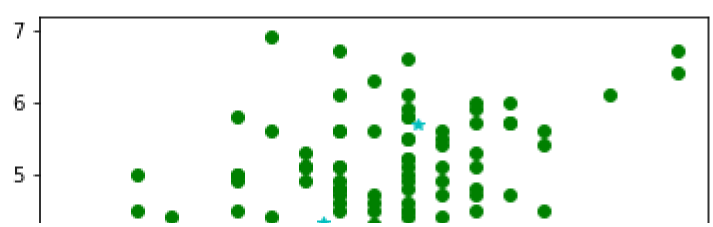

3
2
2.00 2.25 2.50 2.75 3.00 3.25 3.50 3.75

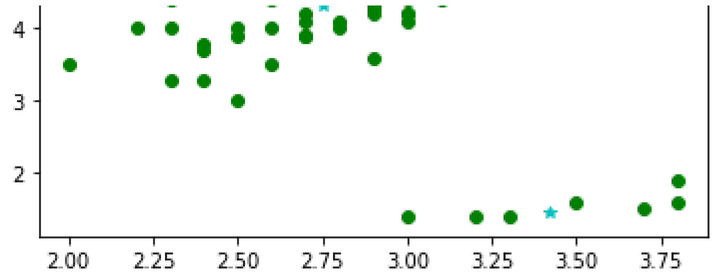

7
6
5
4
3
2
2.00 2.25 2.50 2.75 3.00 3.25 3.50 3.75

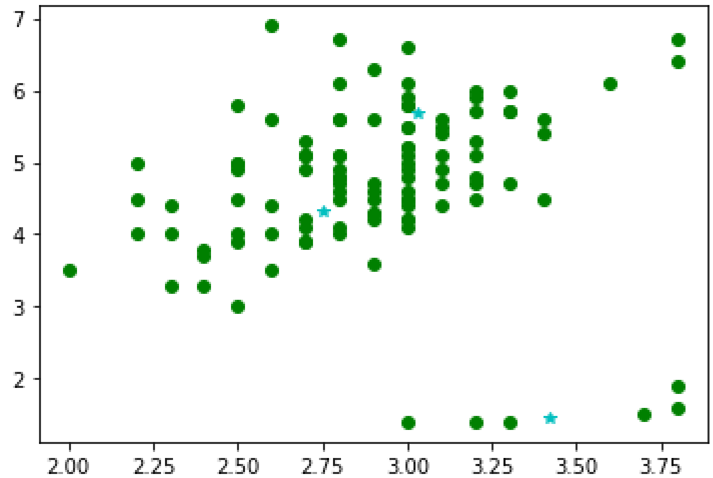

7
6
5
4
3
2.00 2.25 2.50 2.75 3.00 3.25 3.50 3.75

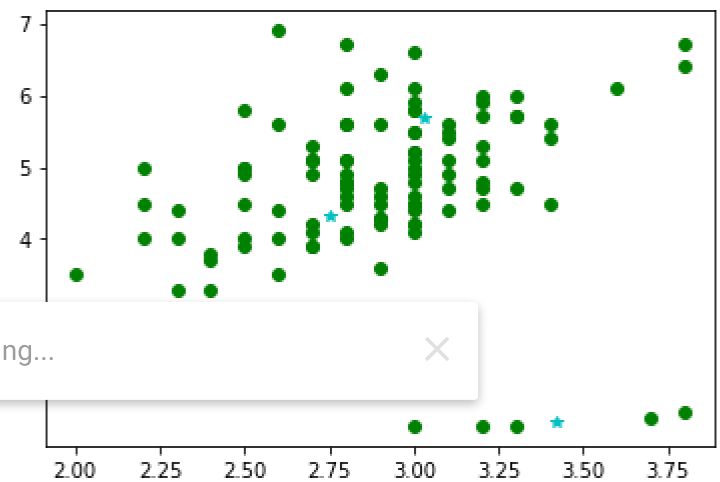
Saving...


7
6
5
4
3
2
2.00 2.25 2.50 2.75 3.00 3.25 3.50 3.75

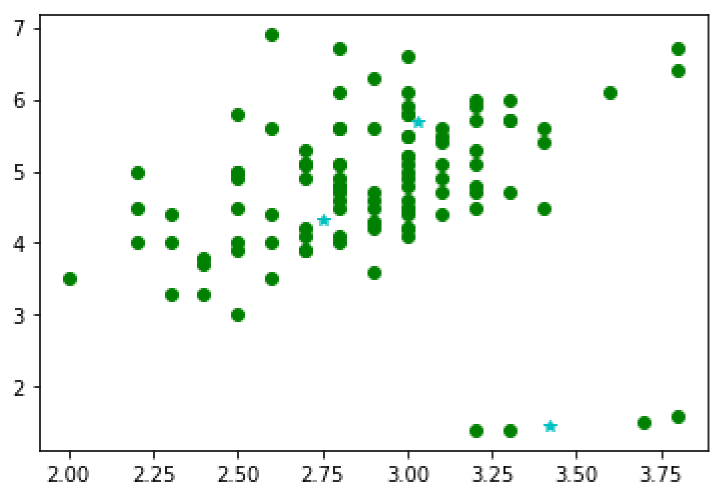

7
6
5

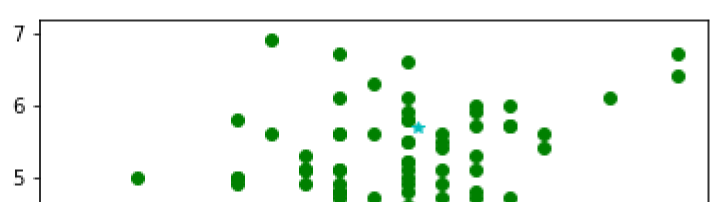

4
3
2
2.00 2.25 2.50 2.75 3.00 3.25 3.50 3.75

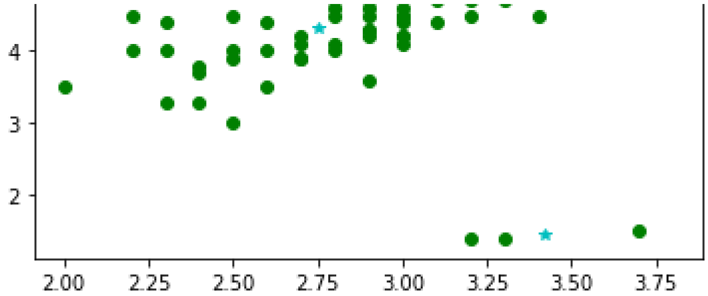

7
6
5
4
3
2
2.00 2.25 2.50 2.75 3.00 3.25 3.50 3.75

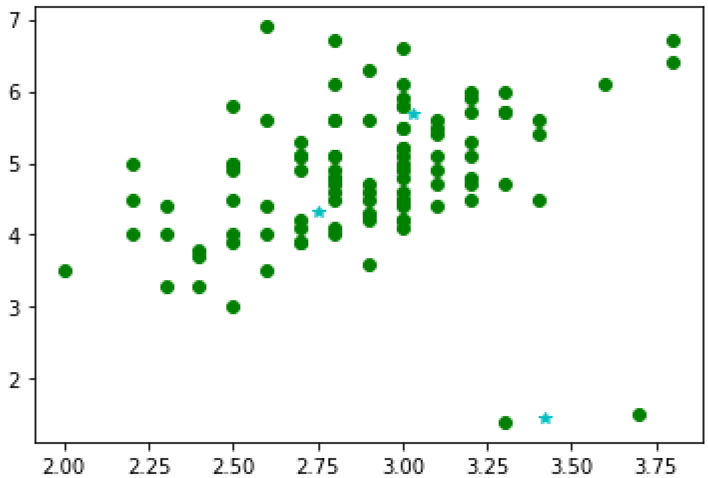

7
6
5
4
2.00 2.25 2.50 2.75 3.00 3.25 3.50 3.75

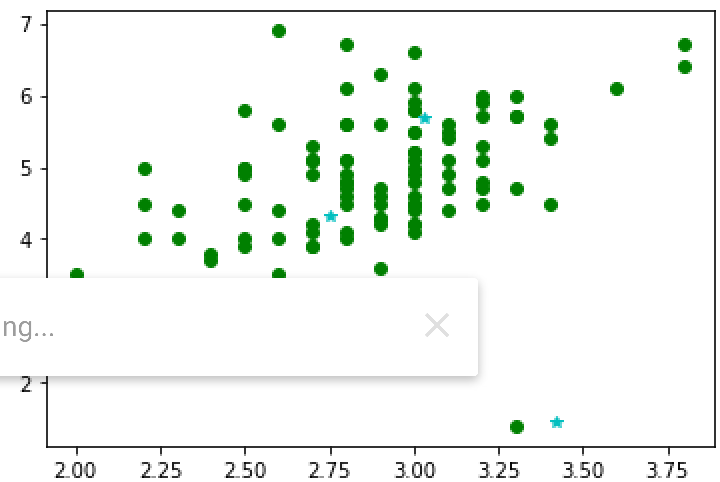
Saving...

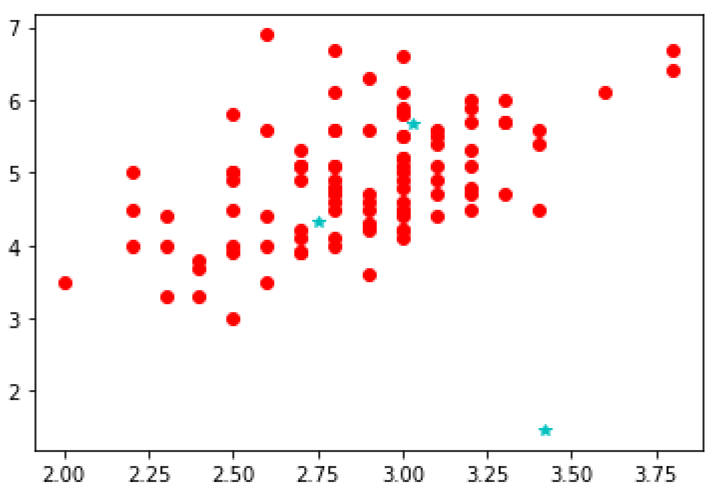

7
6
5
4
3
2
2.00 2.25 2.50 2.75 3.00 3.25 3.50 3.75

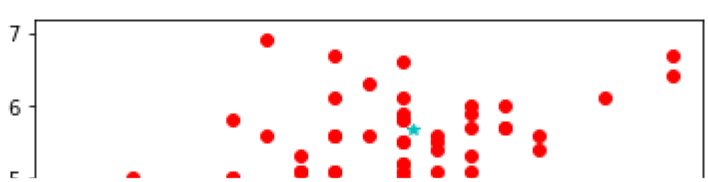

7
6
5

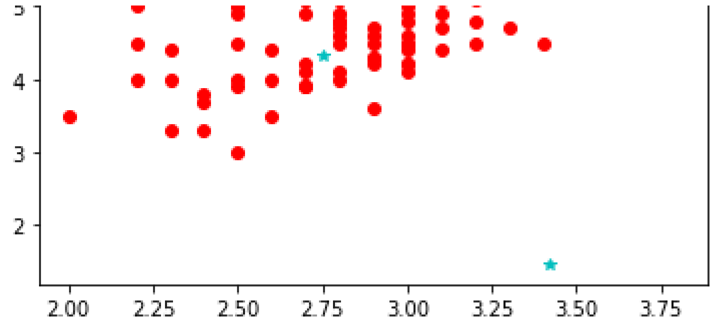

4
3
2
2.00 2.25 2.50 2.75 3.00 3.25 3.50 3.75

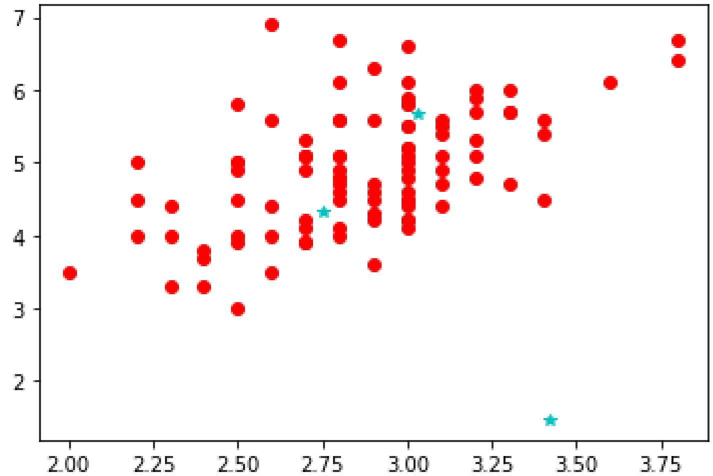

7
6
5
4
3
2
2.00 2.25 2.50 2.75 3.00 3.25 3.50 3.75

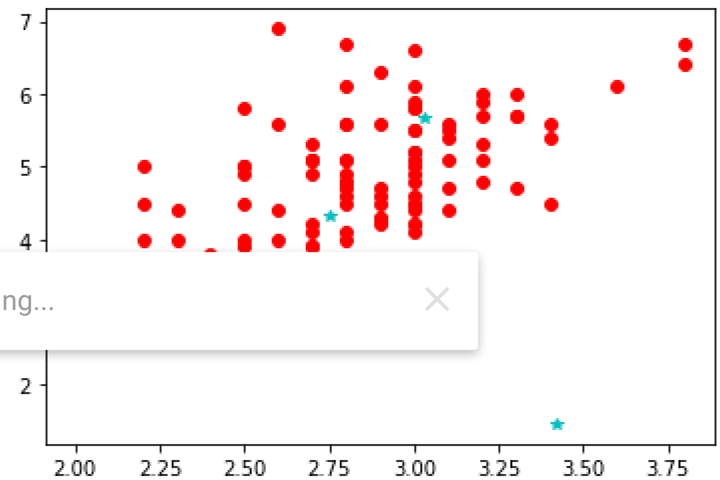

7
6
5
4
2
2.00 2.25 2.50 2.75 3.00 3.25 3.50 3.75


7
6
5
4
3
2
2.00 2.25 2.50 2.75 3.00 3.25 3.50 3.75

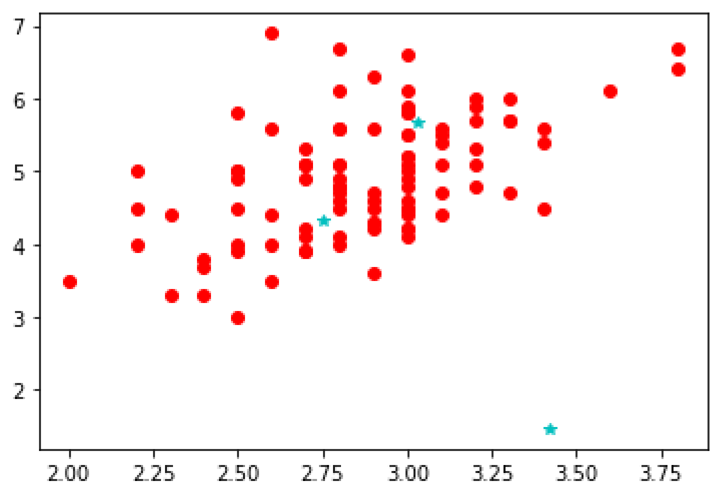

7
6

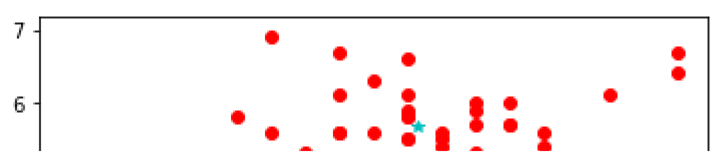


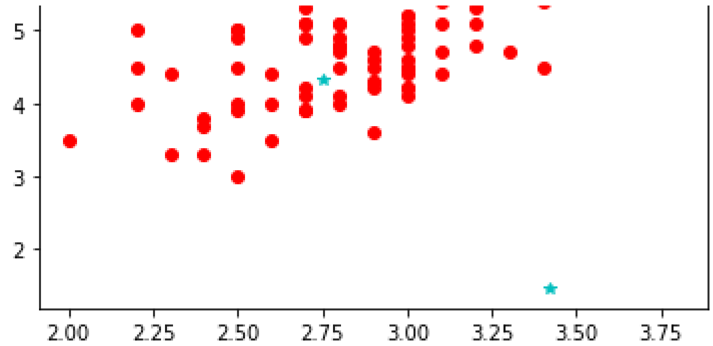


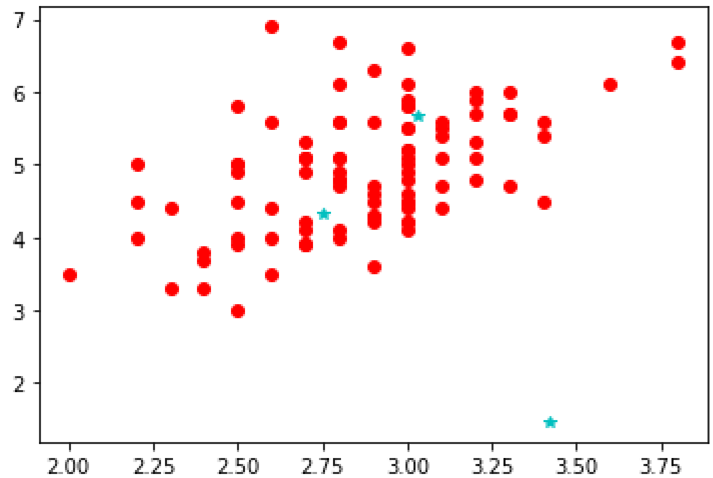


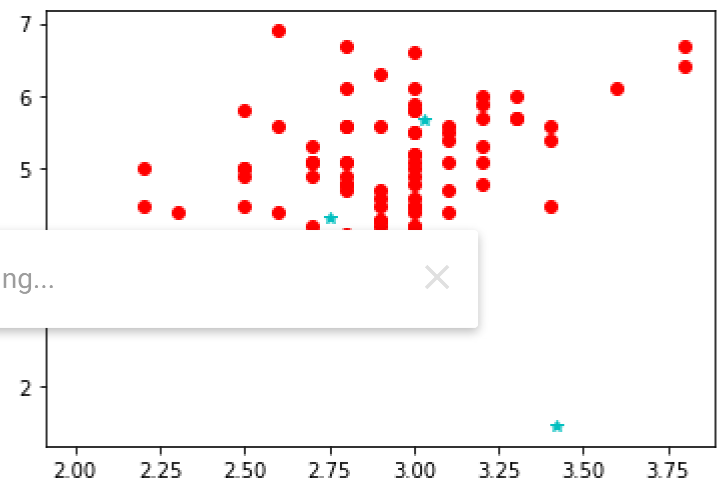
Saving...



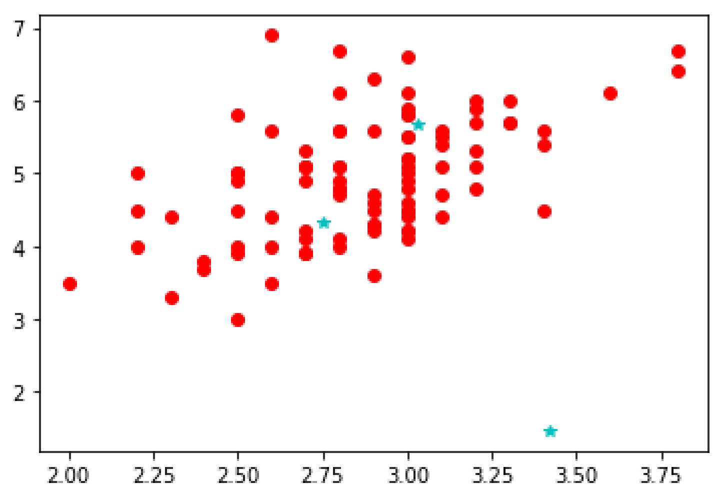


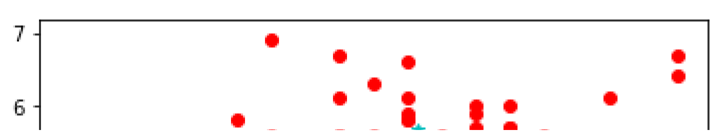

5
4
3
2
2.00 2.25 2.50 2.75 3.00 3.25 3.50 3.75

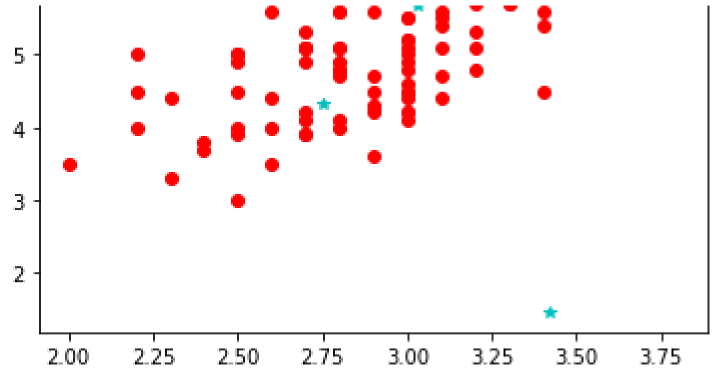

7
6
5
4
3
2
2.00 2.25 2.50 2.75 3.00 3.25 3.50 3.75

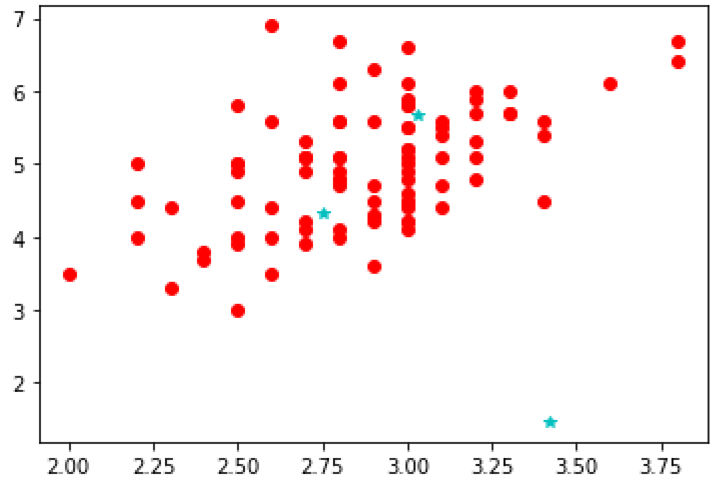

7
6
5
2
2.00 2.25 2.50 2.75 3.00 3.25 3.50 3.75

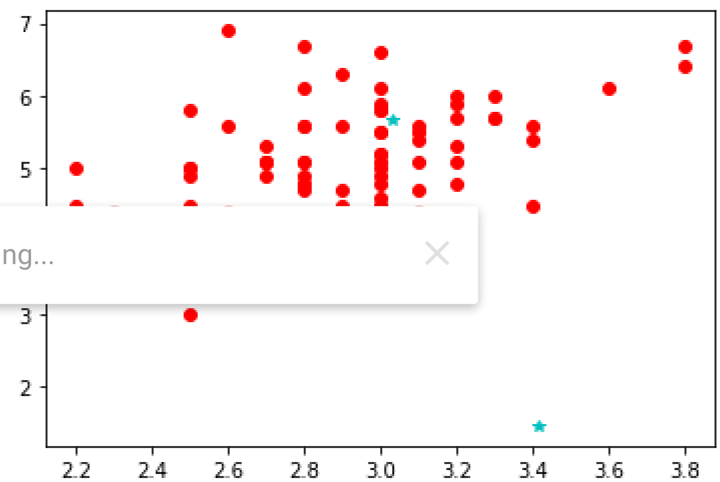
Saving...


7
6
5
4
3
2
2.00 2.25 2.50 2.75 3.00 3.25 3.50 3.75

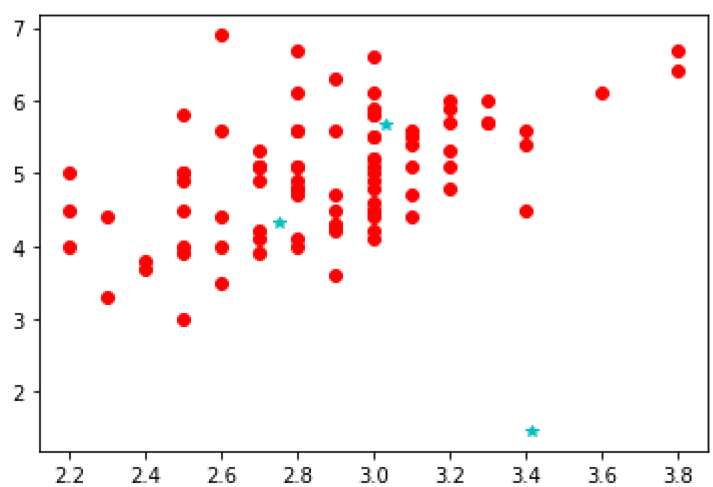

7
6

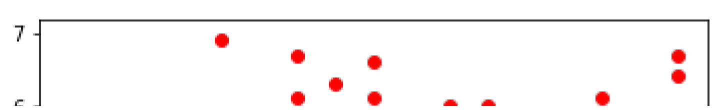

5
4
3
2
2.00
2.25
2.50
2.75
3.00
3.25
3.50
3.75

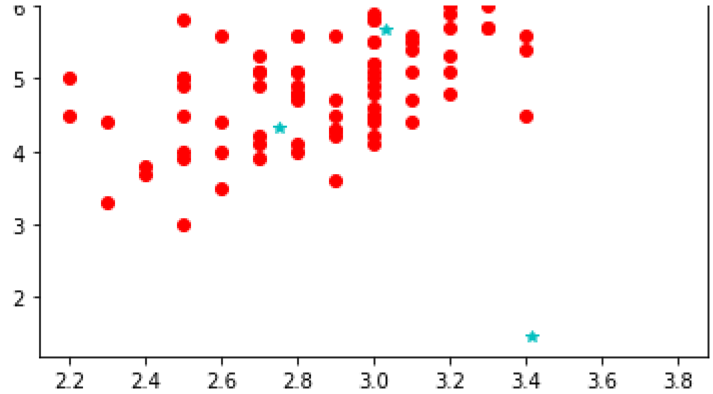

7
6
5
4
3
2
2.00
2.25
2.50
2.75
3.00
3.25
3.50
3.75

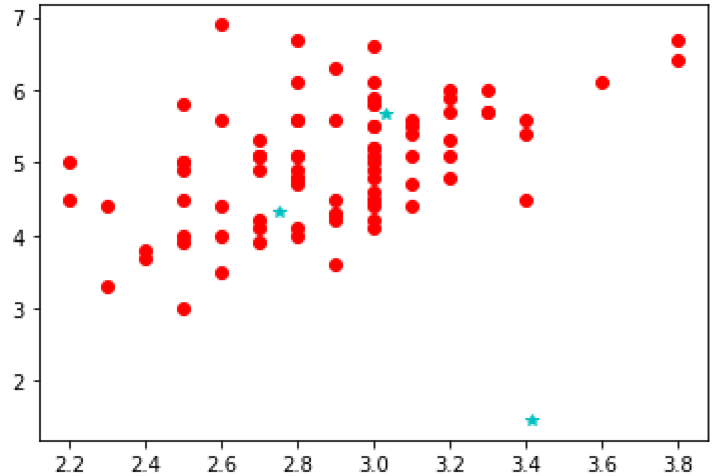

7
6
5
3
2
2.2
2.4
2.6
2.8
3.0
3.2
3.4
3.6
3.8

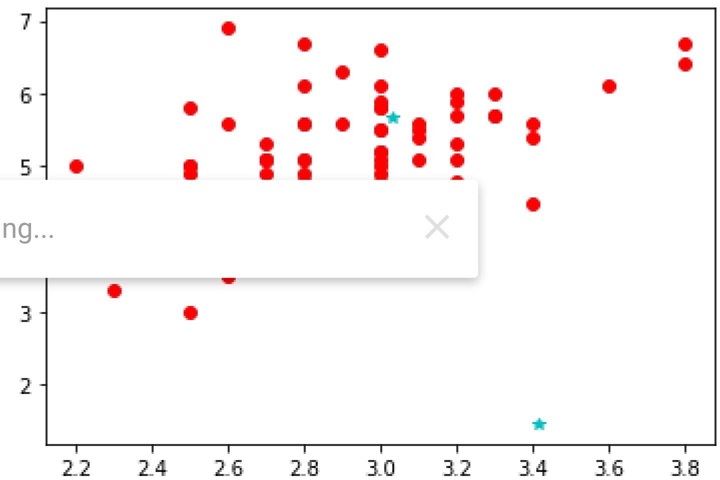
Saving...

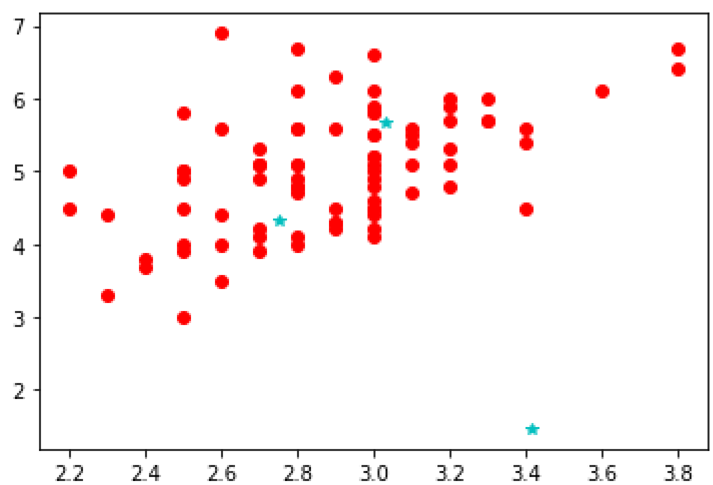

7
6
5
4
3
2
2.2
2.4
2.6
2.8
3.0
3.2
3.4
3.6
3.8

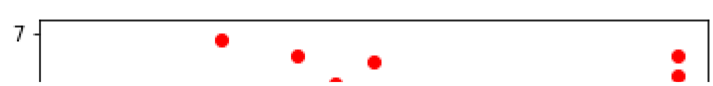

7

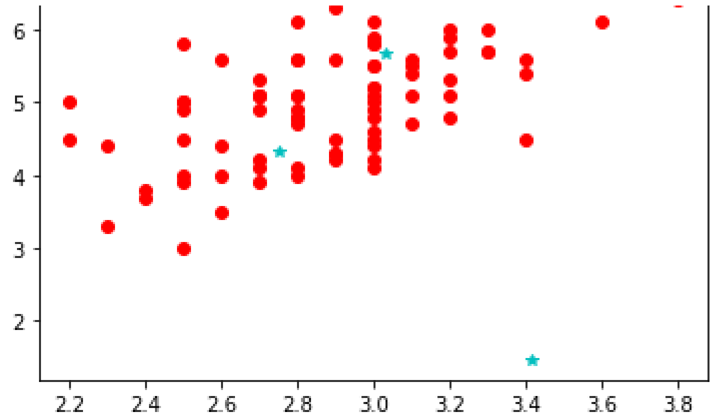

6
5
4
3
2
2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8

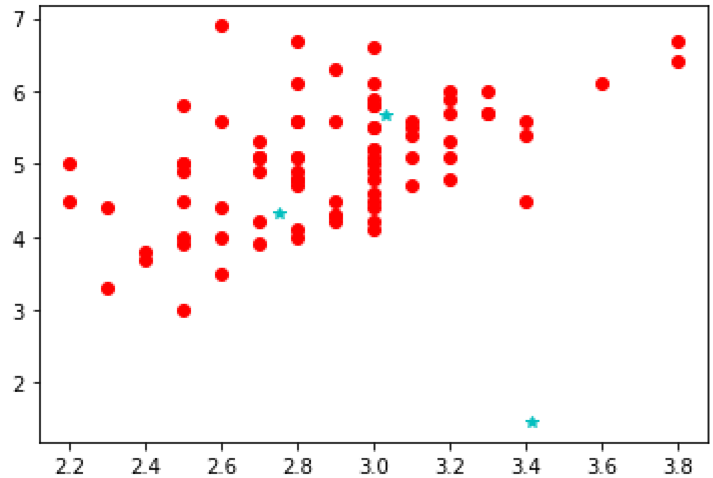

7
6
5
4
3
2
2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8

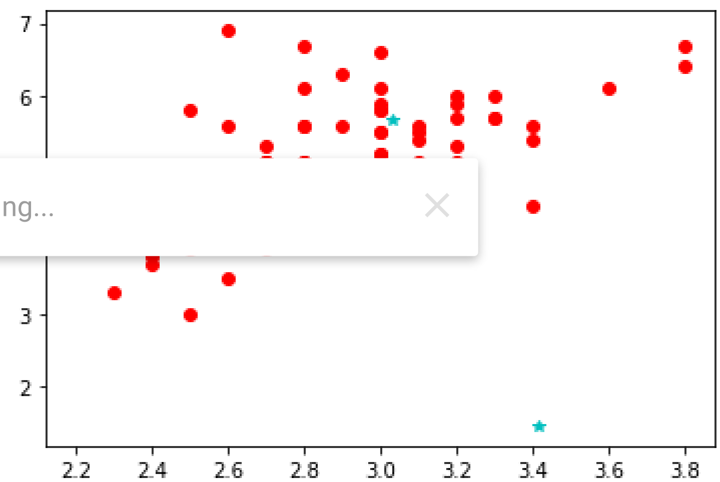

7
6
5
3
2
2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8


7
6
5
4
3
2
2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8

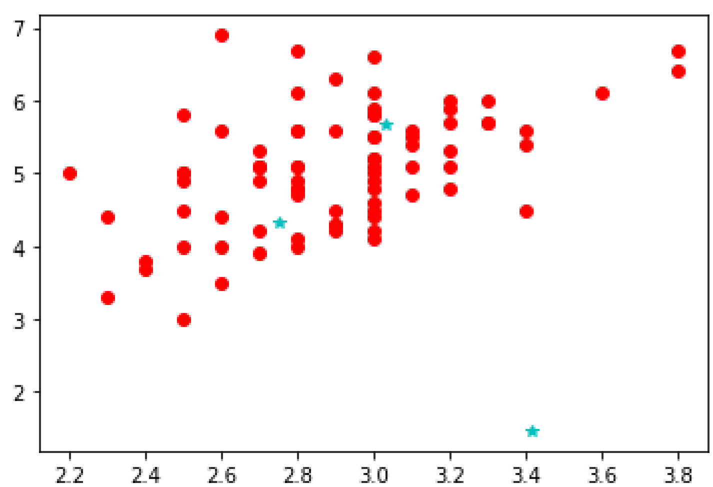

7

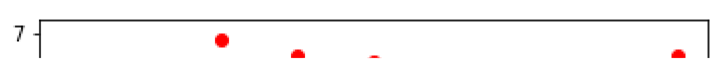

6
5
4
3
2
2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8

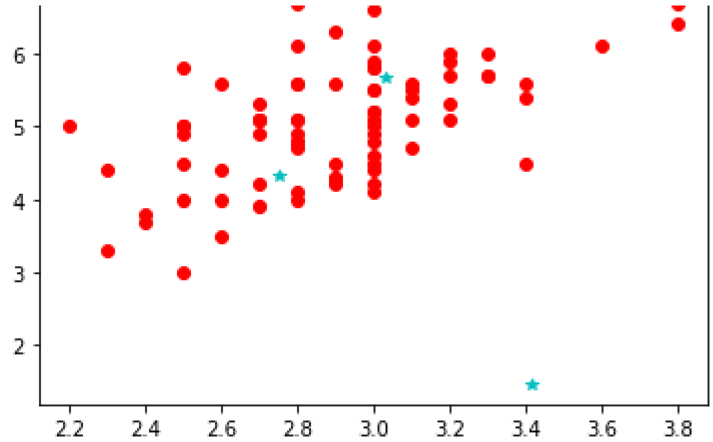

7
6
5
4
3
2
2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8

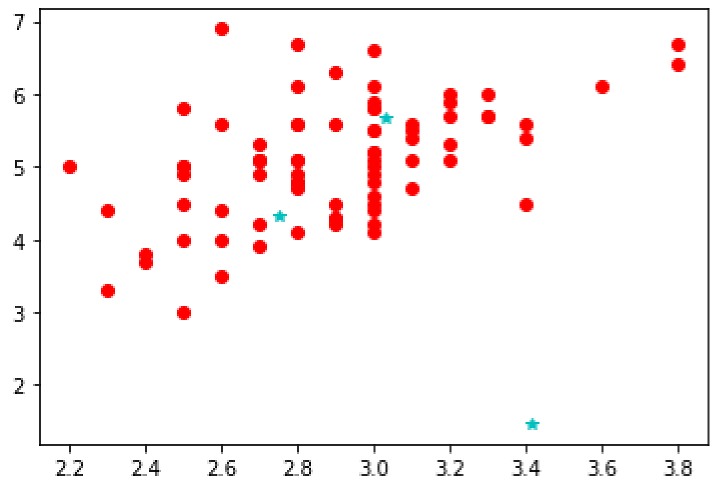

7
6
3
2
2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8

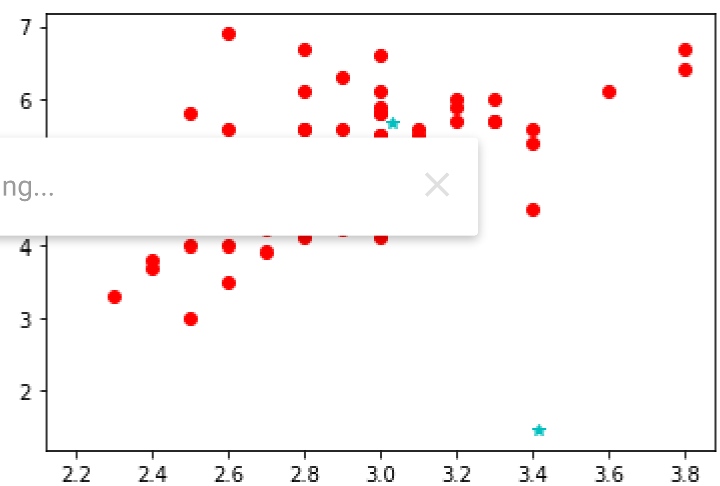
Saving...

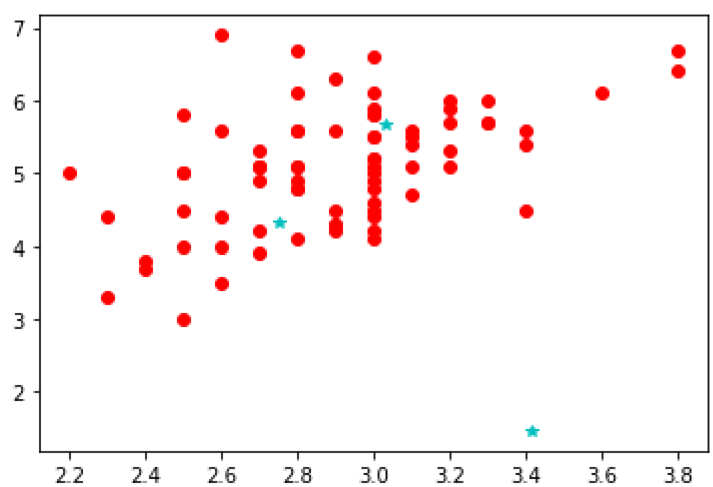

7
6
5
4
3
2
2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8

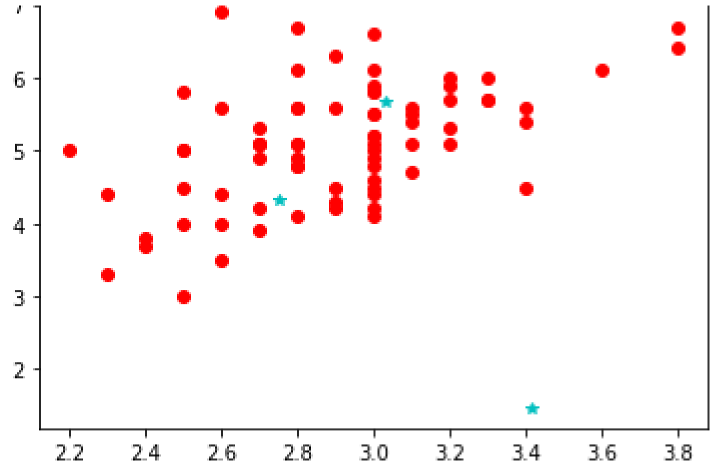

7

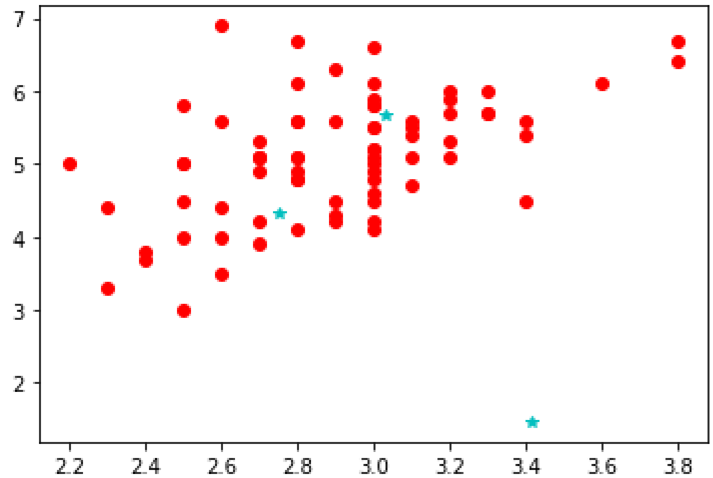

2
3
4
5
6
2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8

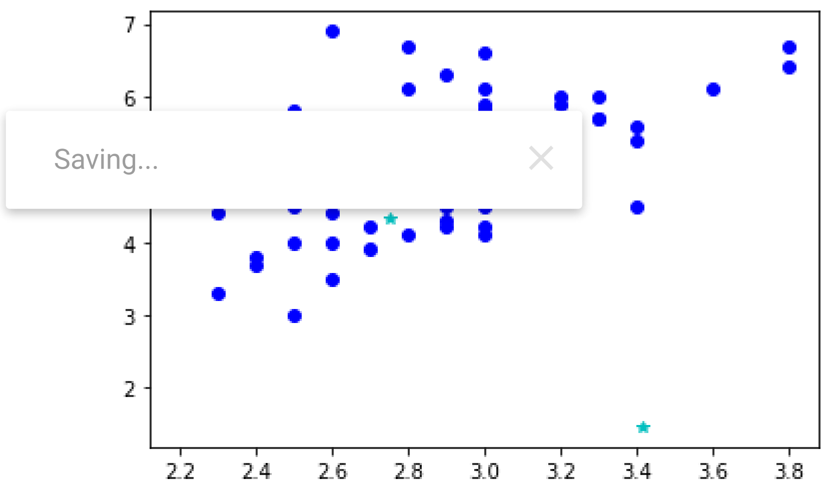

2
3
4
5
6
7
2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8

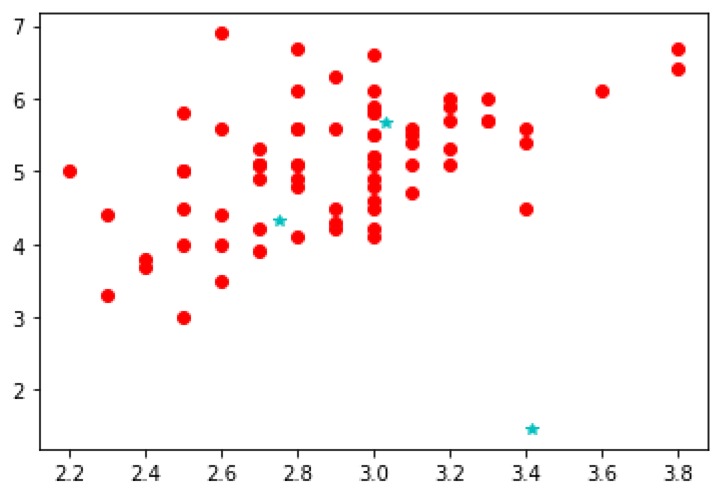

2
3
4
6
7
2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8

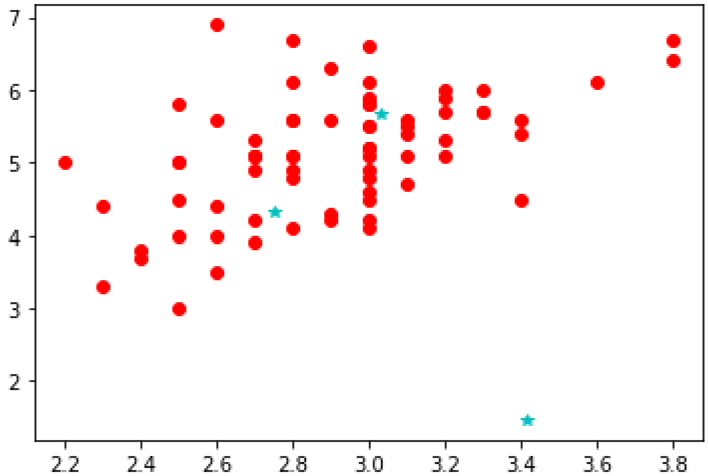

2
3
4
5
6
7
2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8

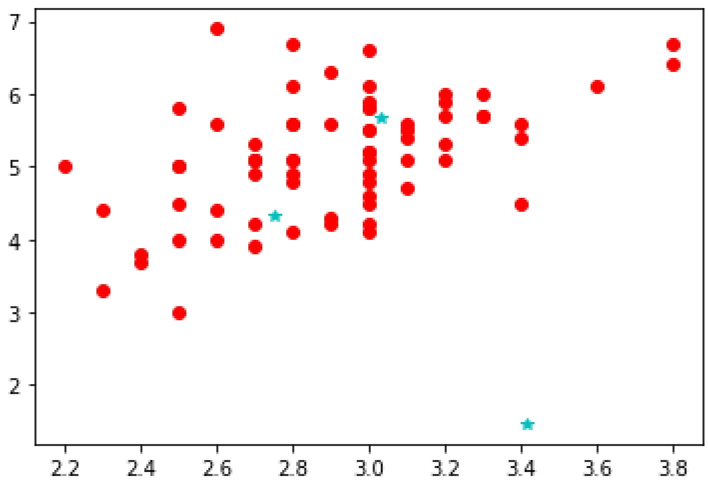


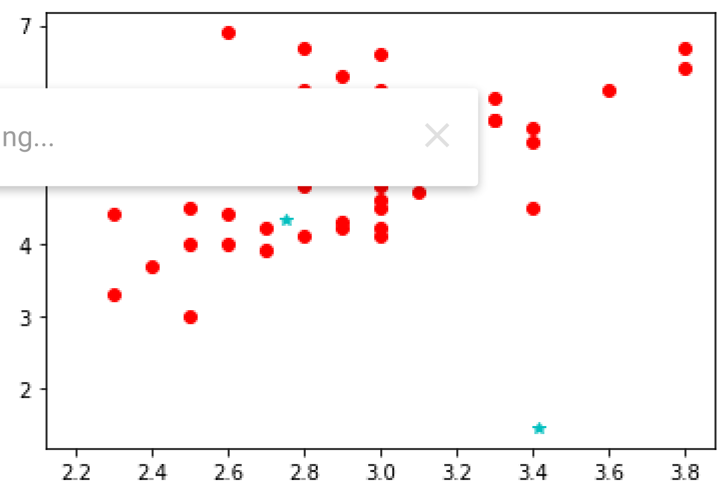



Saving...

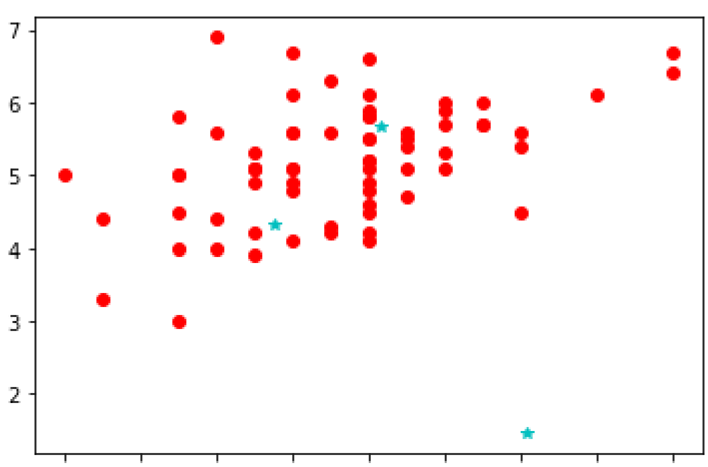


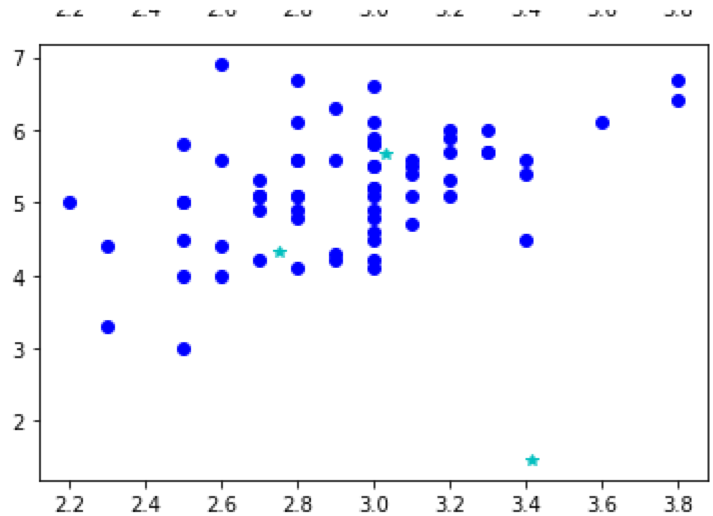

7
6
5
4
3
2
2.2
2.4
2.6
2.8
3.0
3.2
3.4
3.6
3.8

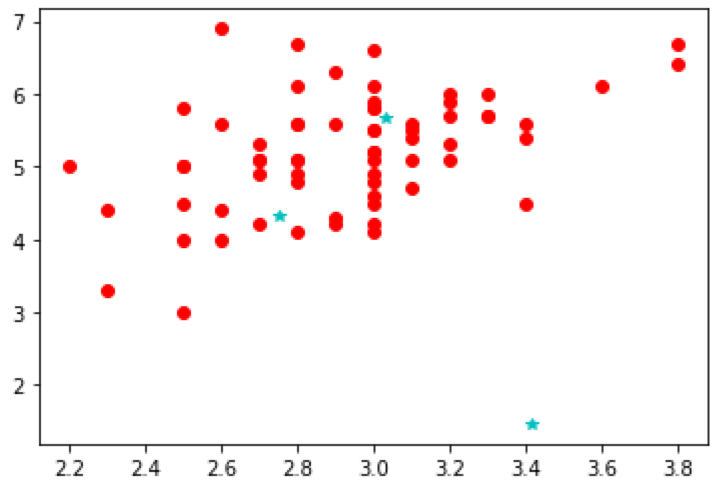

7
6
5
4
3
2
2.2
2.4
2.6
2.8
3.0
3.2
3.4
3.6
3.8

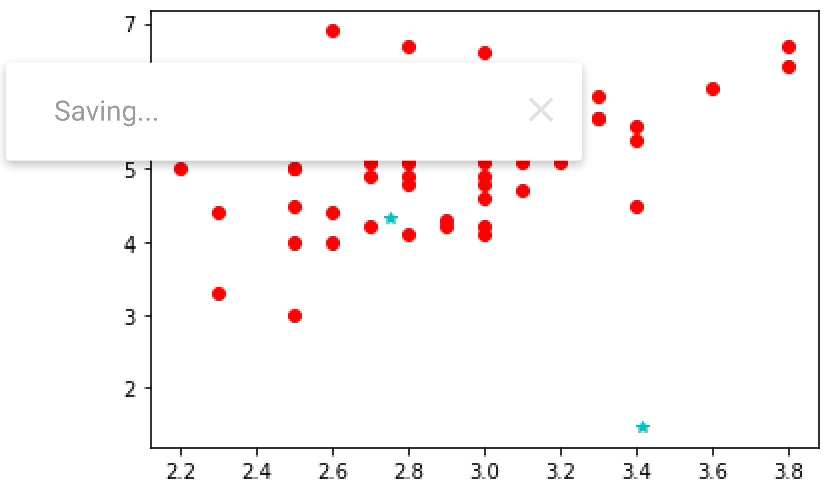

7
4
3
2
2.2
2.4
2.6
2.8
3.0
3.2
3.4
3.6
3.8

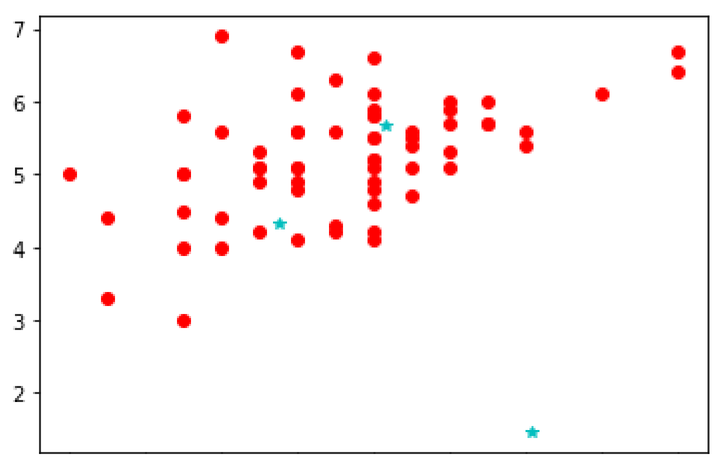
Saving...

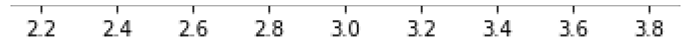

7
6
5
4
3
2

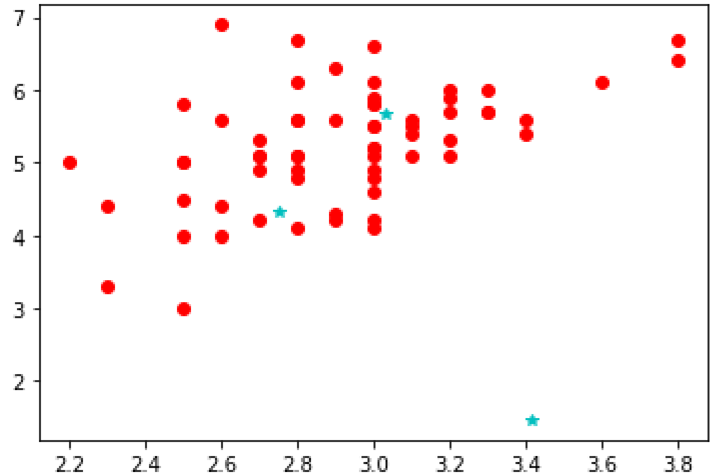

7
6
5
4
3
2
2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8

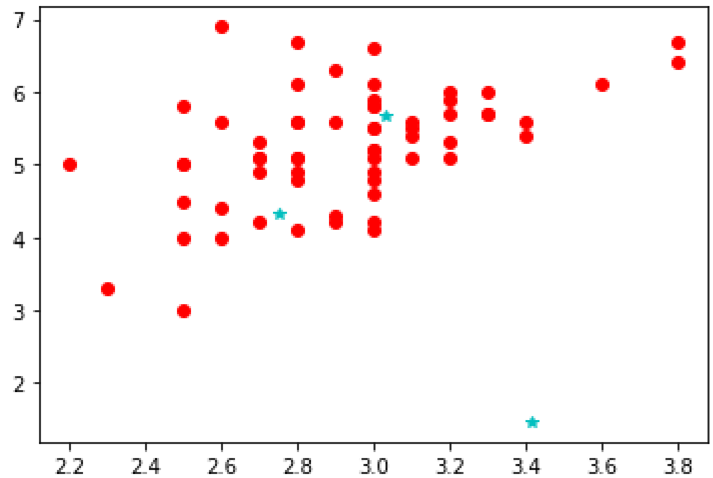

7
6
5
4
3
2
2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8


7
Saving...
5
4
3
2
2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8

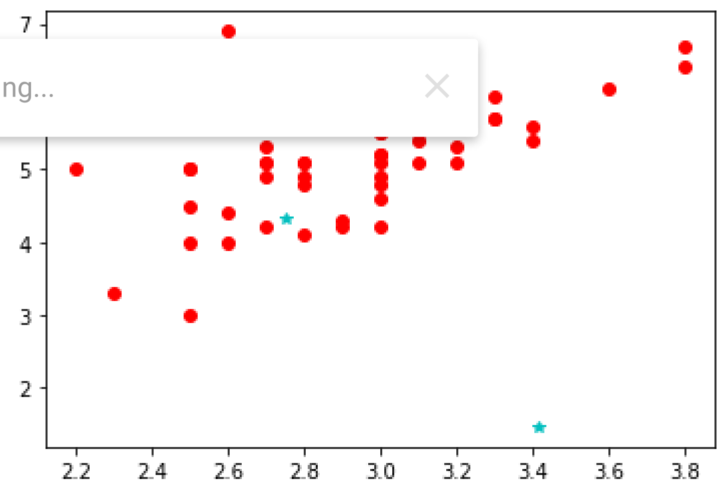

7
6
5
4
3
2

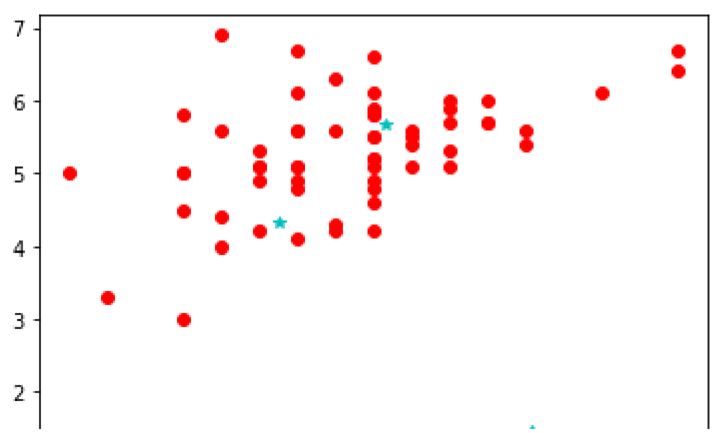

2.2
2.4
2.6
2.8
3.0
3.2
3.4
3.6
3.8

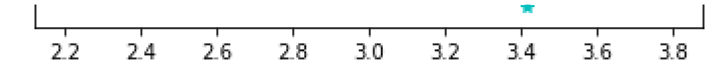

7
6
5
4
3
2
2.2
2.4
2.6
2.8
3.0
3.2
3.4
3.6
3.8

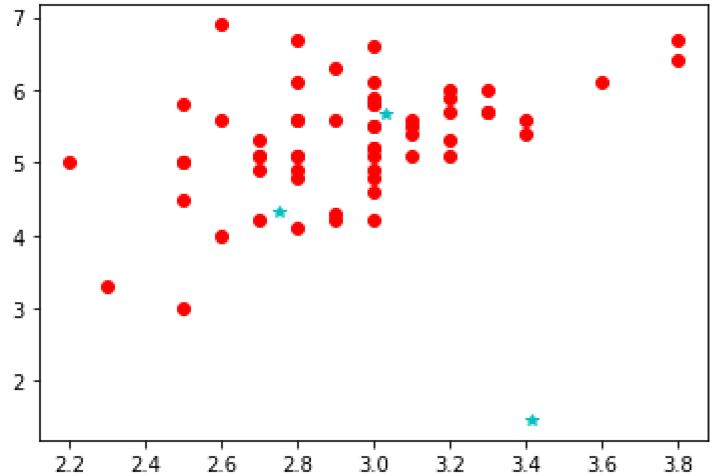

7
6
5
4
3
2
2.2
2.4
2.6
2.8
3.0
3.2
3.4
3.6
3.8

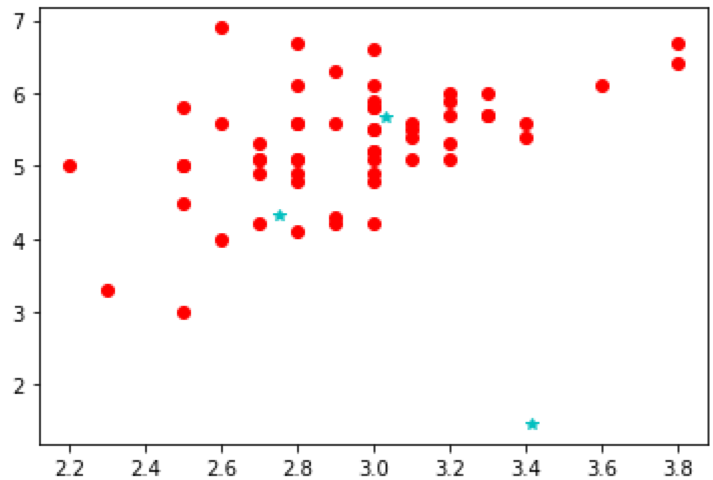
Saving...


7
5
4
3
2
2.2
2.4
2.6
2.8
3.0
3.2
3.4
3.6
3.8

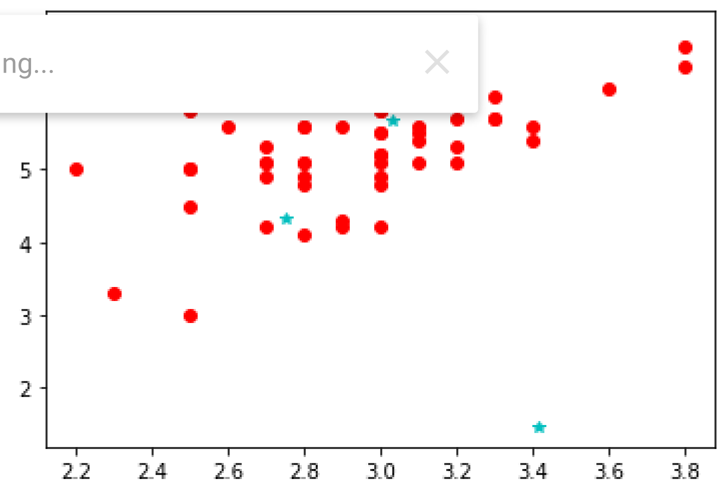

7
6
5
4
3
2

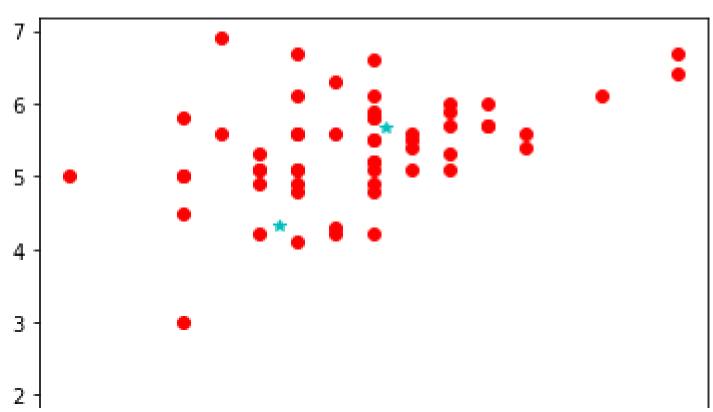

2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8

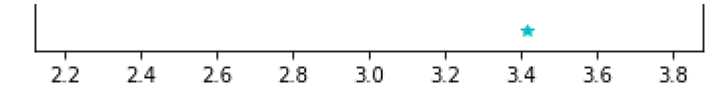

7
6
5
4
3
2
2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8

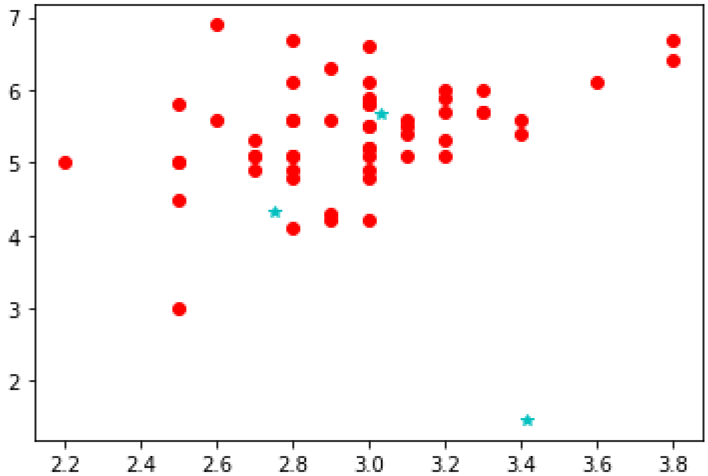

7
6
5
4
3
2
2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8

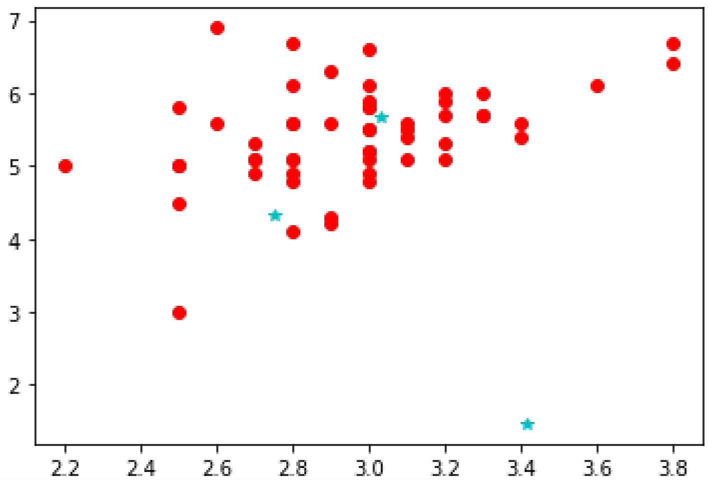
Saving...


5
4
3
2
2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8

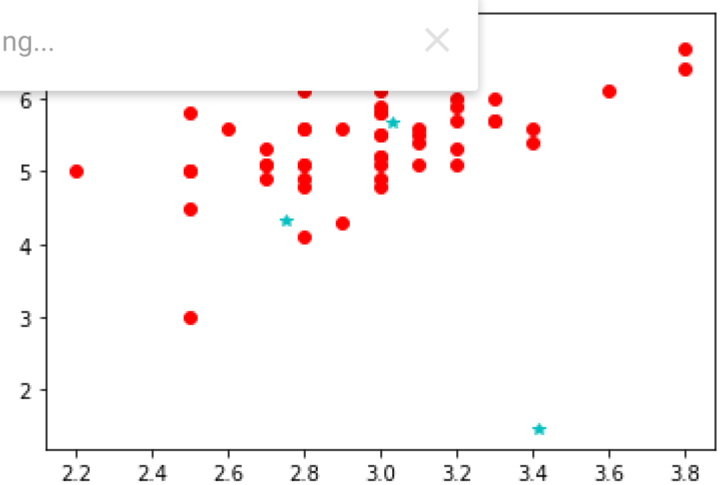

7
6
5
4
3
2

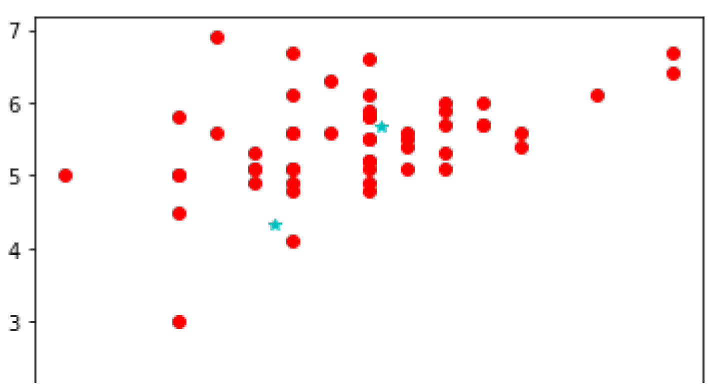

2.2
2.4
2.6
2.8
3.0
3.2
3.4
3.6
3.8

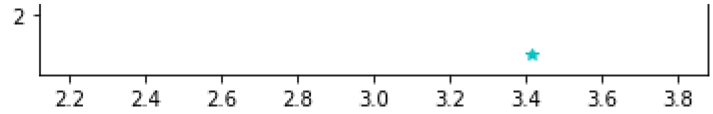

7
6
5
4
3
2
2.2
2.4
2.6
2.8
3.0
3.2
3.4
3.6
3.8

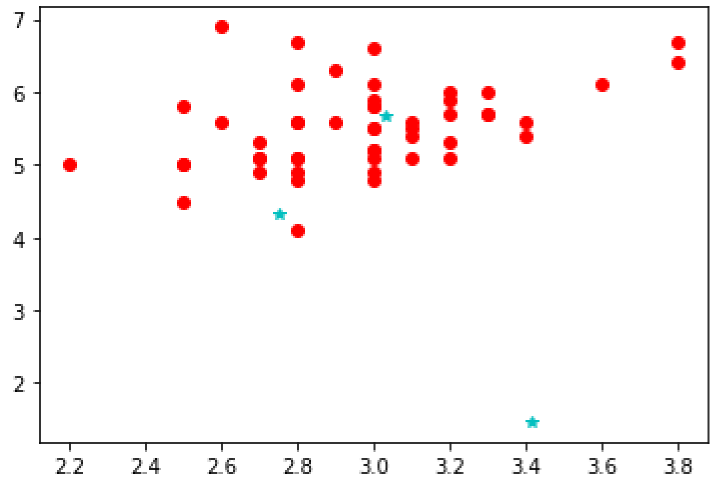

7
6
5
4
3
2
2.2
2.4
2.6
2.8
3.0
3.2
3.4
3.6
3.8

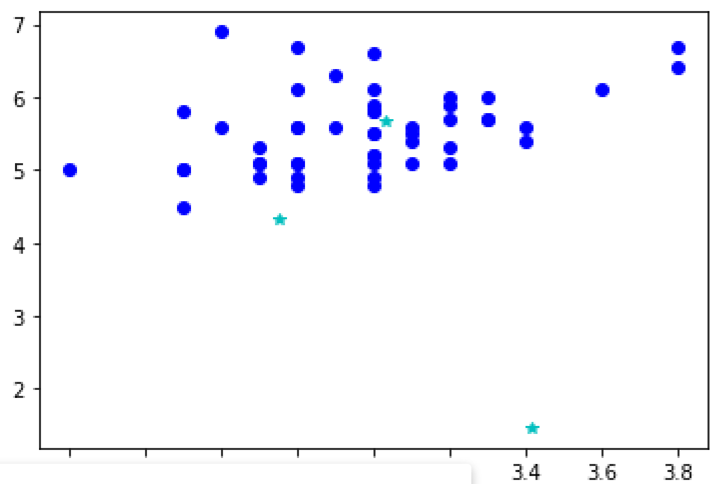
Saving...


6
5
4
3
2
2.2
2.4
2.6
2.8
3.0
3.2
3.4
3.6
3.8

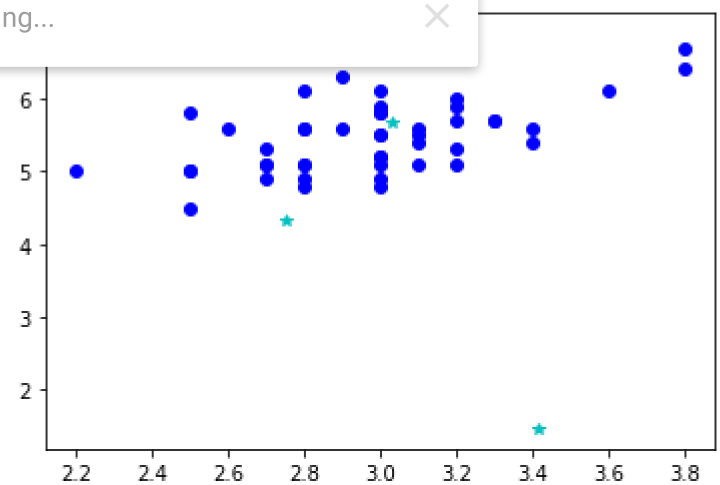

7
6
5
4
3

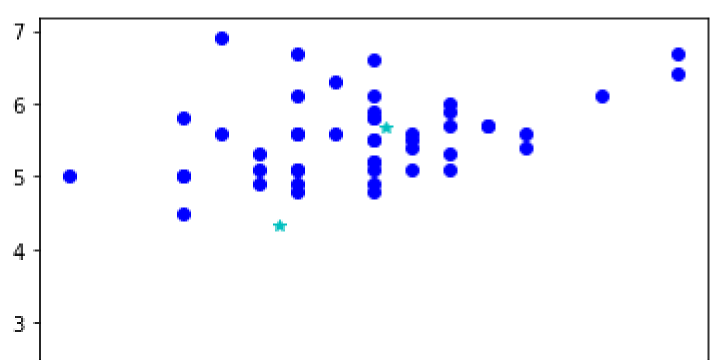

2
2.2
2.4
2.6
2.8
3.0
3.2
3.4
3.6
3.8

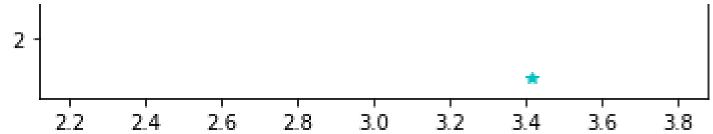

7
6
5
4
3
2
2.2
2.4
2.6
2.8
3.0
3.2
3.4
3.6
3.8

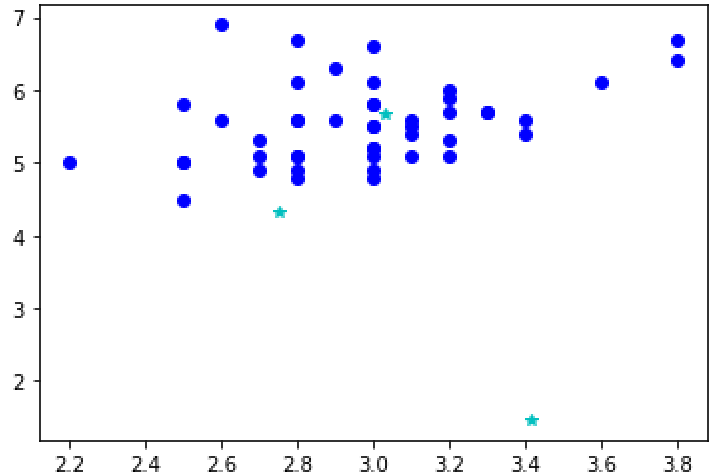

7
6
5
4
3
2
3.4
3.6
3.8

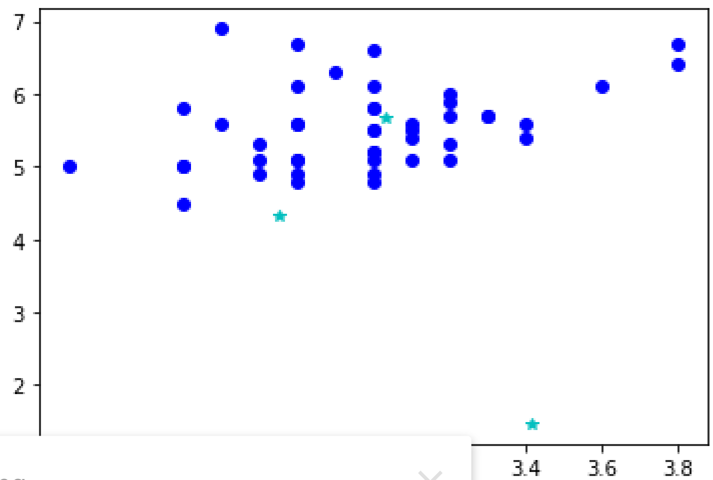
Saving...


6
5
4
3
2
2.2
2.4
2.6
2.8
3.0
3.2
3.4
3.6
3.8

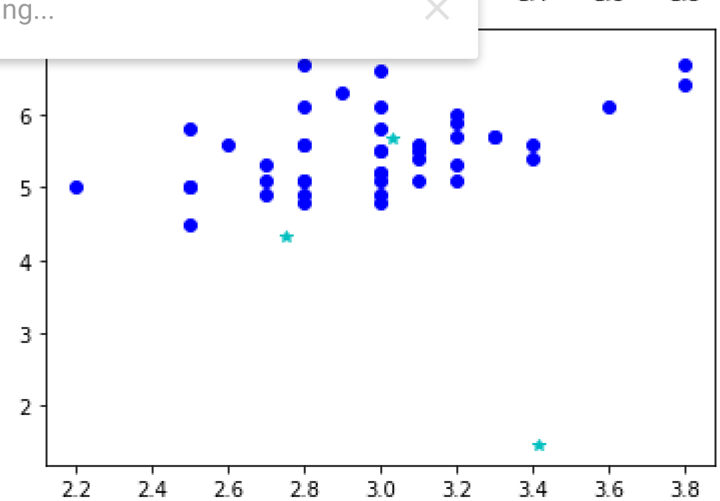

7
6
5
4
3

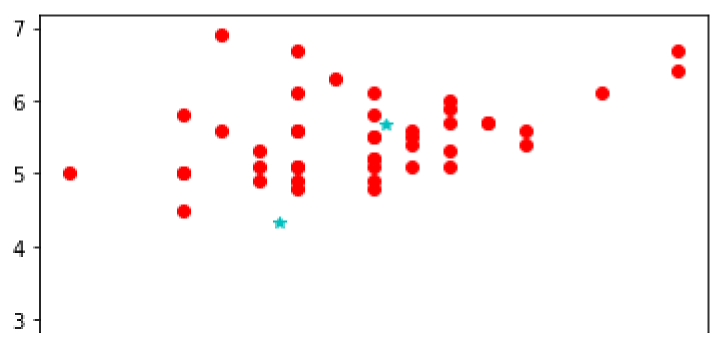

2
2.2
2.4
2.6
2.8
3.0
3.2
3.4
3.6
3.8

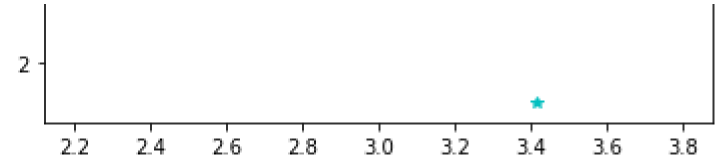

7
6
5
4
3
2
2.2
2.4
2.6
2.8
3.0
3.2
3.4
3.6
3.8

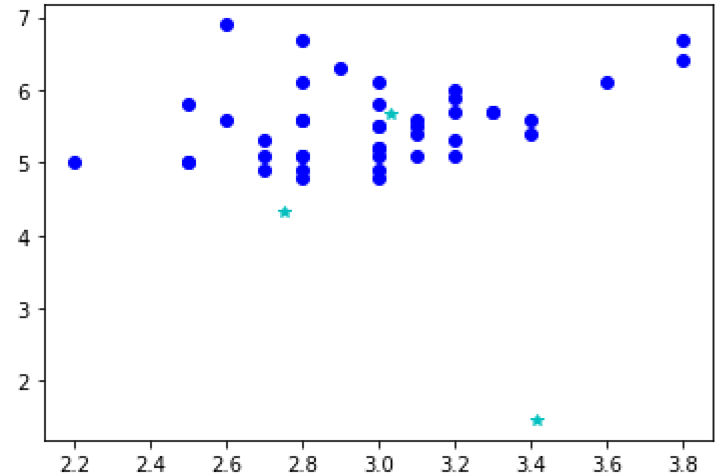

7
6
5
4
3
2
3.4
3.6
3.8

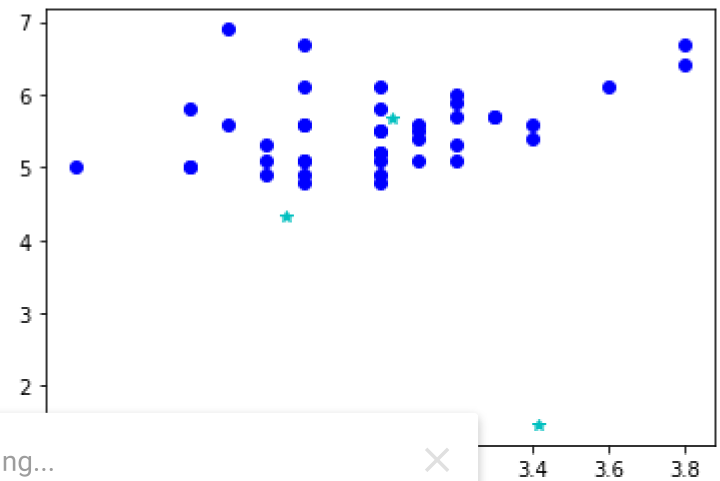
Saving...

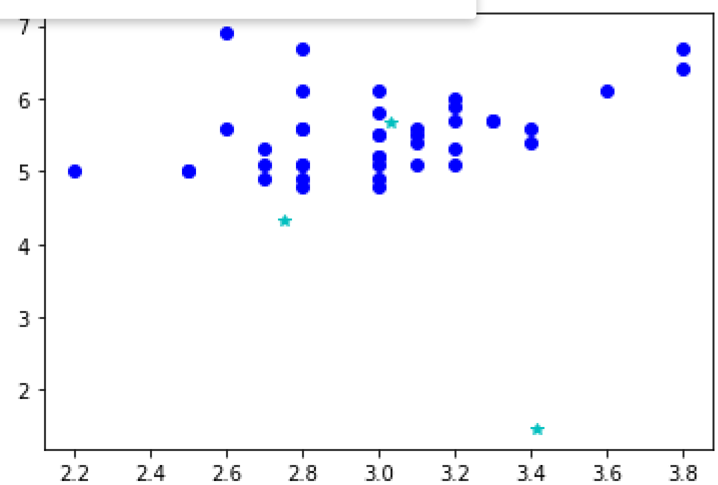

6
5
4
3
2
2.2
2.4
2.6
2.8
3.0
3.2
3.4
3.6
3.8

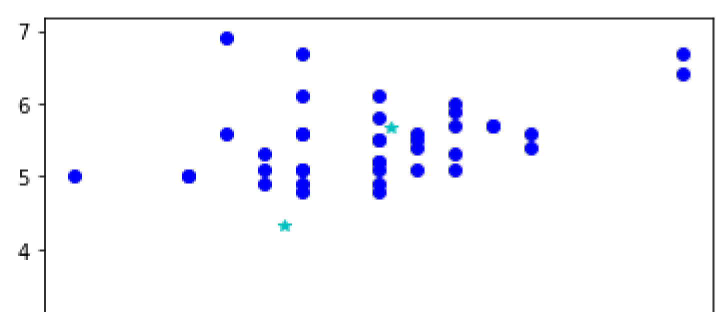

7
6
5
4
3

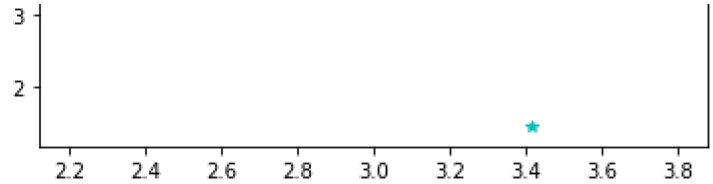

2
2.2
2.4
2.6
2.8
3.0
3.2
3.4
3.6
3.8

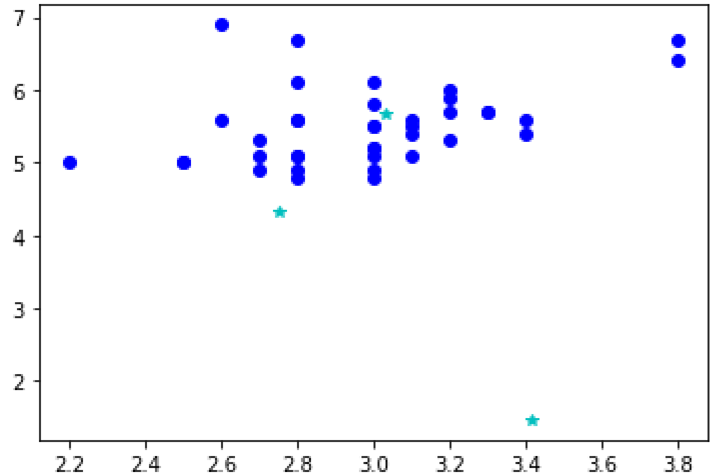

7
6
5
4
3
2
2.2
2.4
2.6
2.8
3.0
3.2
3.4
3.6
3.8

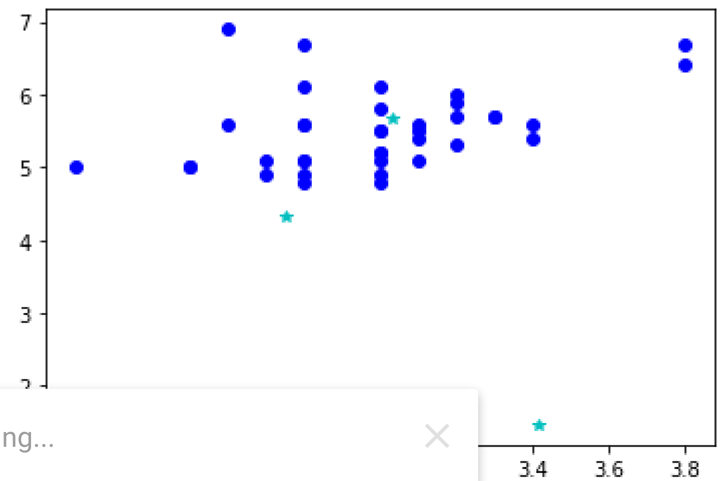

7
6
5
4
3
2
3.4
3.6
3.8


7
6
5
4
3
2
2.2
2.4
2.6
2.8
3.0
3.2
3.4
3.6
3.8

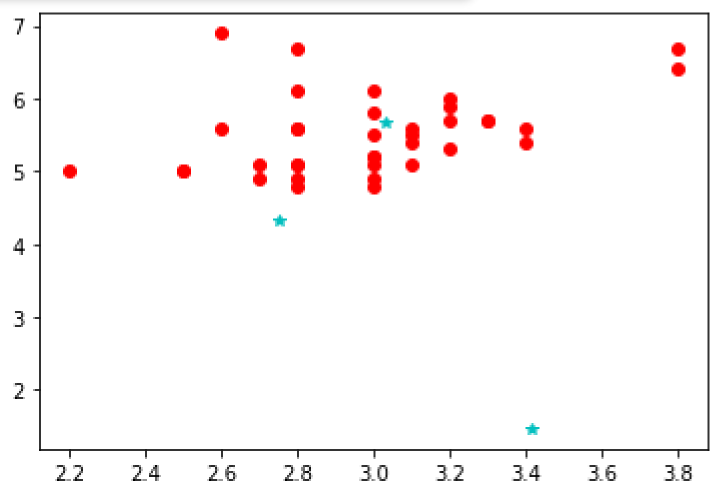

7
6
5
4

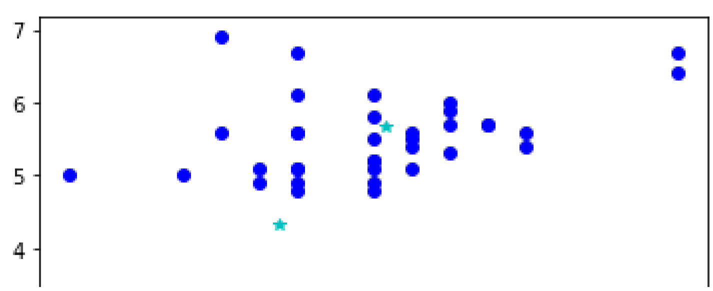

3
2
2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8

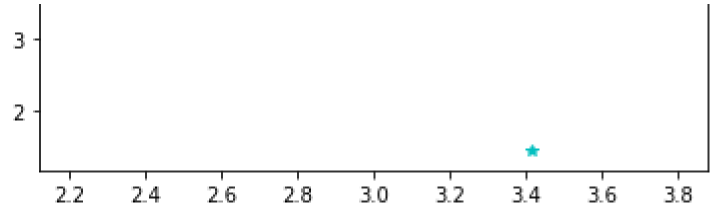

7
6
5
4
3
2
2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8

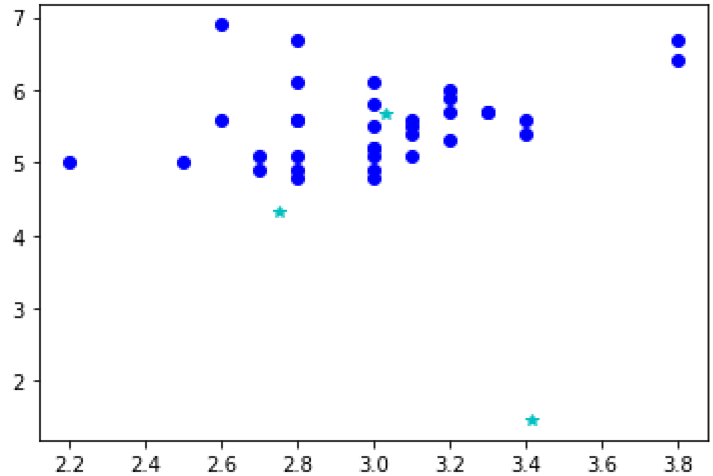

7
6
5
4
3
2
3.4 3.6 3.8

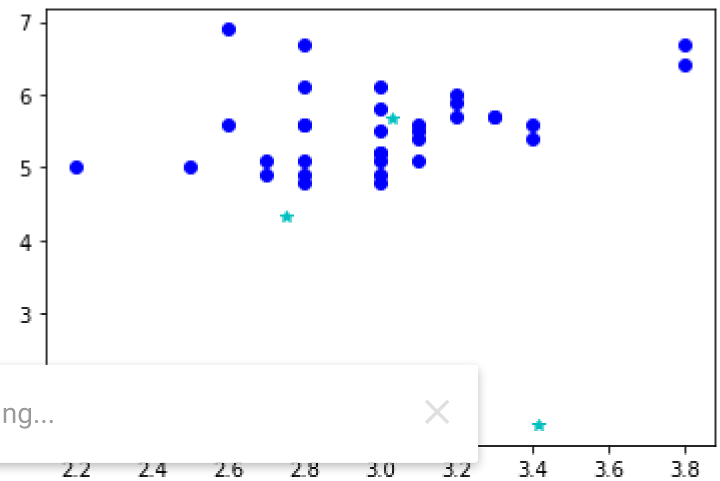
Saving...


7
6
5
4
3
2
2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8

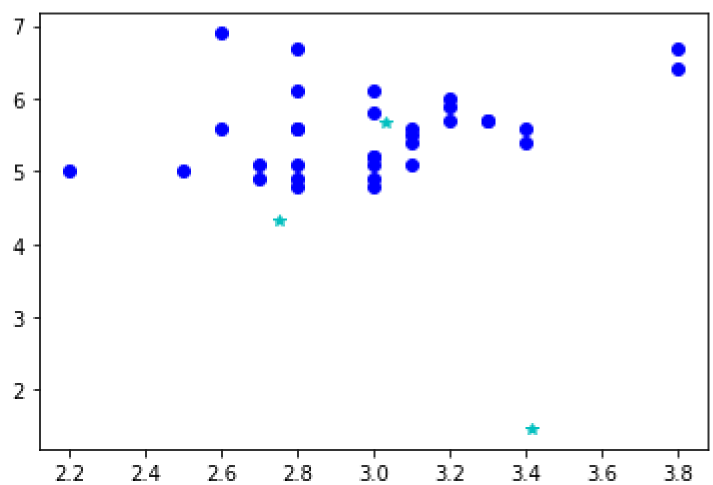

7
6
5
4

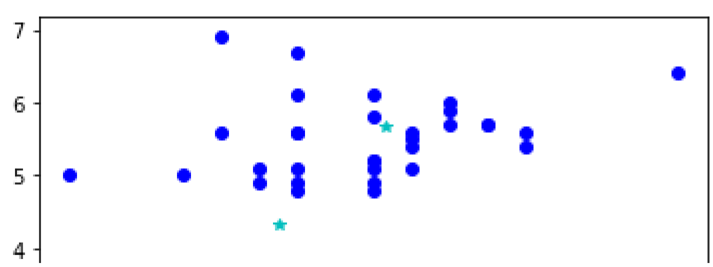


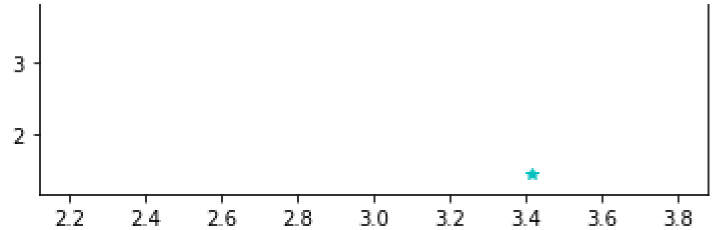


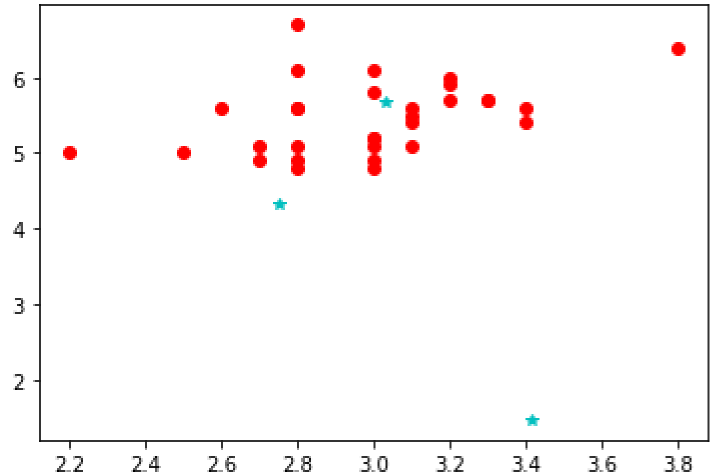


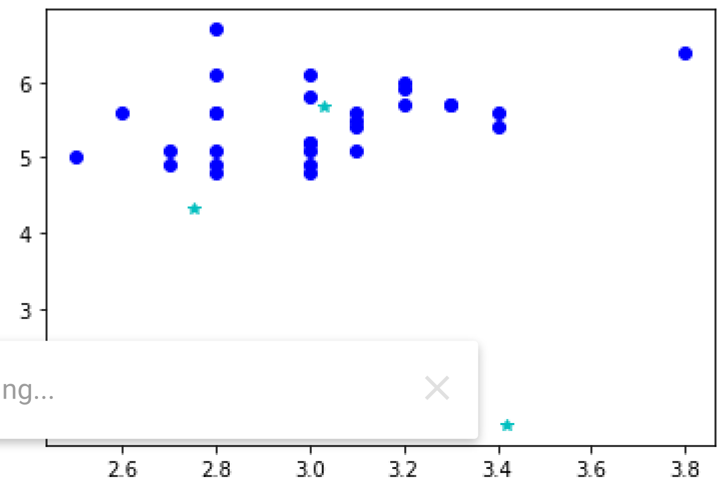
Saving...



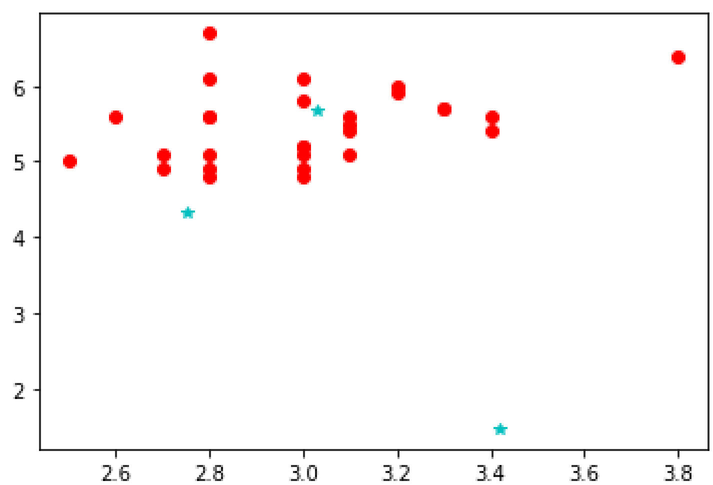


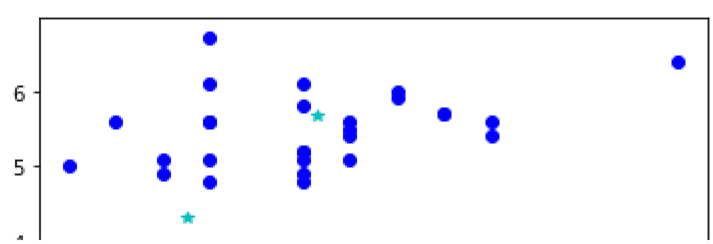

3
2
2.2
2.4
2.6
2.8
3.0
3.2
3.4
3.6
3.8

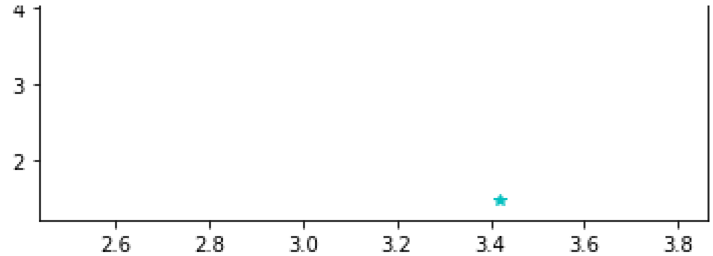

6
5
4
3
2
2.2
2.4
2.6
2.8
3.0
3.2
3.4
3.6
3.8

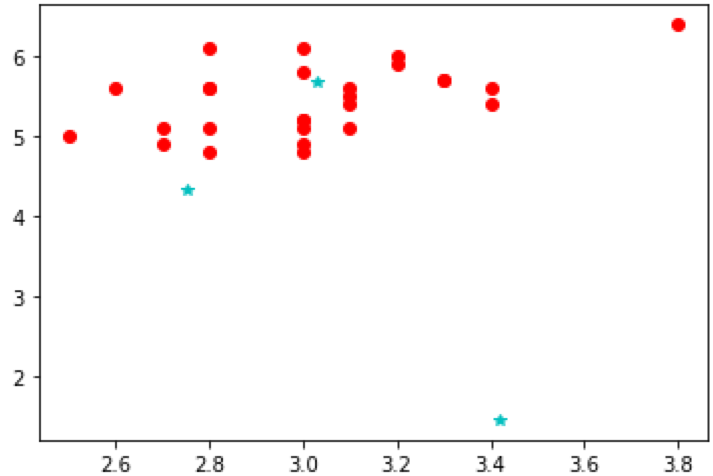

6
5
4
3
2.6
2.8
3.0
3.2
3.4
3.6
3.8

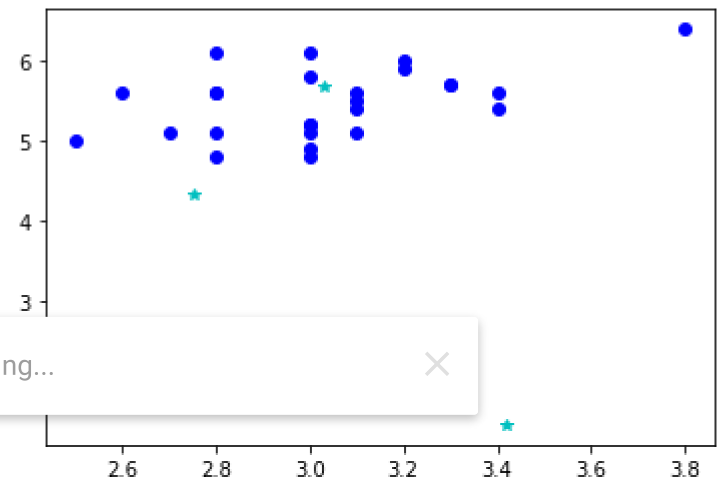
Saving...


6
5
4
3
2
2.6
2.8
3.0
3.2
3.4
3.6
3.8

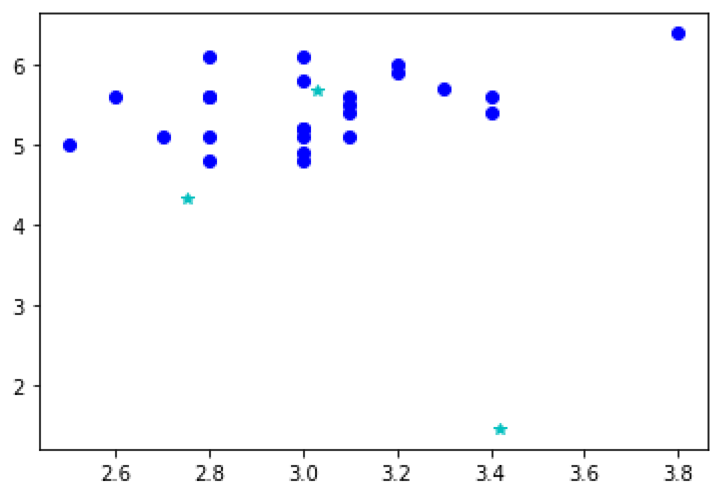

6
5

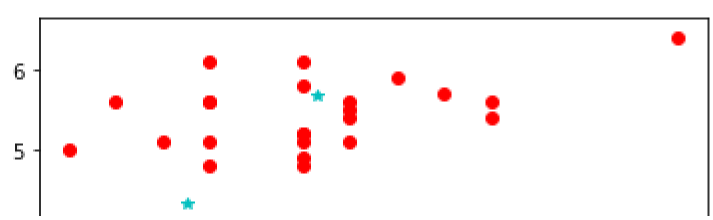

4
3
2
2.6 2.8 3.0 3.2 3.4 3.6 3.8

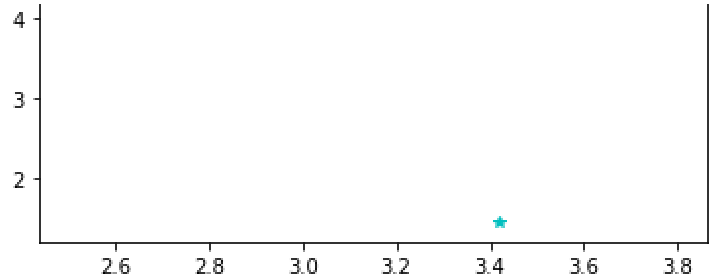

6
5
4
3
2
2.6 2.8 3.0 3.2 3.4 3.6 3.8

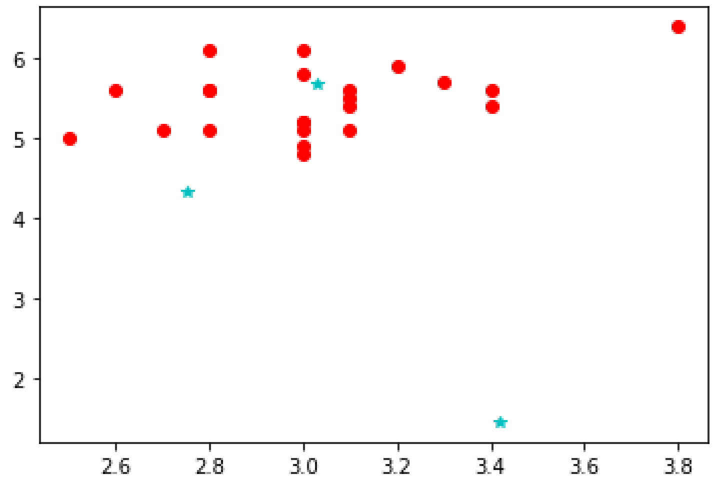

6
5
4
3
2.6 2.8 3.0 3.2 3.4 3.6 3.8

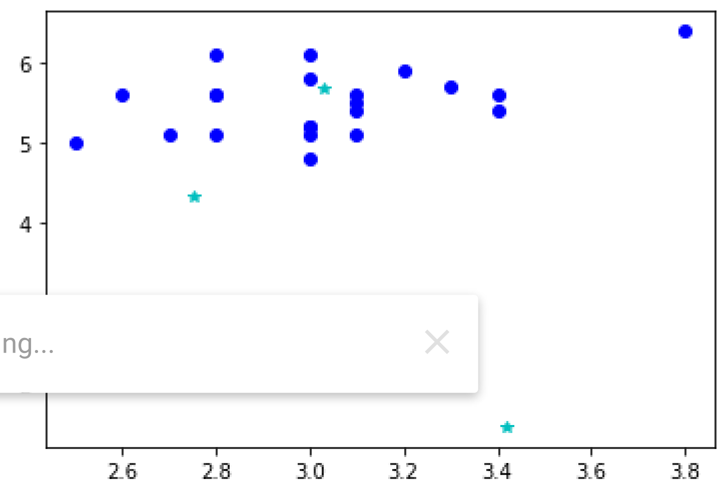
Saving...


6
5
4
3
2
2.6 2.8 3.0 3.2 3.4 3.6 3.8

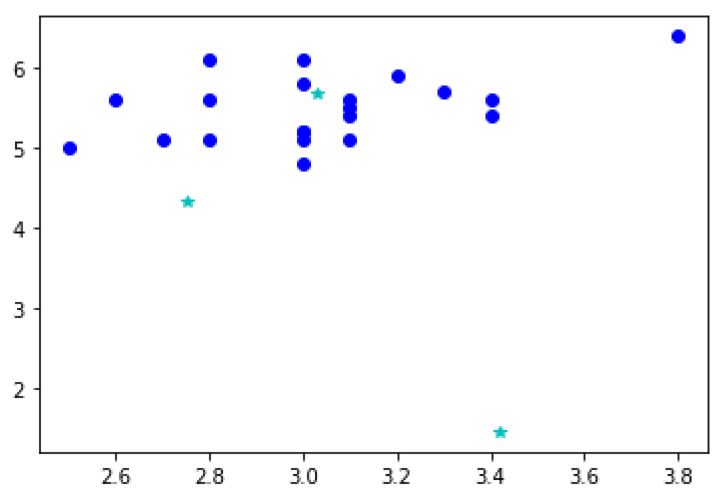

6
5

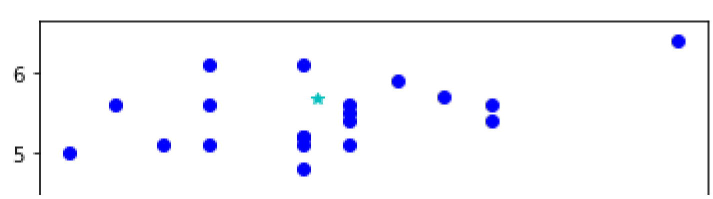

4
3
2
2.6 2.8 3.0 3.2 3.4 3.6 3.8

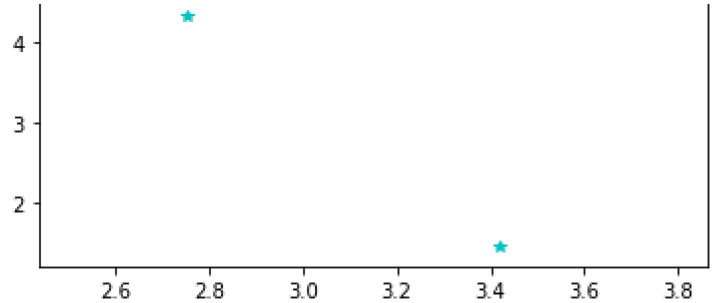

6
5
4
3
2
2.6 2.8 3.0 3.2 3.4 3.6 3.8

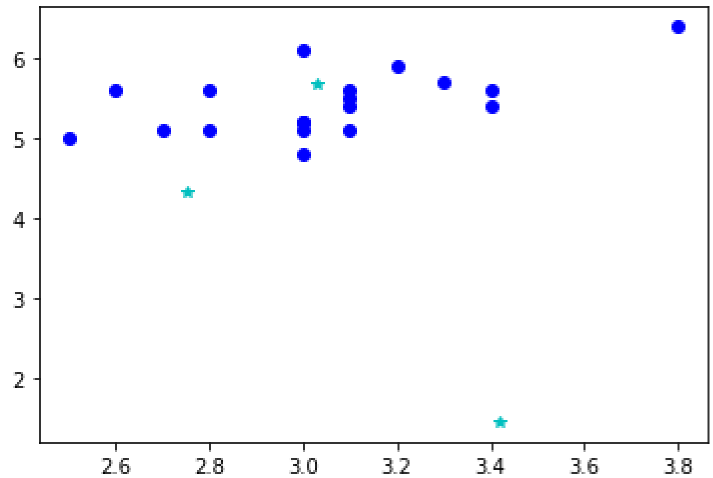

6
5
4
2.6 2.8 3.0 3.2 3.4 3.6 3.8

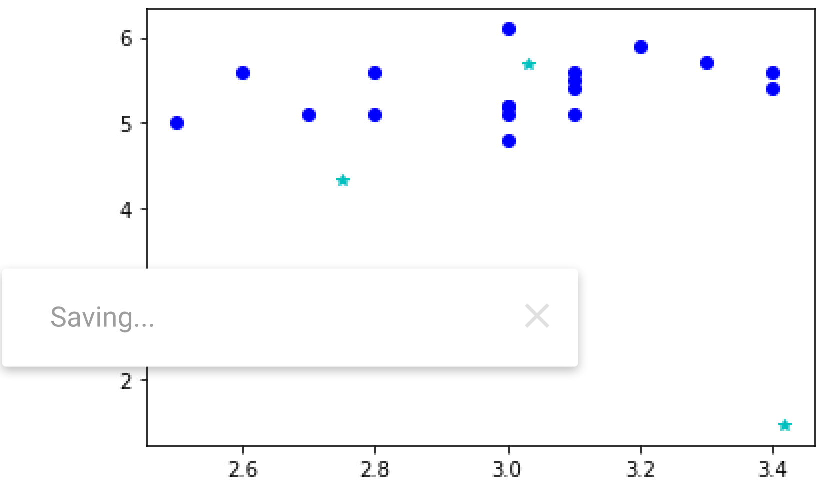
Saving...

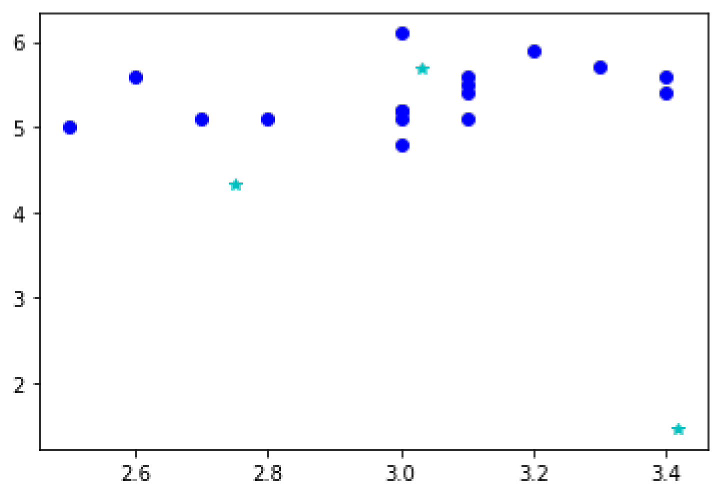

6
5
4
3
2
2.6 2.8 3.0 3.2 3.4 3.6 3.8

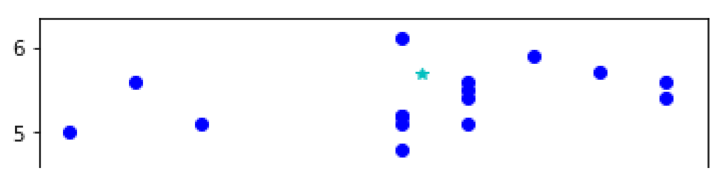

6
5

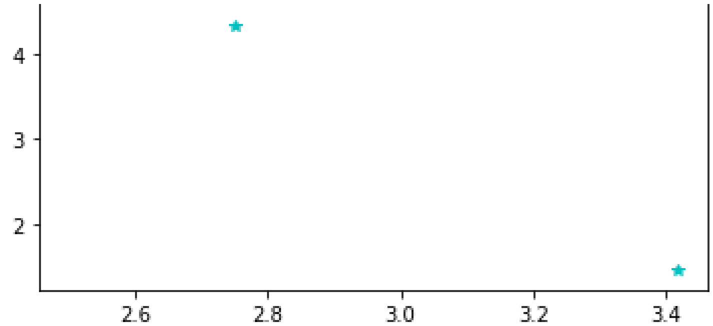

4
3
2
2.6 2.8 3.0 3.2 3.4 3.6 3.8

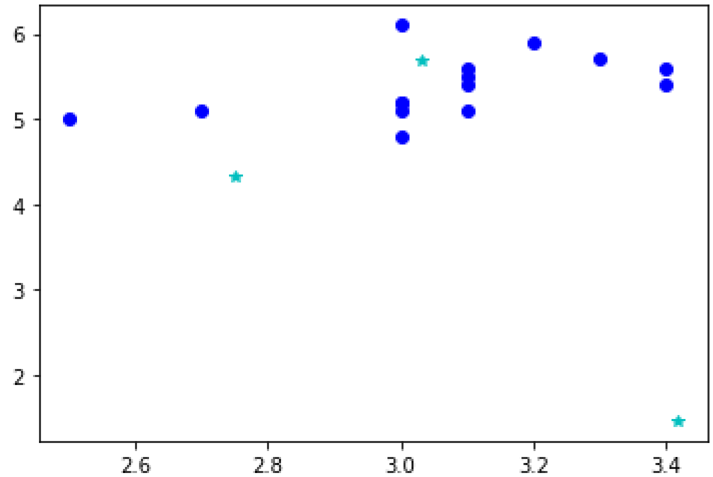

6
5
4
3
2
2.6 2.8 3.0 3.2 3.4 3.6 3.8

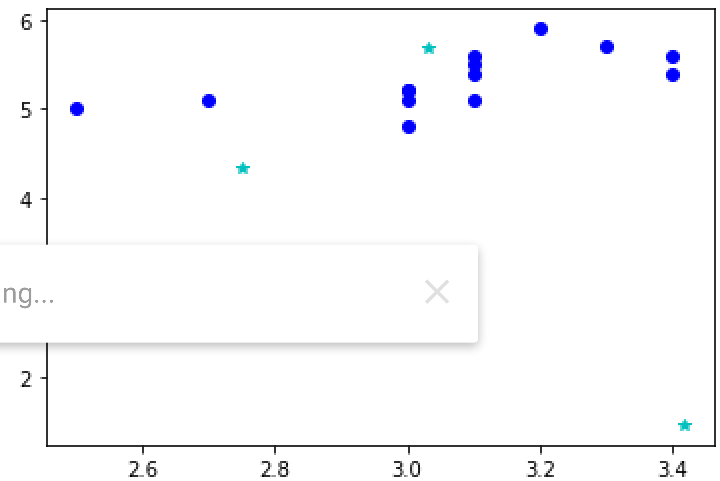

6
5
4
Saving...
2
2.6 2.8 3.0 3.2 3.4

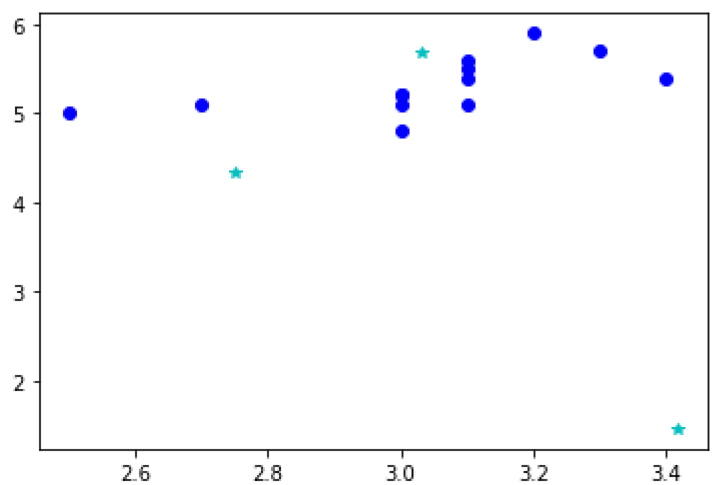

6
5
4
3
2
2.6 2.8 3.0 3.2 3.4

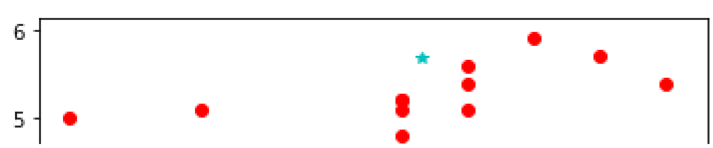

6
5

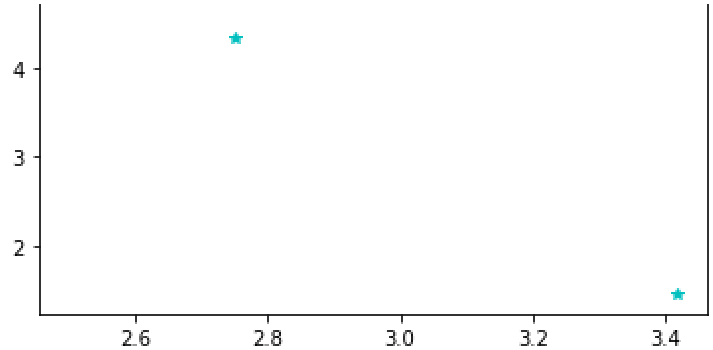

4
3
2
2.6 2.8 3.0 3.2 3.4

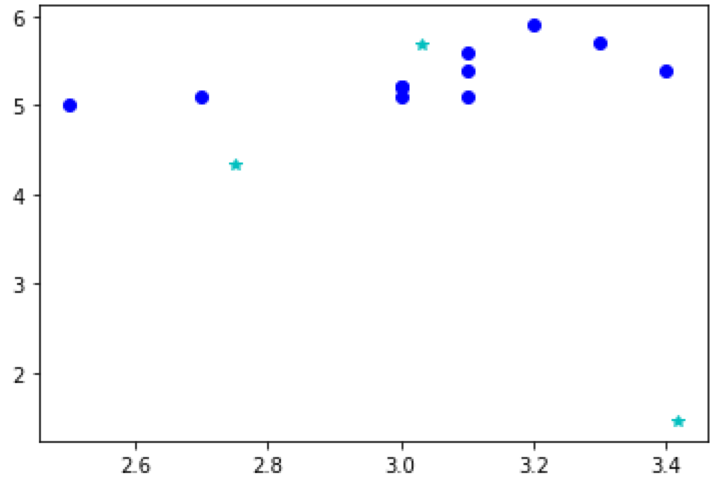

6
5
4
3
2
2.6 2.8 3.0 3.2 3.4

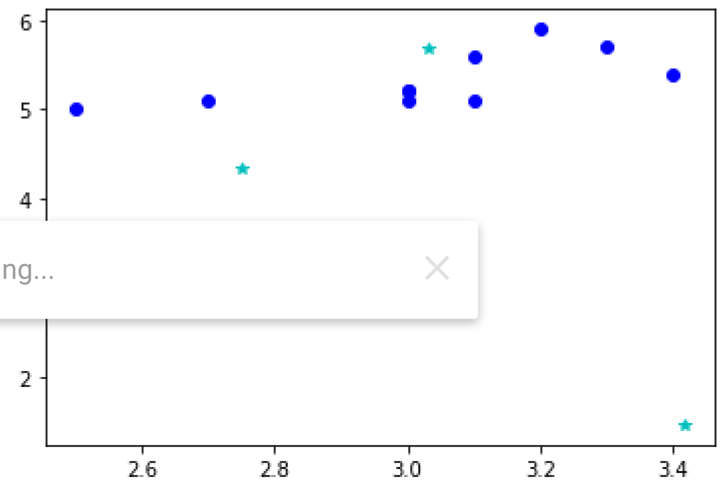

6
5
4
2
2.6 2.8 3.0 3.2 3.4


6
5
4
3
2
2.6 2.8 3.0 3.2 3.4

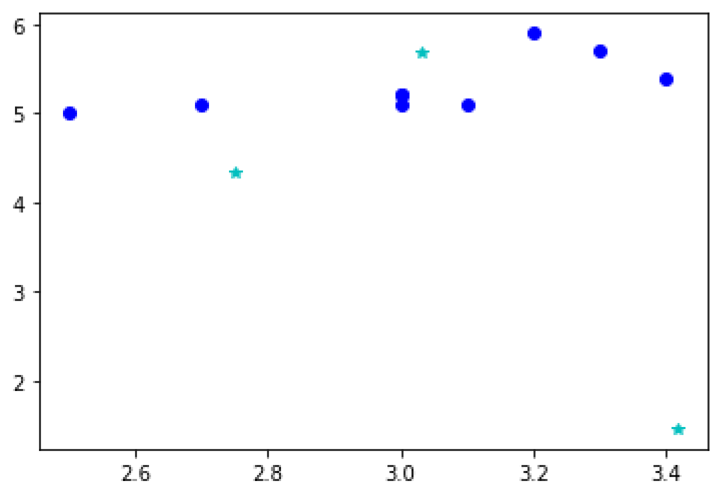

6
5

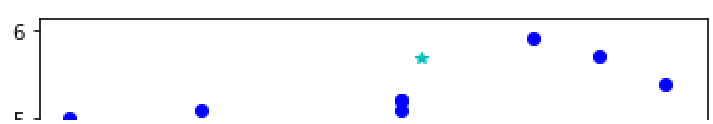

4
3
2
2.6 2.8 3.0 3.2 3.4

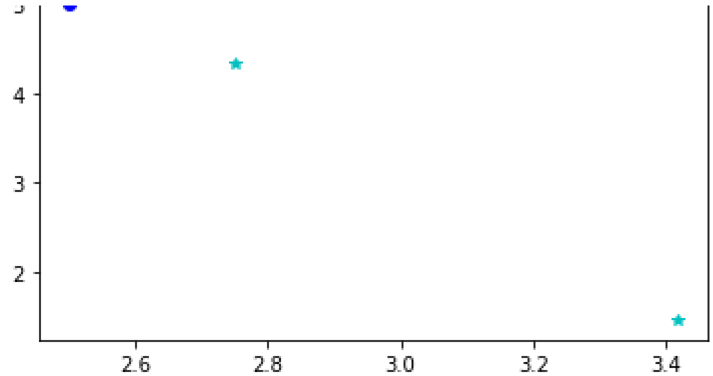

6
5
4
3
2
2.6 2.8 3.0 3.2 3.4

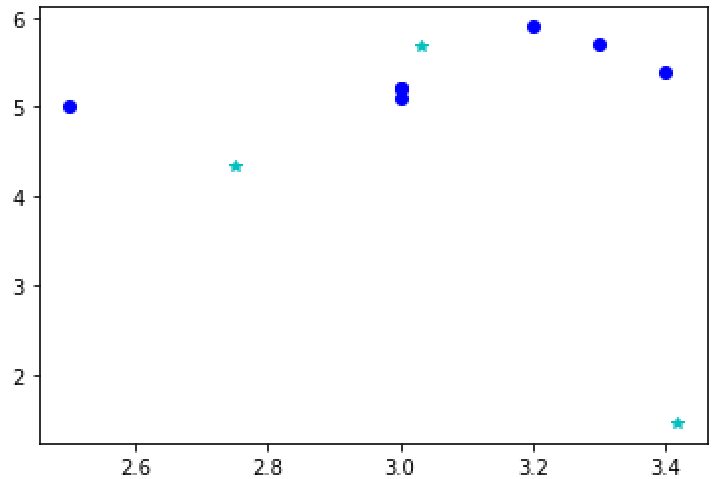

6
5
4
2
2.6 2.8 3.0 3.2 3.4

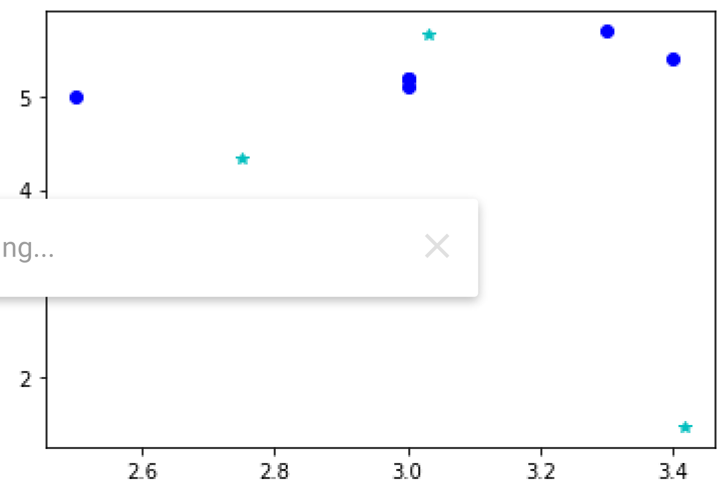
Saving...


6
5
4
3
2
2.6 2.8 3.0 3.2 3.4

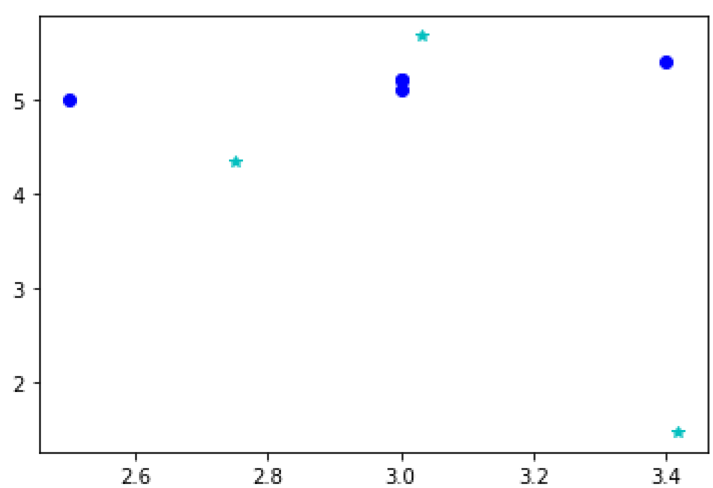

6

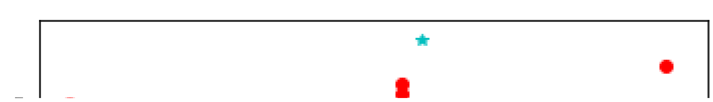






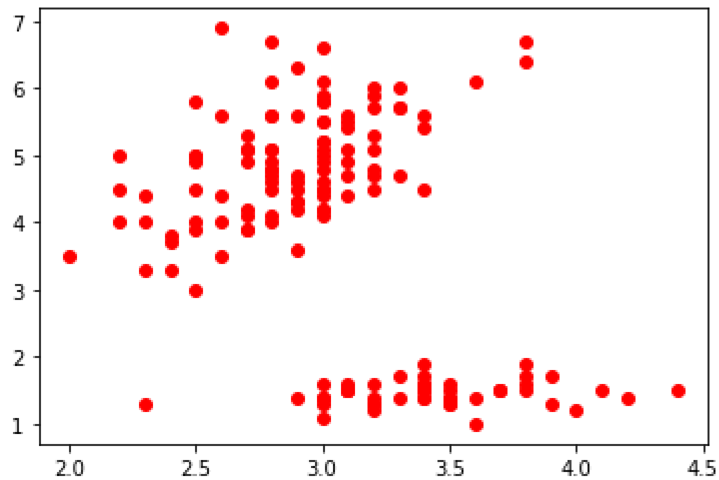
Saving...

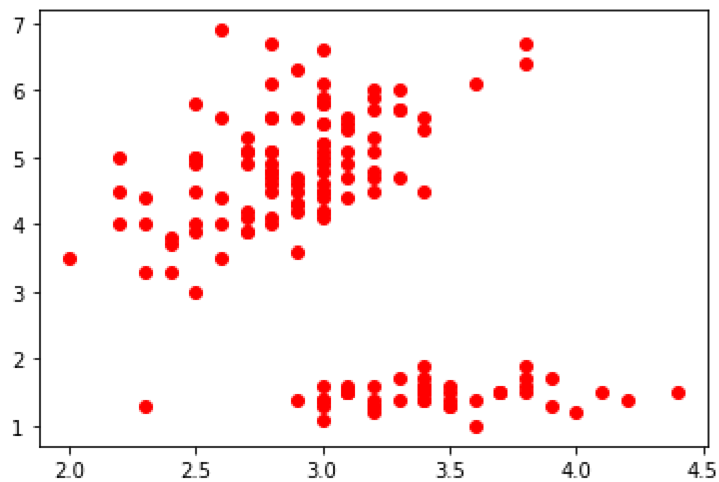


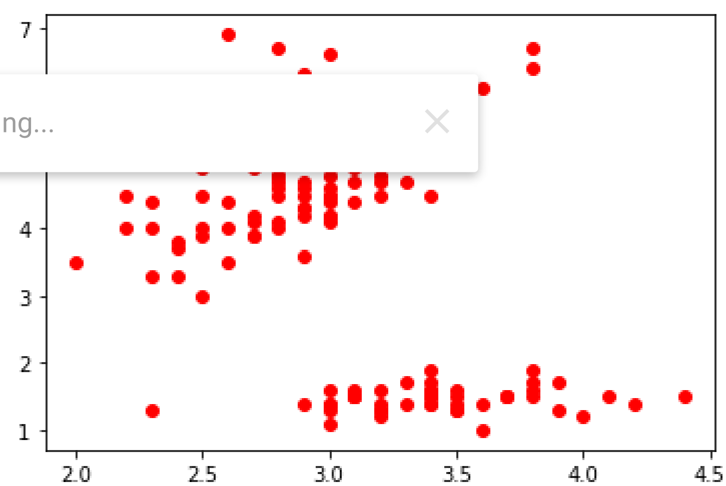


Clustering using Hierarchical Clustering Algorithm

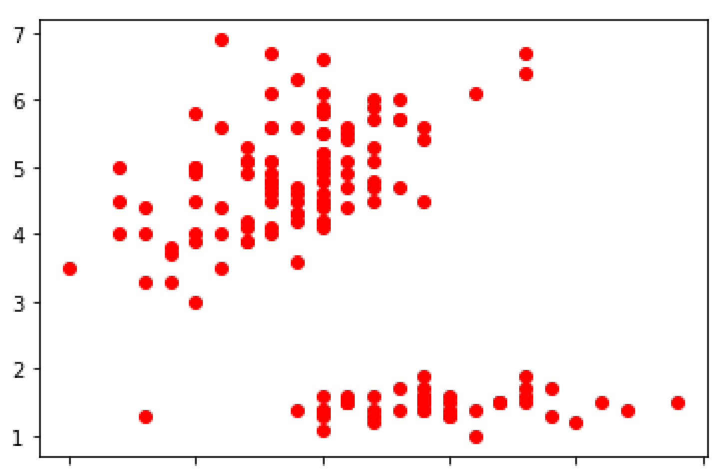
```
estimate2 = hierarchical.AgglomerativeClustering(n_clusters=3)
estimate2.fit(iris.values[:,1:3])

for i in range(150):
  if estimate2.labels_[i]==0:
    plt.plot(iris.values[i:,1],iris.values[i:,2],'go')
  elif estimate2.labels_[i]==1:
    plt.plot(iris.values[i:,1],iris.values[i:,2],'ro')
  elif estimate2.labels_[i]==2:
    plt.plot(iris.values[i:,1],iris.values[i:,2],'bo')
  plt.show()
  #pairplot
```

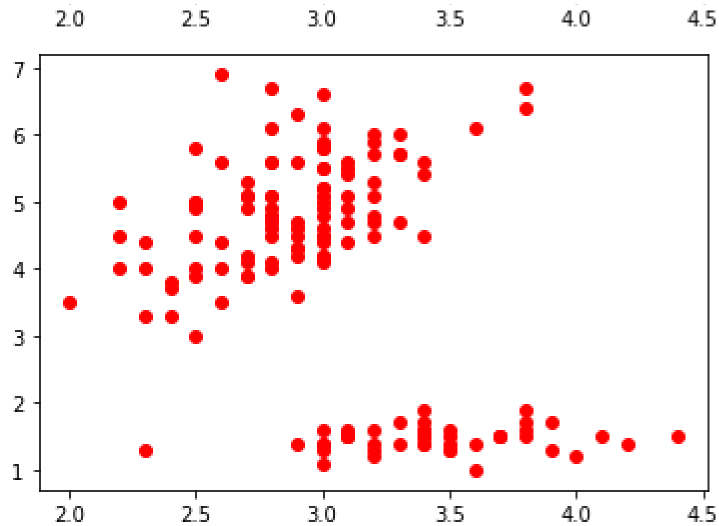

7
6
5
4
3
2
1
2.0
2.5
3.0
3.5
4.0
4.5

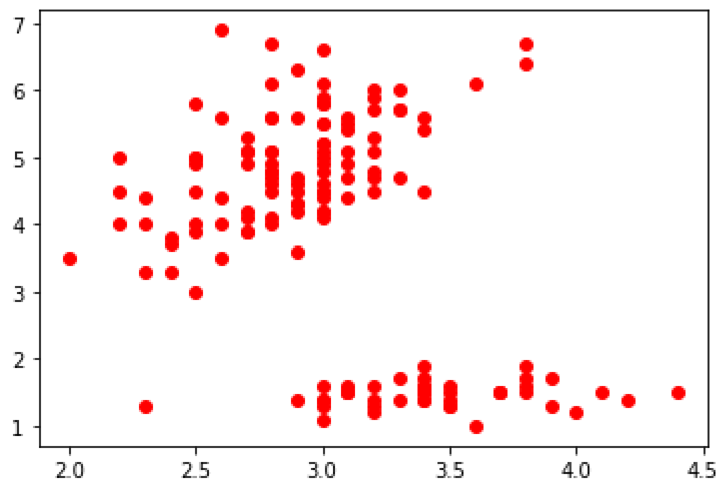

7
6
5
4
3
2
1
2.0
2.5
3.0
3.5
4.0
4.5

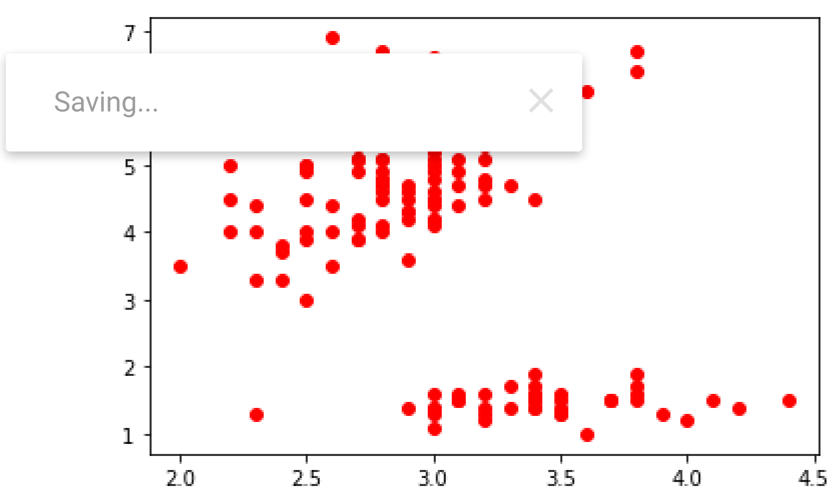

7
4
3
2
1
2.0
2.5
3.0
3.5
4.0
4.5

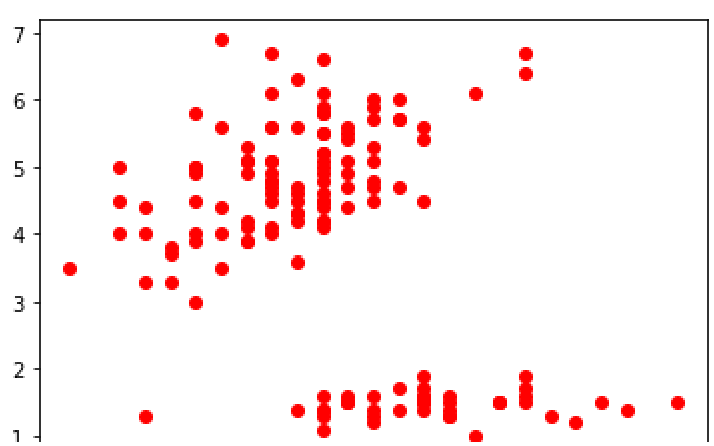
Saving...


7
6
5
4
3
2
1

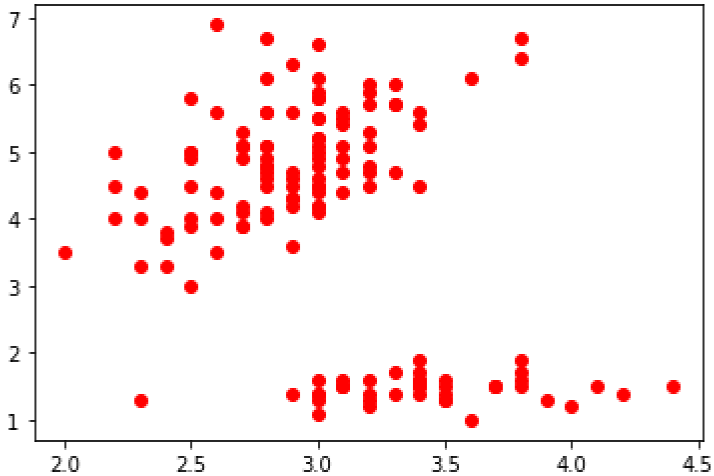

2.0
2.5
3.0
3.5
4.0
4.5
7
6
5
4
3
2
1
2.0
2.5
3.0
3.5
4.0
4.5

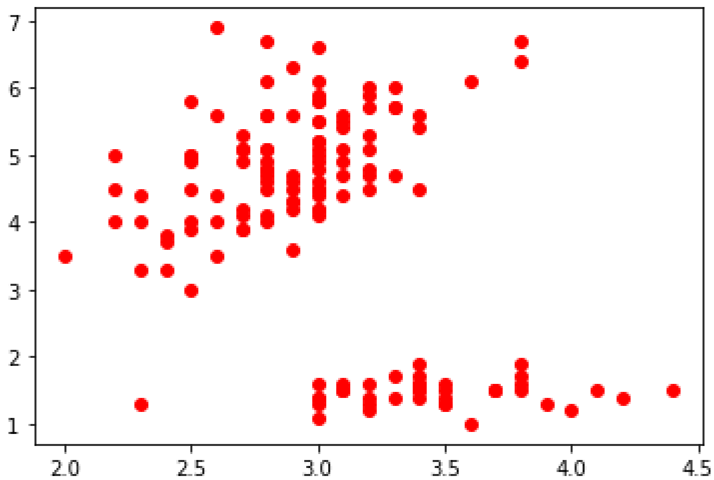

7
6
5
4
3
2
1
2.0
2.5
3.0
3.5
4.0
4.5

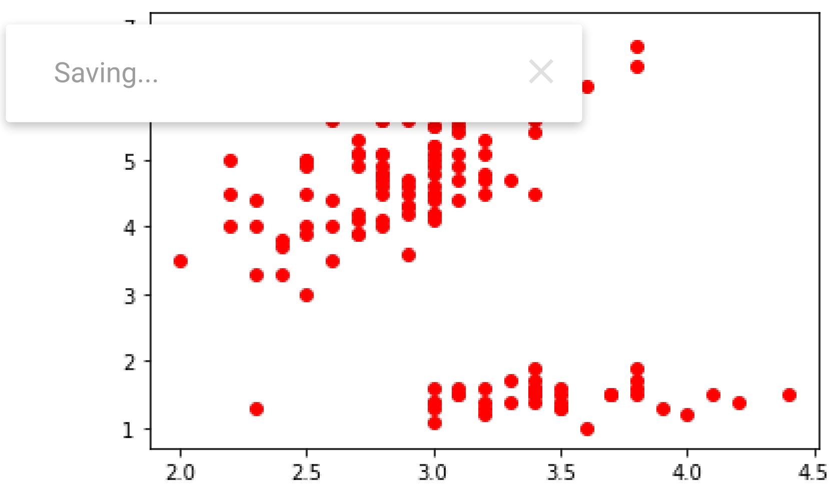

Saving...
7
5
4
3
2
1
2.0
2.5
3.0
3.5
4.0
4.5

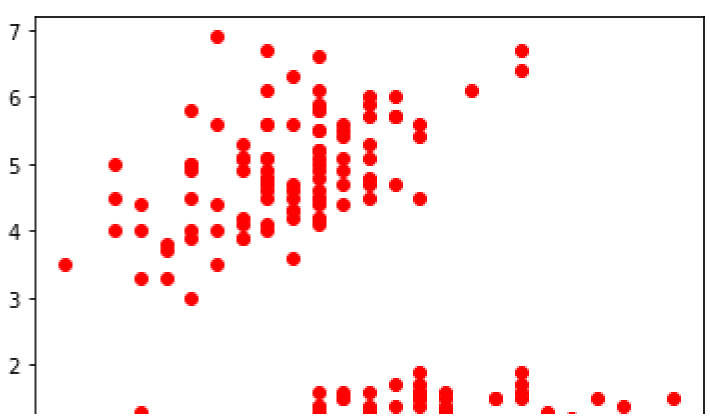

7
6
5
4
3
2
1

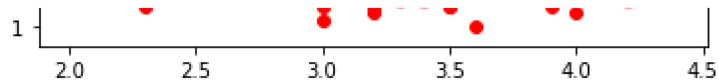

2.0
2.5
3.0
3.5
4.0
4.5

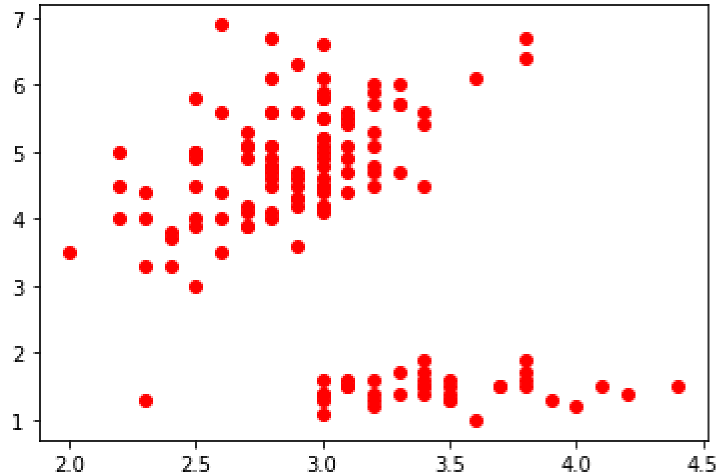

7
6
5
4
3
2
1
2.0
2.5
3.0
3.5
4.0
4.5

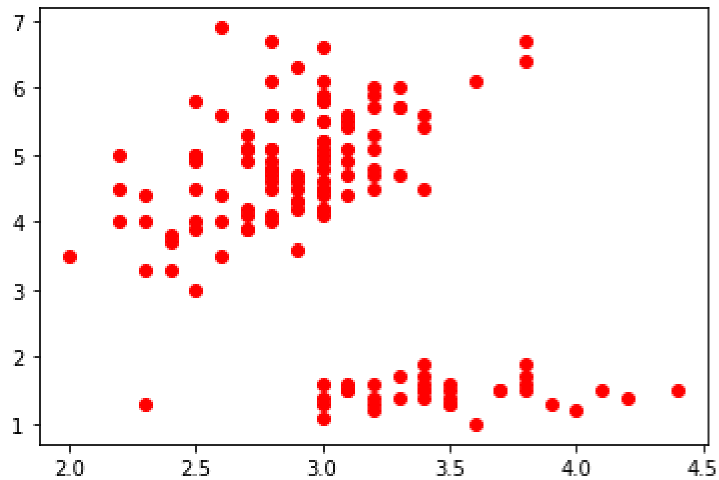

7
6
5
4
3
2
1
2.0
2.5
3.0
3.5
4.0
4.5


Saving...
5
4
3
2
1
2.0
2.5
3.0
3.5
4.0
4.5

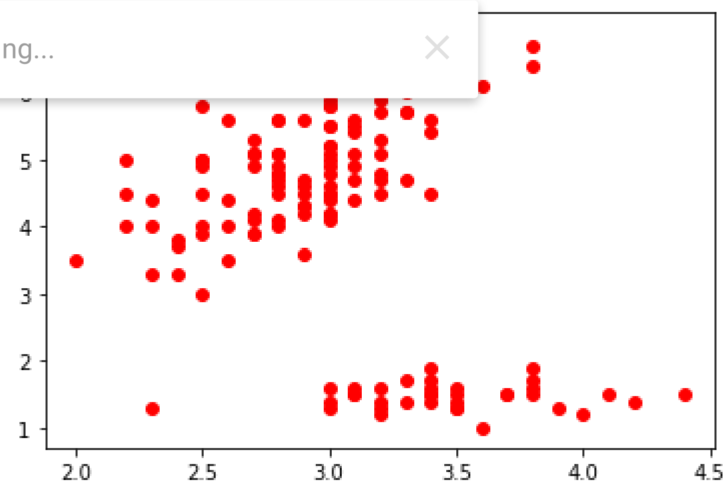

7
6
5
4
3
2

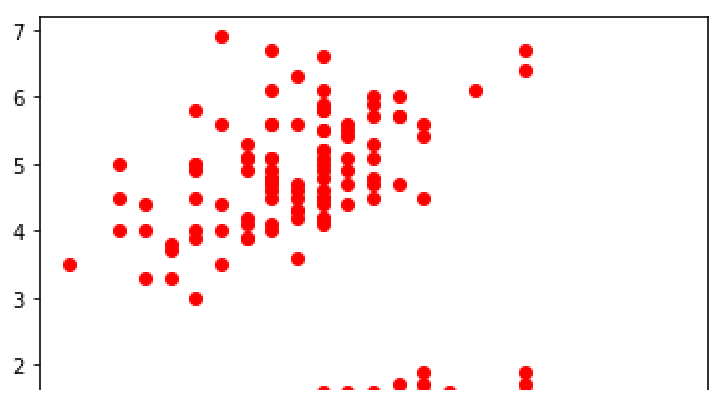

1
2.0
2.5
3.0
3.5
4.0
4.5

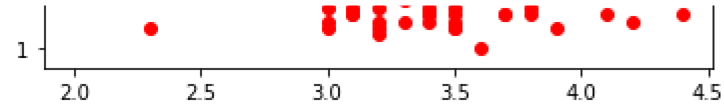

7
6
5
4
3
2
1
2.0
2.5
3.0
3.5
4.0
4.5

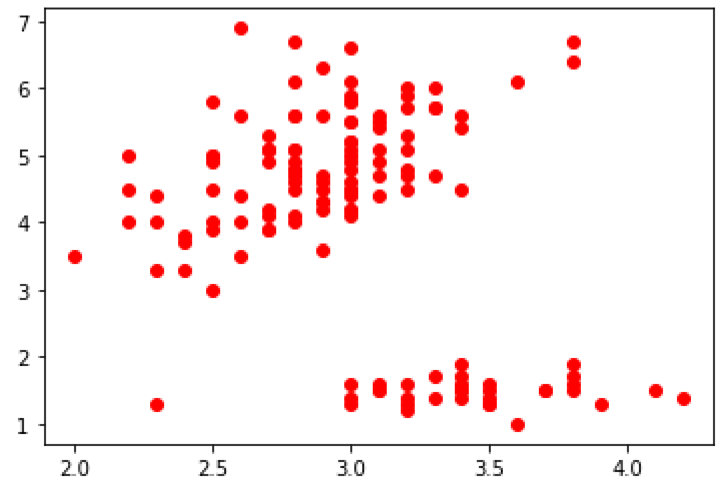

7
6
5
4
3
2
1
2.0
2.5
3.0
3.5
4.0
4.5

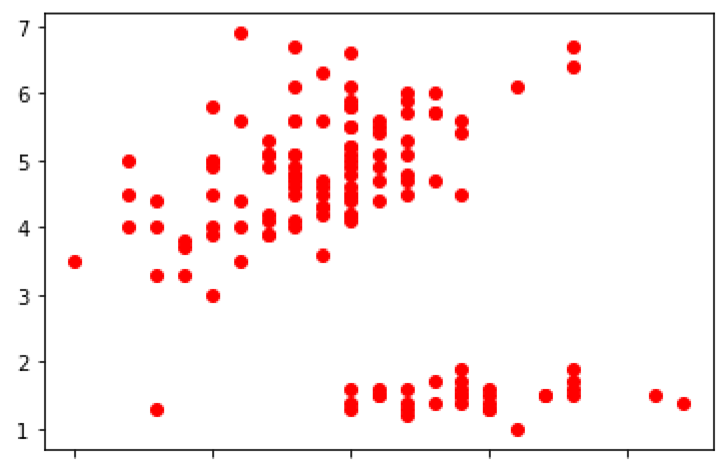
Saving...

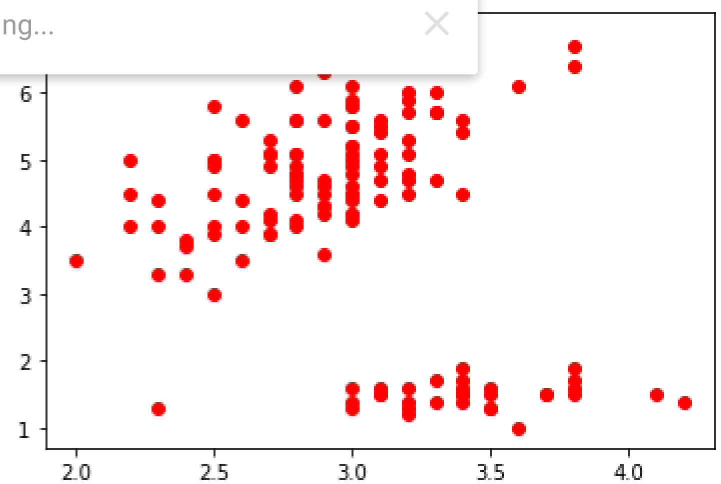

5
4
3
2
1
2.0
2.5
3.0
3.5
4.0
4.5

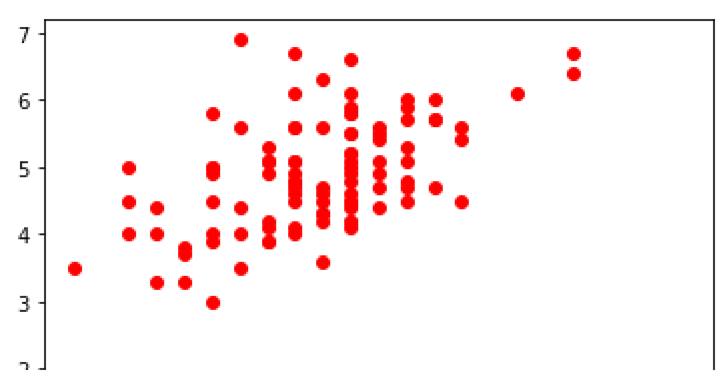

7
6
5
4
3
2

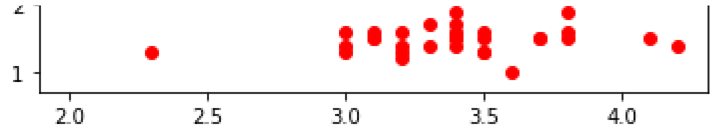

1
2.0
2.5
3.0
3.5
4.0
4.5

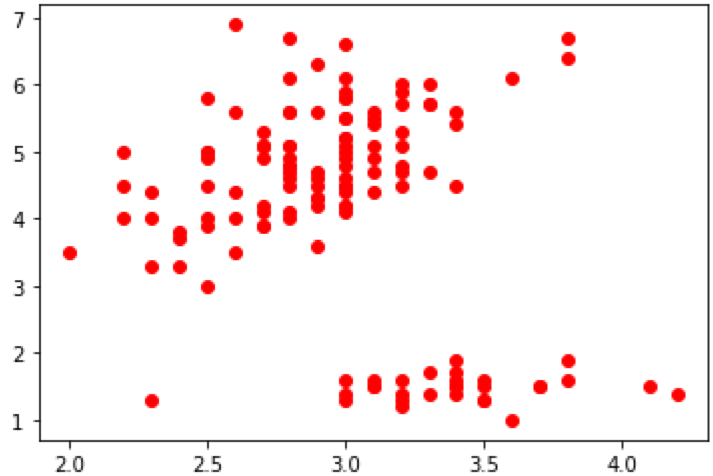

7
6
5
4
3
2
1
2.0
2.5
3.0
3.5
4.0

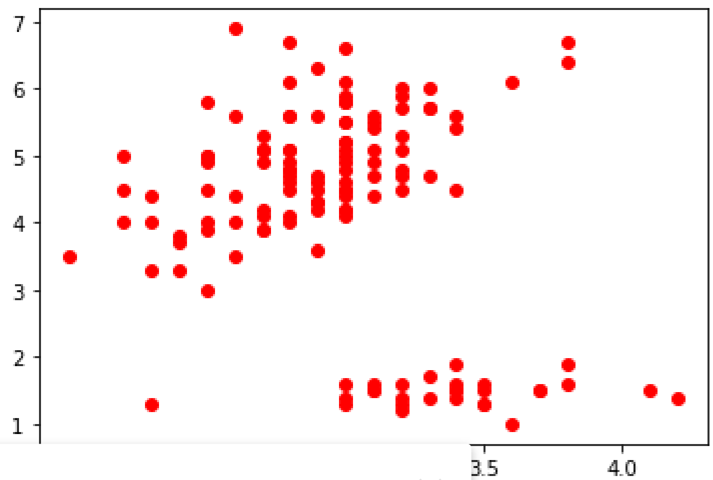

7
6
5
4
3
2
1
3.5
4.0


6
5
4
3
2
1
2.0
2.5
3.0
3.5
4.0

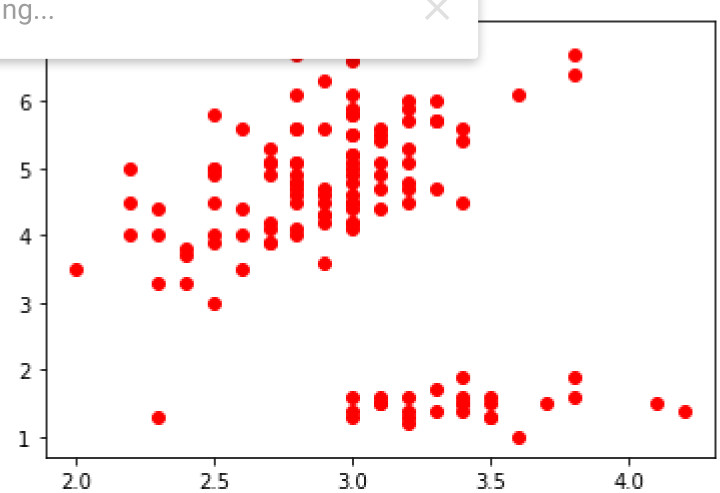

7
6
5
4
3

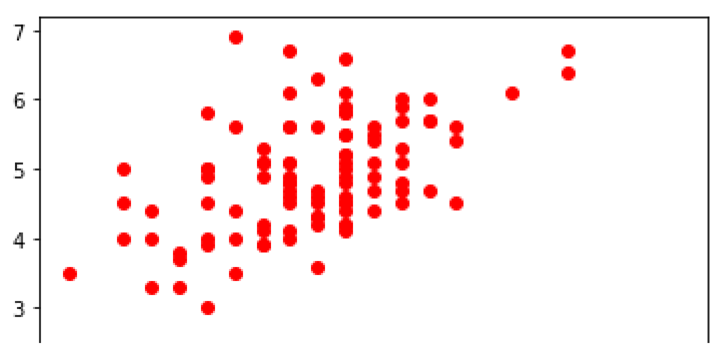

2
1
2.0
2.5
3.0
3.5
4.0

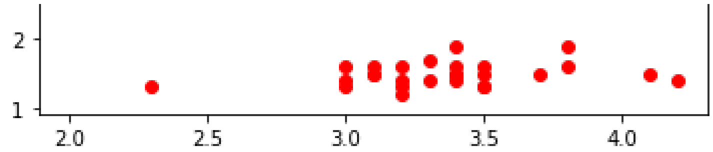

7
6
5
4
3
2
1
2.0
2.5
3.0
3.5
4.0

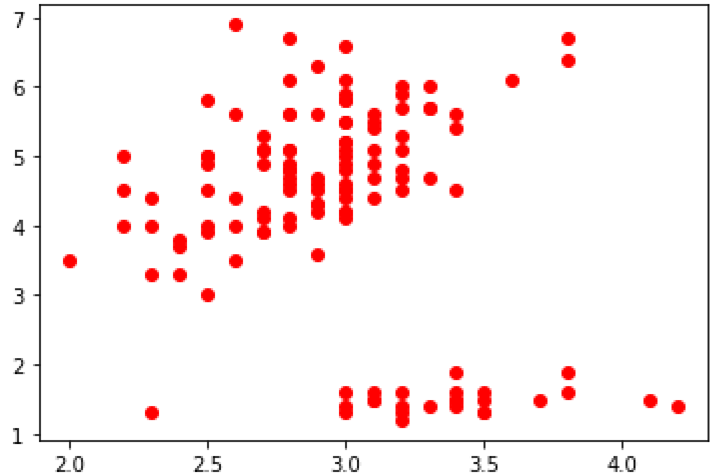

7
6
5
4
3
2
1
3.5
4.0

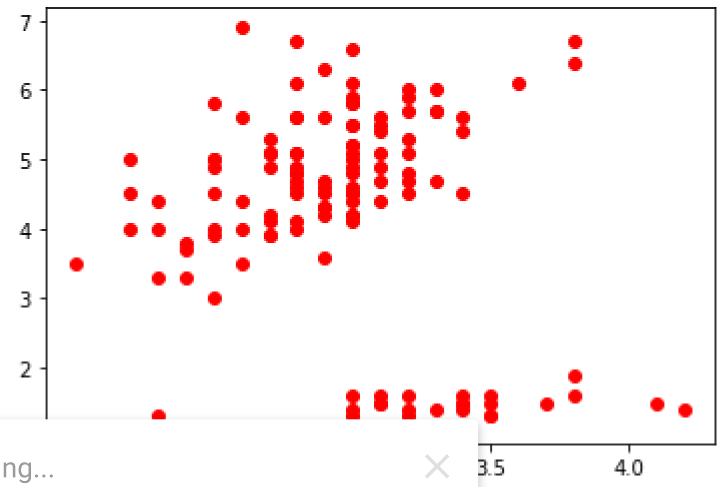
Saving...

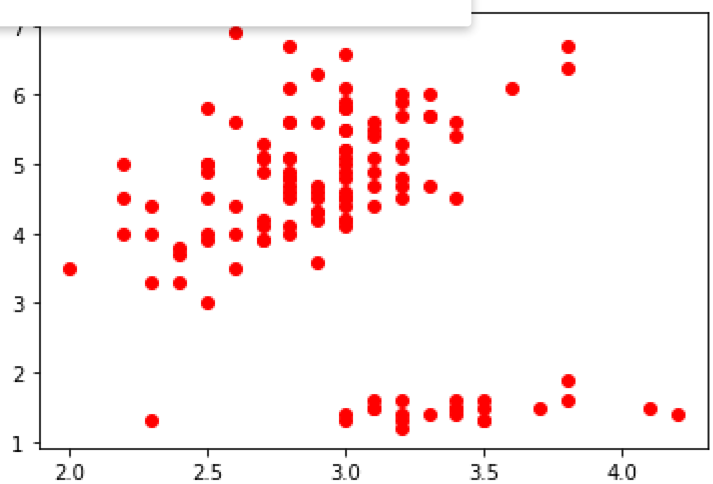

6
5
4
3
2
1
2.0
2.5
3.0
3.5
4.0

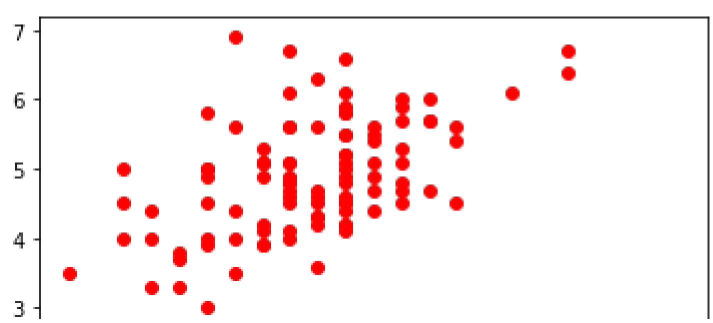

7
6
5
4
3

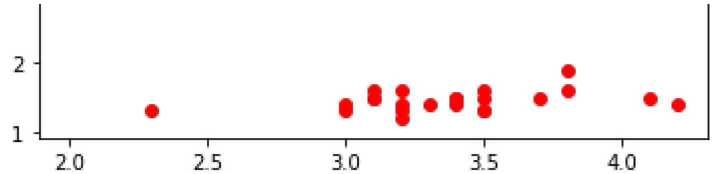

2
1
2.0
2.5
3.0
3.5
4.0

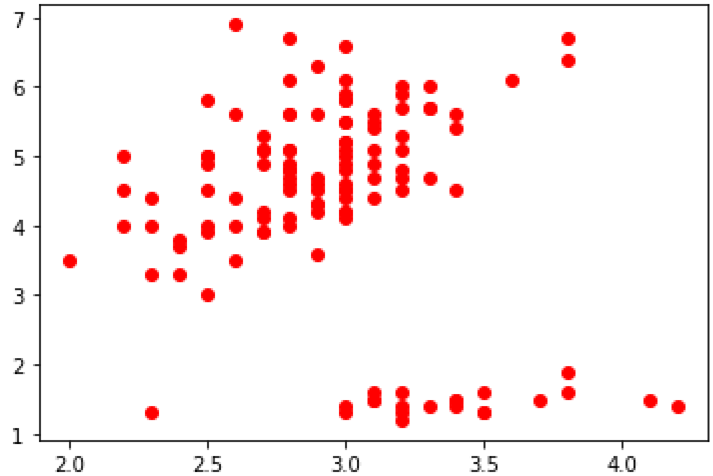

7
6
5
4
3
2
1
2.0
2.5
3.0
3.5
4.0

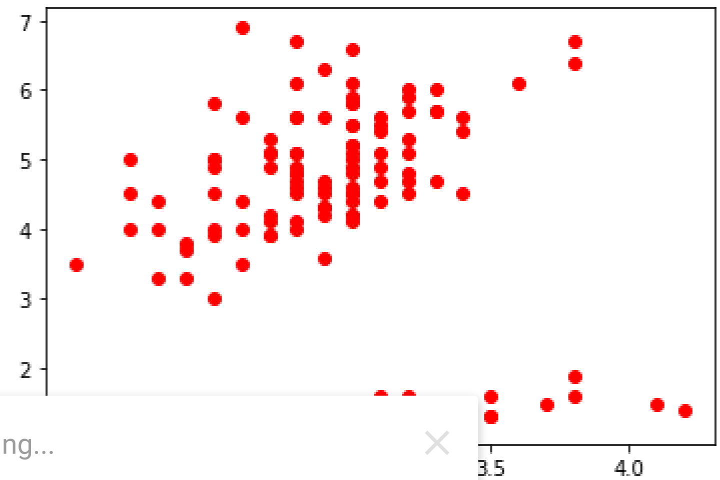

7
6
5
4
3
2
3.5
4.0

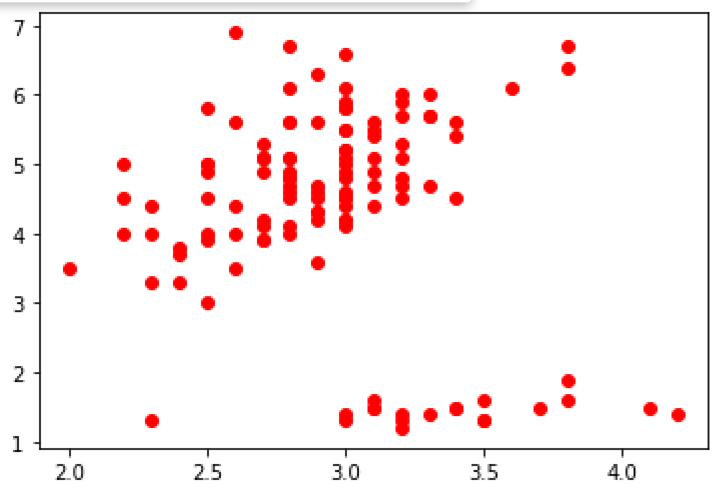

6
5
4
3
2
1
2.0
2.5
3.0
3.5
4.0

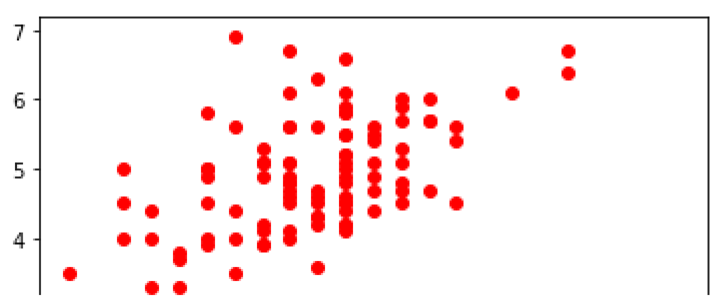

7
6
5
4
3

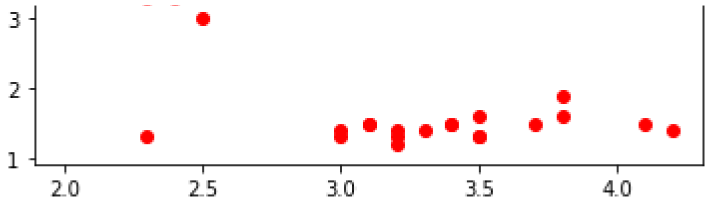

2
1
2.0
2.5
3.0
3.5
4.0

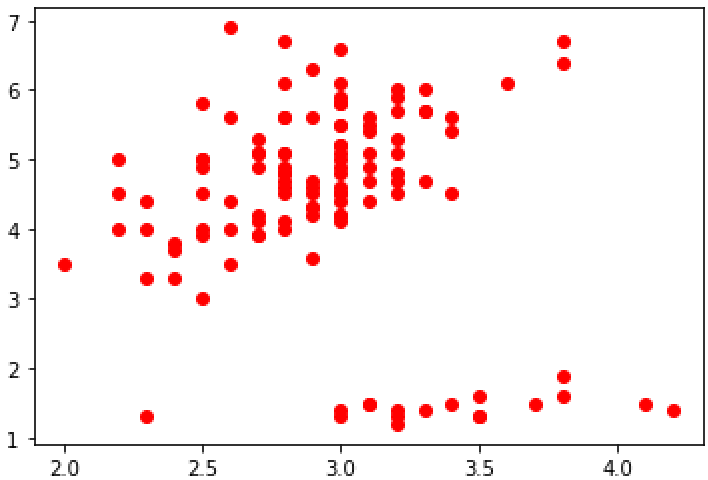

7
6
5
4
3
2
1
2.0
2.5
3.0
3.5
4.0

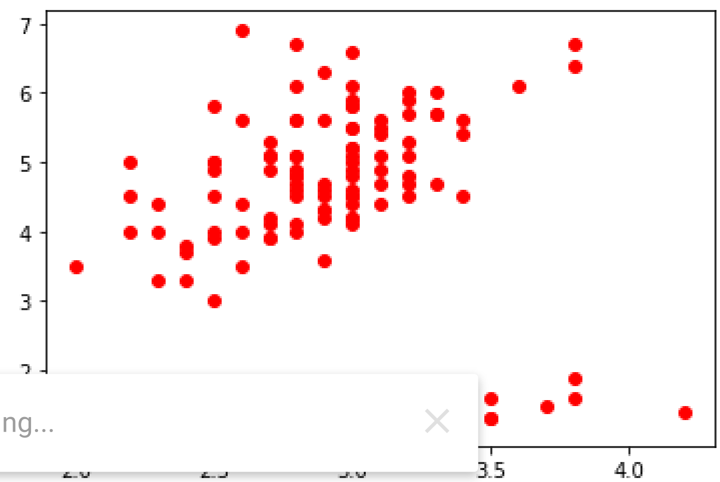

7
6
5
4
3
2
3.5
4.0


7
6
5
4
3
2
1
2.0
2.5
3.0
3.5
4.0

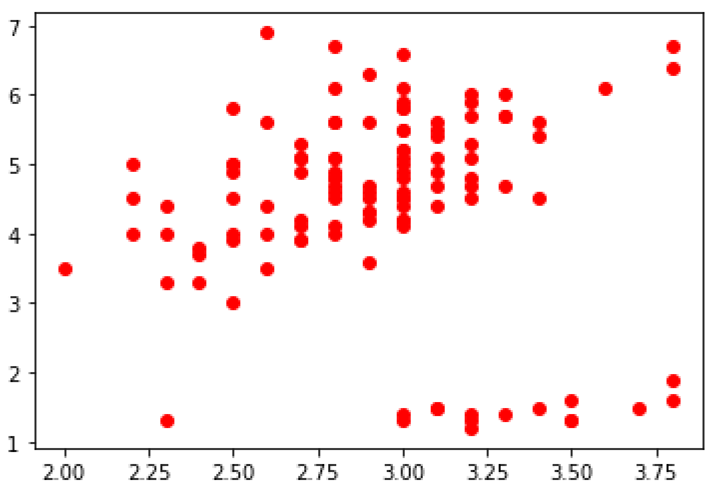

7
6
5
4

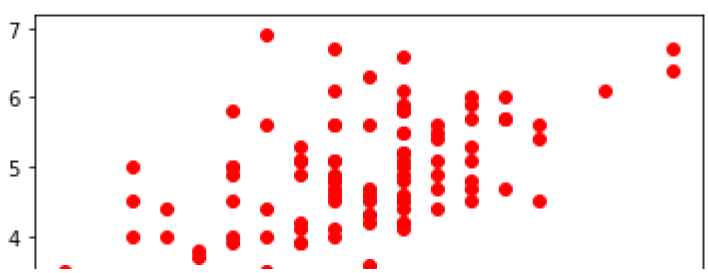

3
2
1
2.0
2.5
3.0
3.5
4.0

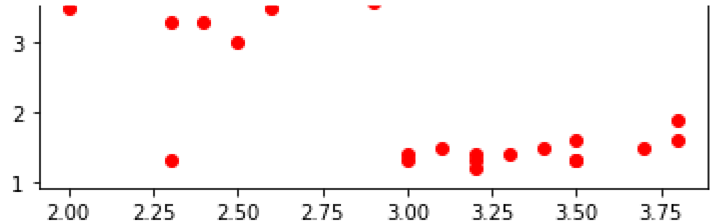

7
6
5
4
3
2
1
2.0
2.5
3.0
3.5
4.0

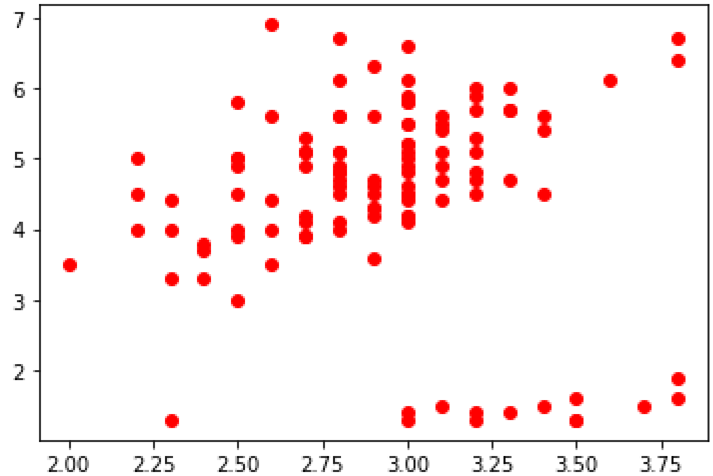

7
6
5
4
3
3.5
4.0

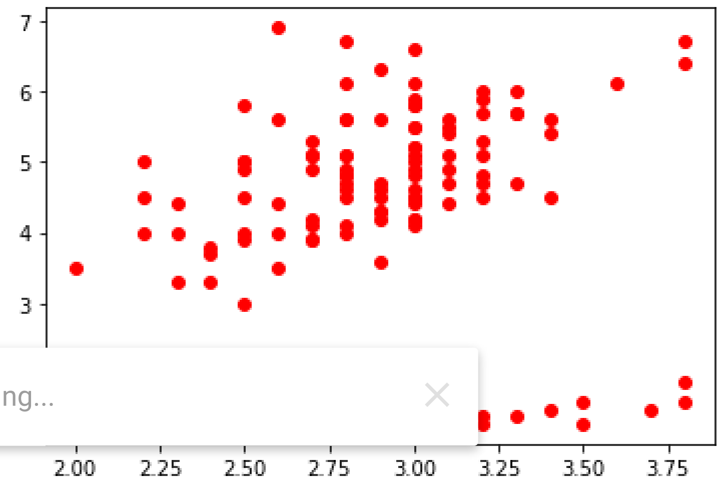
Saving...


7
6
5
4
3
2
1
2.00
2.25
2.50
2.75
3.00
3.25
3.50
3.75

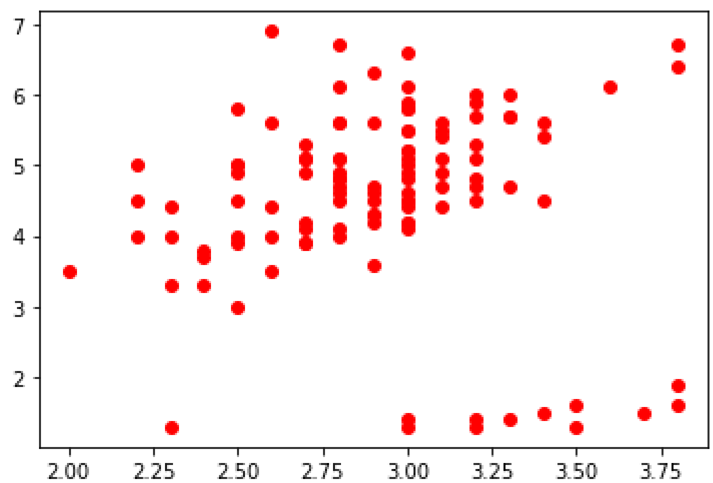

7
6
5
4

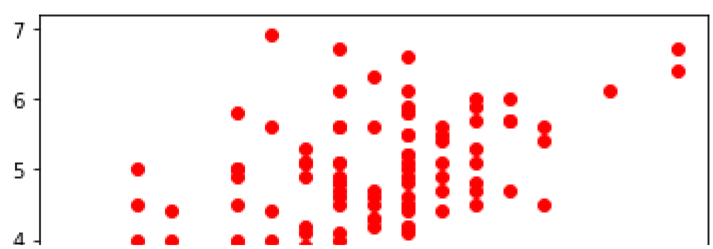

3
2
1
2.00 2.25 2.50 2.75 3.00 3.25 3.50 3.75

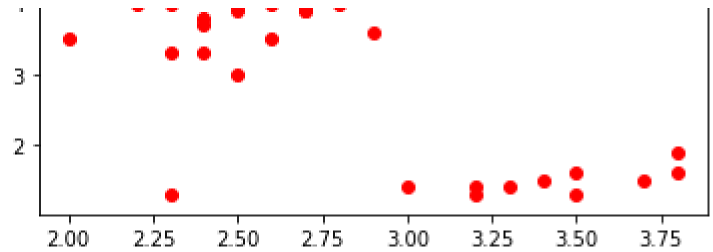

7
6
5
4
3
2
2.00 2.25 2.50 2.75 3.00 3.25 3.50 3.75

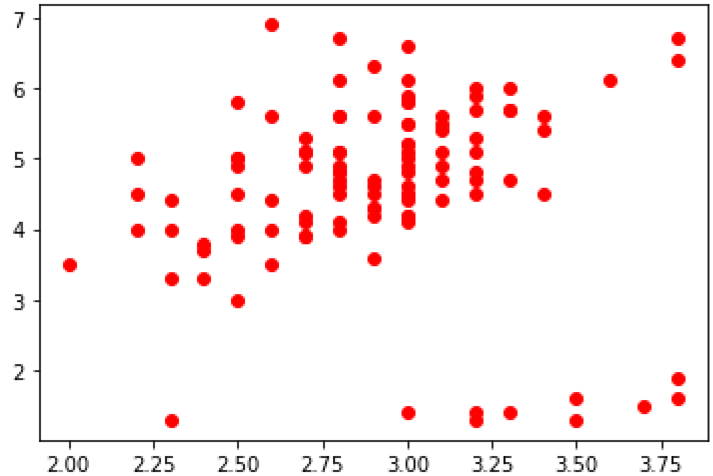

7
6
5
4
3
2.00 2.25 2.50 2.75 3.00 3.25 3.50 3.75

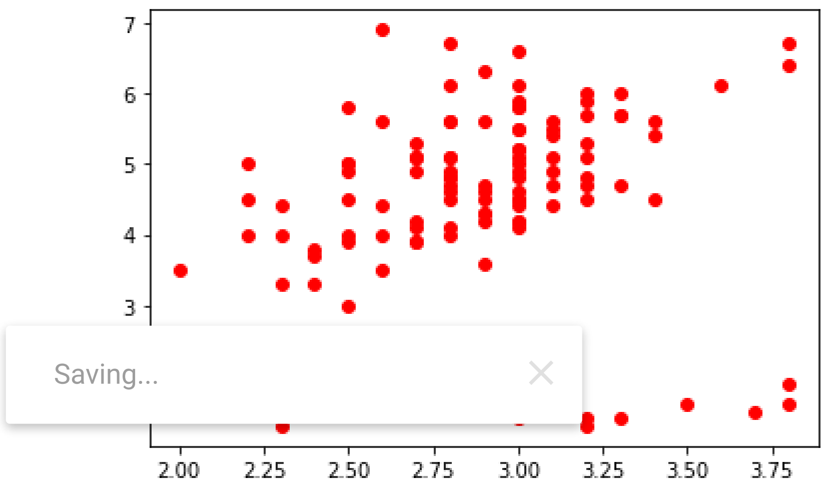
Saving...

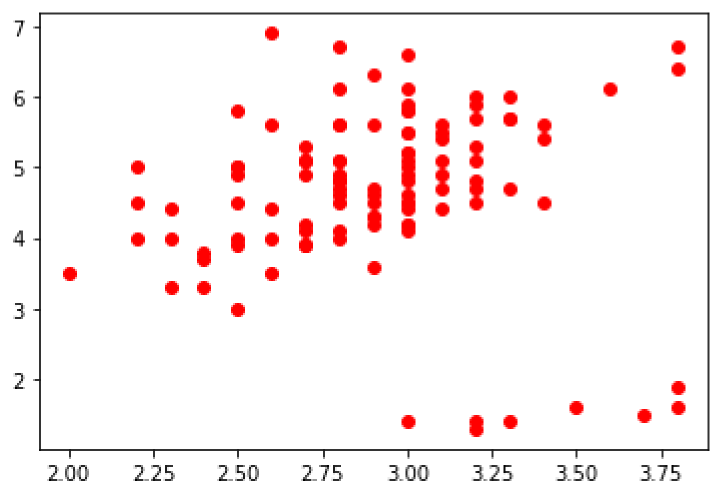

7
6
5
4
3
2
2.00 2.25 2.50 2.75 3.00 3.25 3.50 3.75

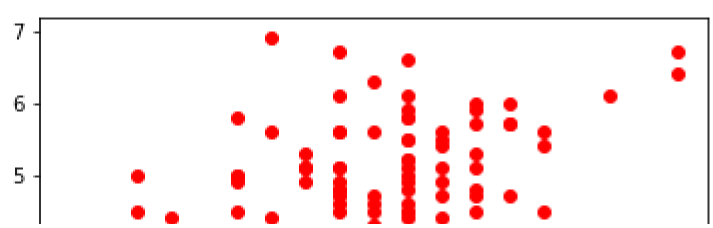

7
6
5
4

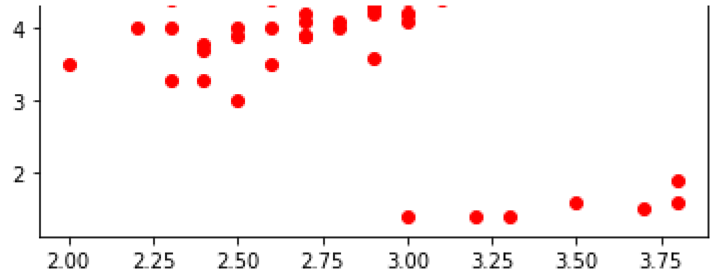

3
2
2.00
2.25
2.50
2.75
3.00
3.25
3.50
3.75

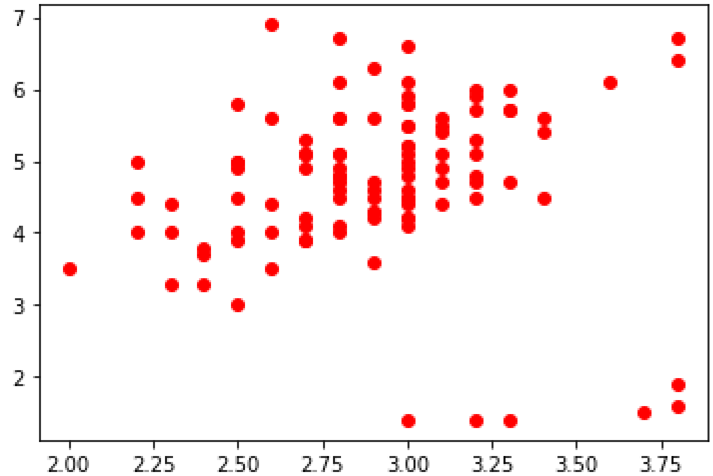

7
6
5
4
3
2
2.00
2.25
2.50
2.75
3.00
3.25
3.50
3.75

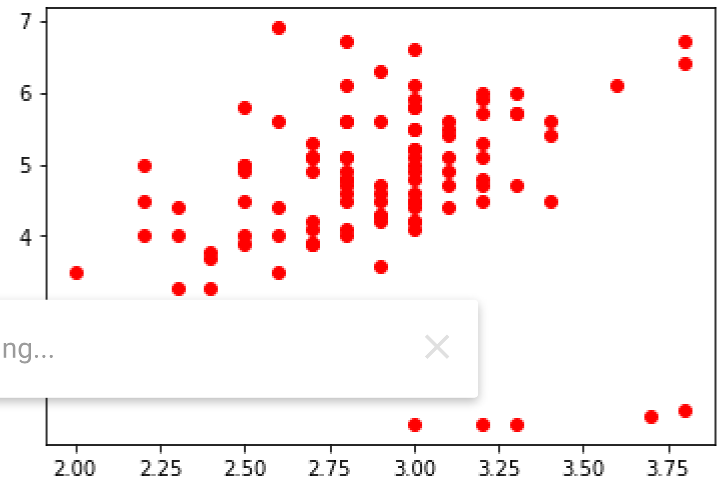

7
6
5
4
3
Saving...
2.00
2.25
2.50
2.75
3.00
3.25
3.50
3.75

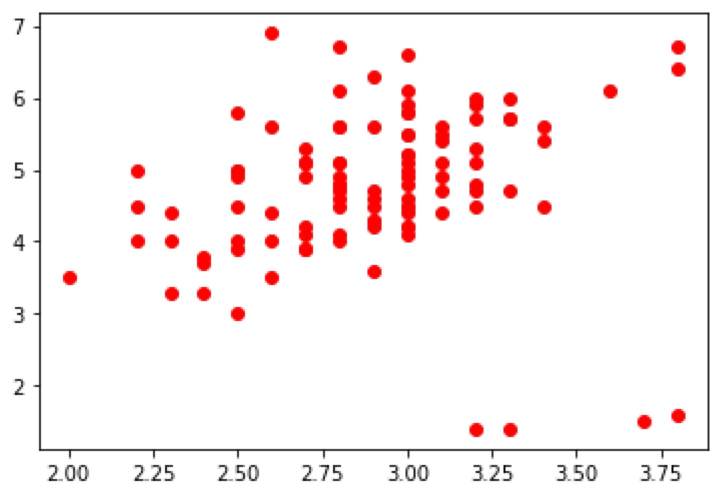

7
6
5
4
3
2
2.00
2.25
2.50
2.75
3.00
3.25
3.50
3.75

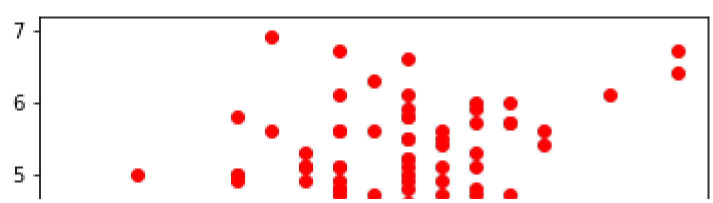

7
6
5

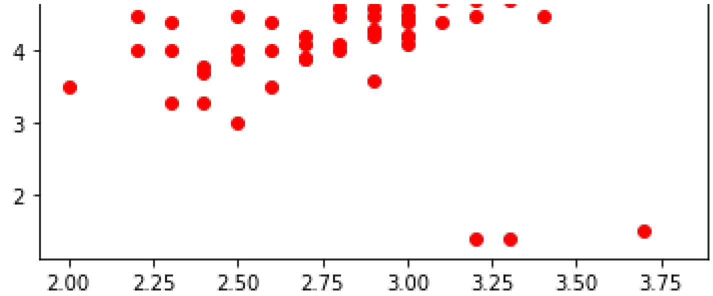

4
3
2
2.00 2.25 2.50 2.75 3.00 3.25 3.50 3.75

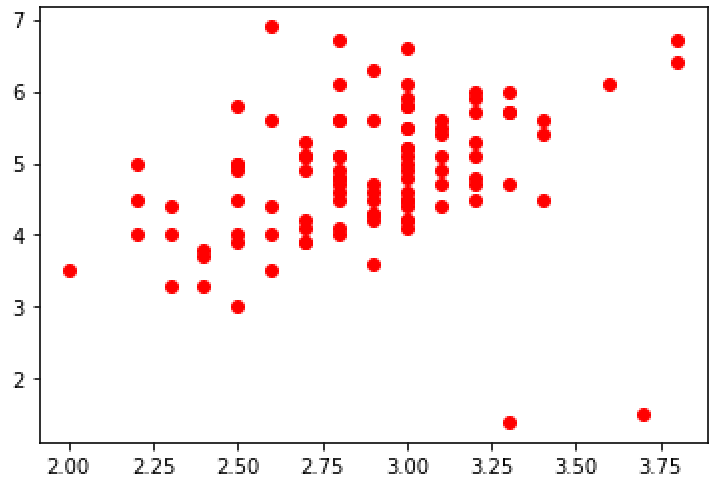

7
6
5
4
3
2
2.00 2.25 2.50 2.75 3.00 3.25 3.50 3.75

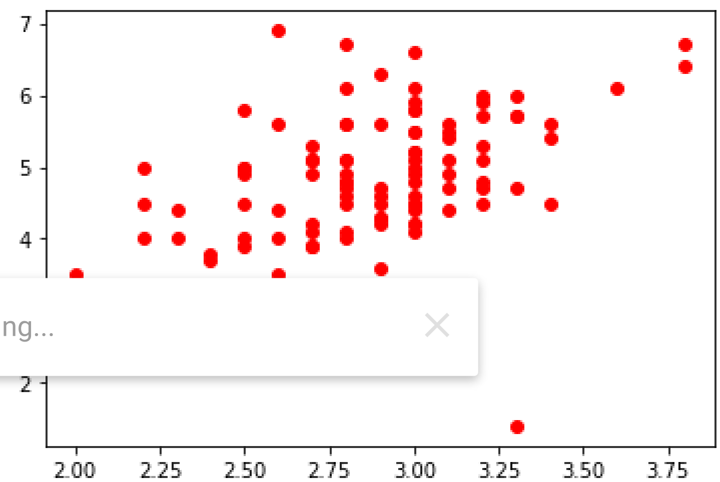

7
6
5
4
2.00 2.25 2.50 2.75 3.00 3.25 3.50 3.75


7
6
5
4
3
2
2.00 2.25 2.50 2.75 3.00 3.25 3.50 3.75

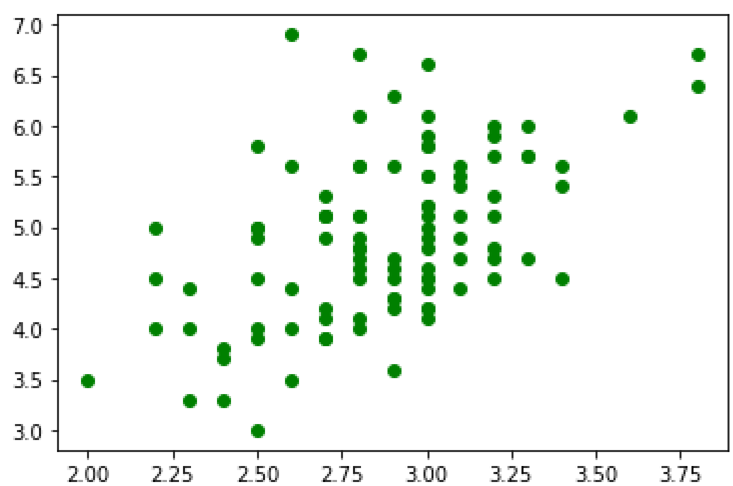

7
6
5

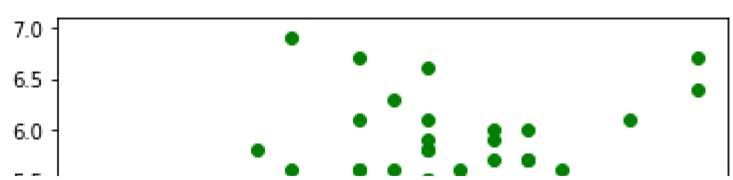

4
3
2
2.00 2.25 2.50 2.75 3.00 3.25 3.50 3.75

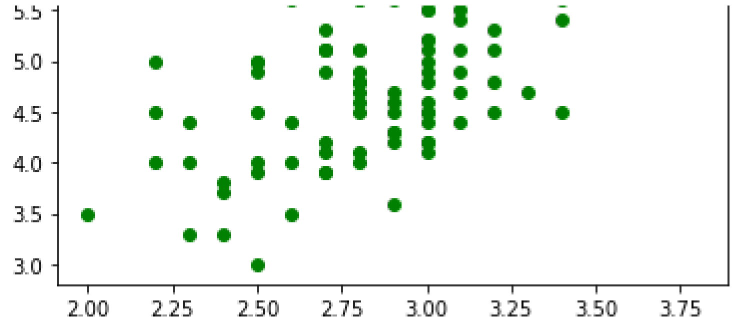

7
6
5
4
3
2
2.00 2.25 2.50 2.75 3.00 3.25 3.50 3.75

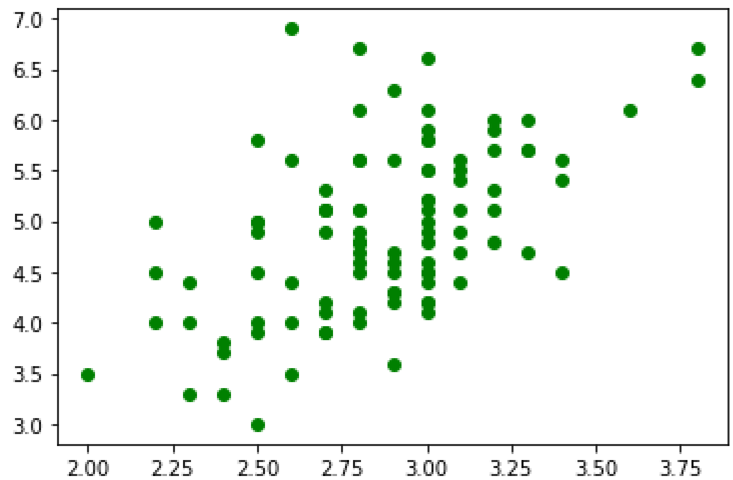

7
6
5
4
2
2.00 2.25 2.50 2.75 3.00 3.25 3.50 3.75

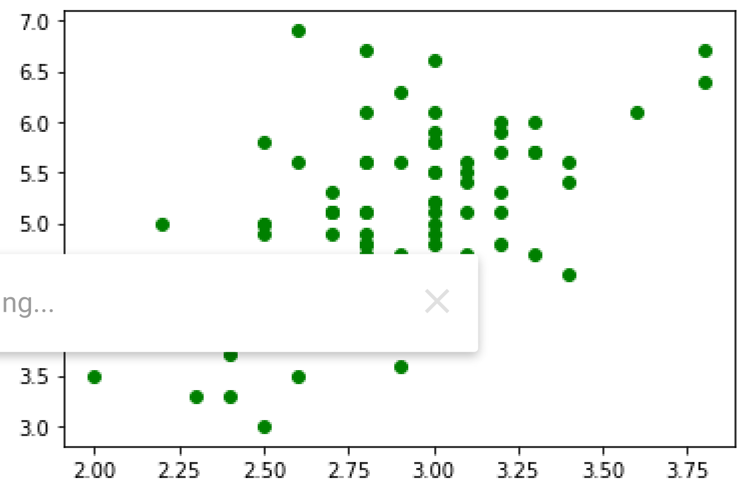
Saving...


7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.00 2.25 2.50 2.75 3.00 3.25 3.50 3.75

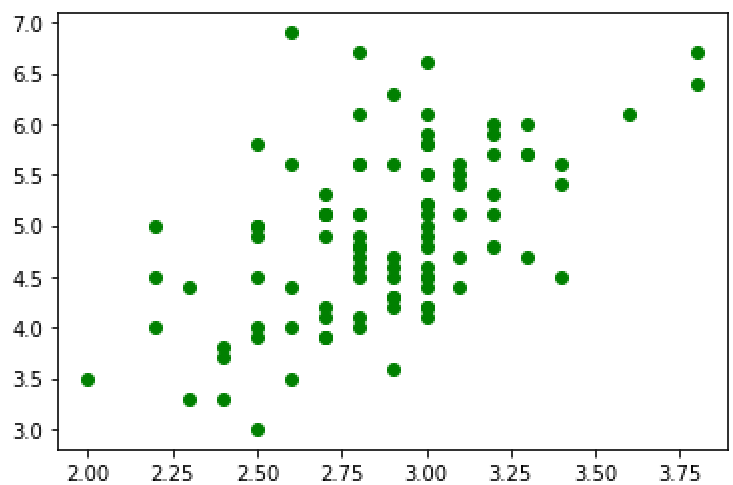

7.0
6.5
6.0

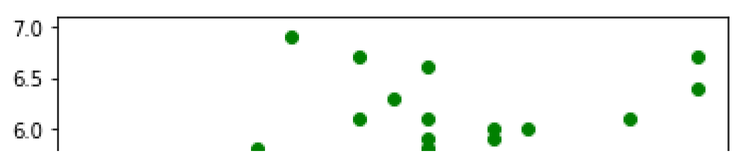

5.5
5.0
4.5
4.0
3.5
3.0
2.00 2.25 2.50 2.75 3.00 3.25 3.50 3.75

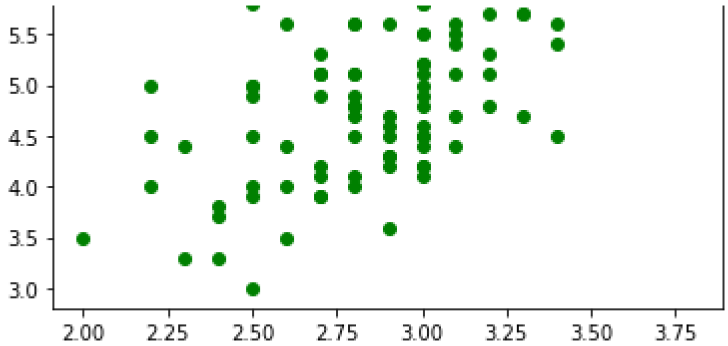

7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.00 2.25 2.50 2.75 3.00 3.25 3.50 3.75

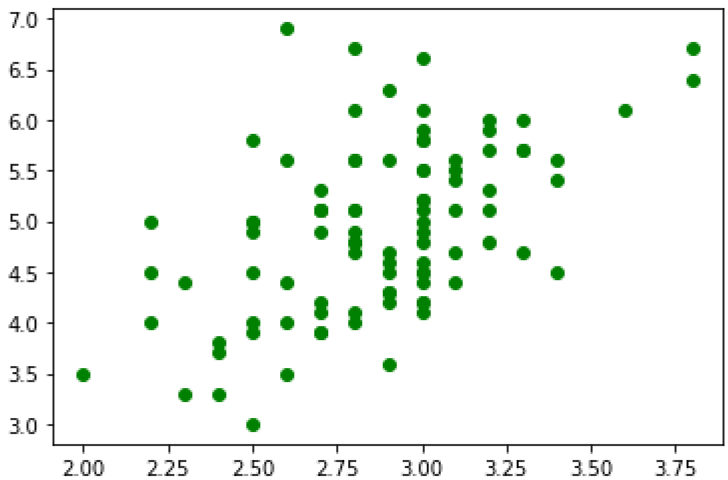

7.0
6.5
6.0
5.5
5.0
3.5
3.0
2.00 2.25 2.50 2.75 3.00 3.25 3.50 3.75

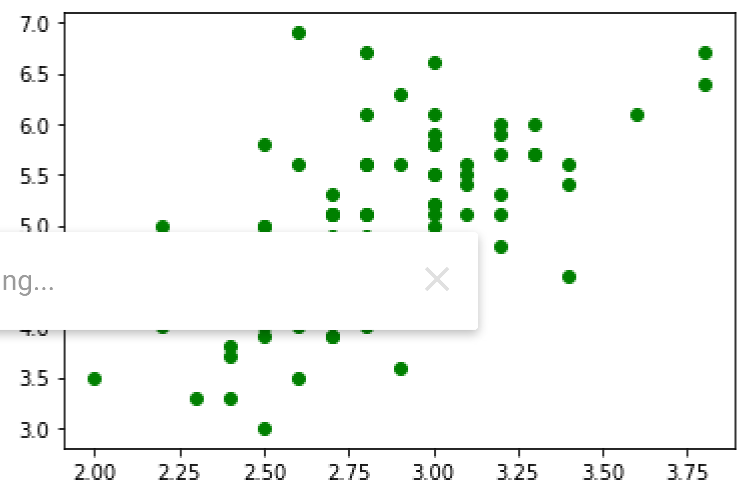
Saving...

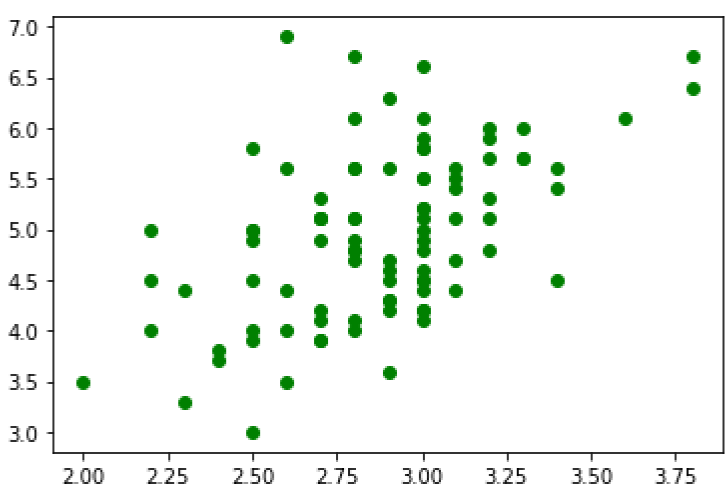

7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.00 2.25 2.50 2.75 3.00 3.25 3.50 3.75

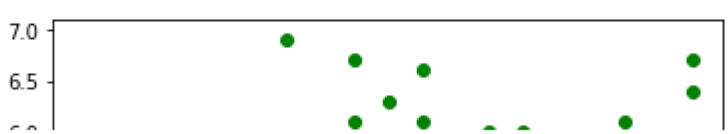

7.0
6.5
6.0

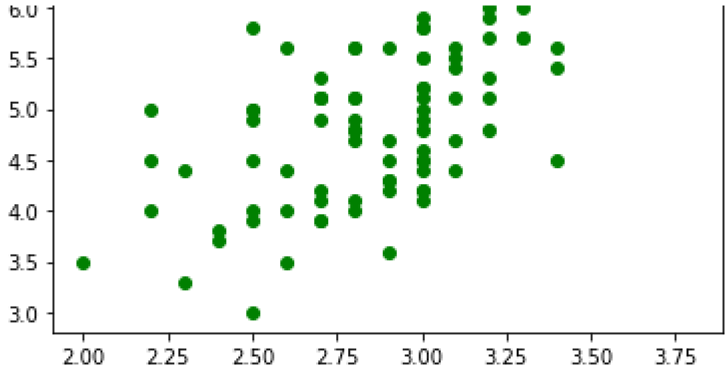

5.5
5.0
4.5
4.0
3.5
3.0
2.00 2.25 2.50 2.75 3.00 3.25 3.50 3.75

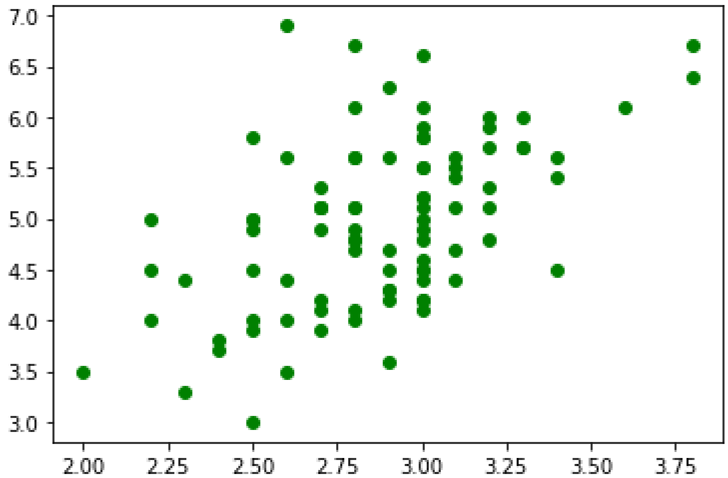

7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.00 2.25 2.50 2.75 3.00 3.25 3.50 3.75

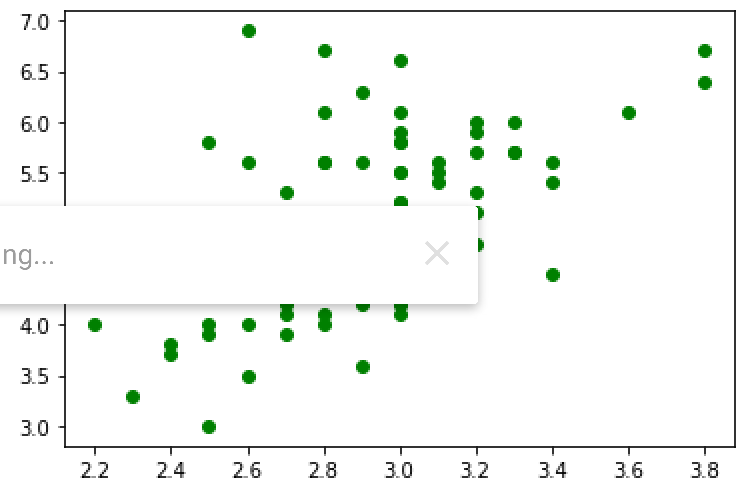

7.0
6.5
6.0
5.5
5.0
3.5
3.0
2.00 2.25 2.50 2.75 3.00 3.25 3.50 3.75


7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.00 2.25 2.50 2.75 3.00 3.25 3.50 3.75

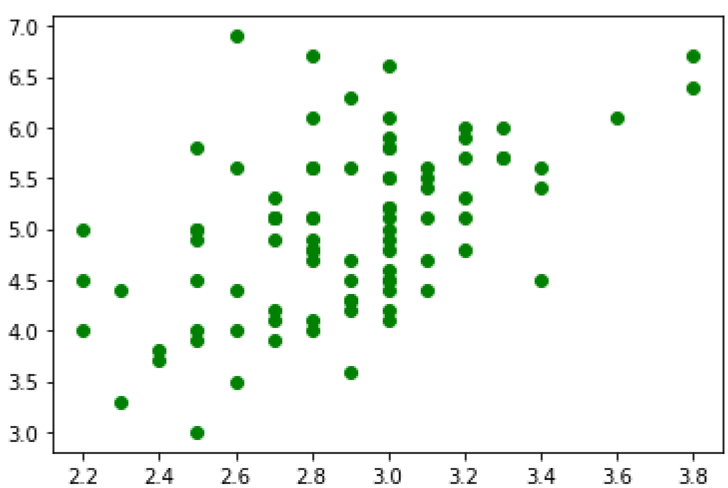

7.0
6.5

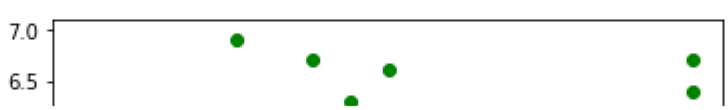

6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.00 2.25 2.50 2.75 3.00 3.25 3.50 3.75

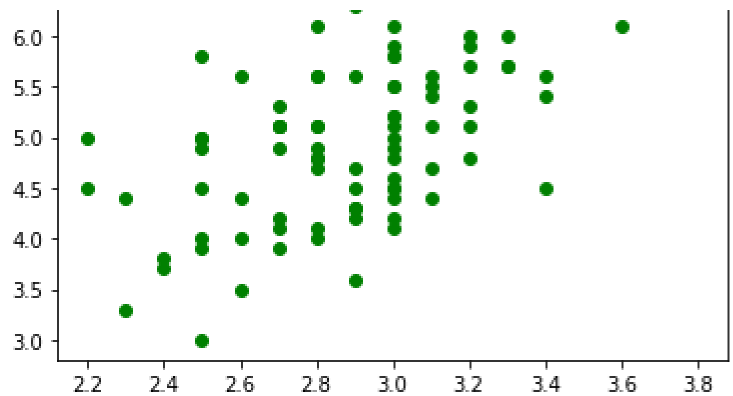

7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.00 2.25 2.50 2.75 3.00 3.25 3.50 3.75

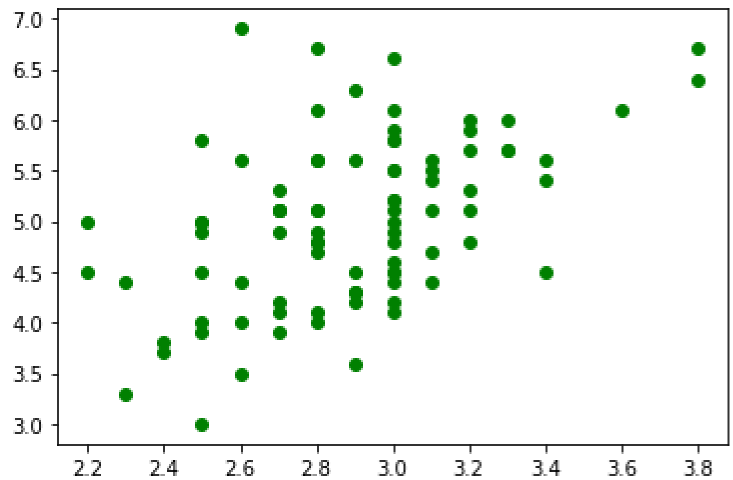

7.0
6.5
6.0
5.5
4.0
3.5
3.0
2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8

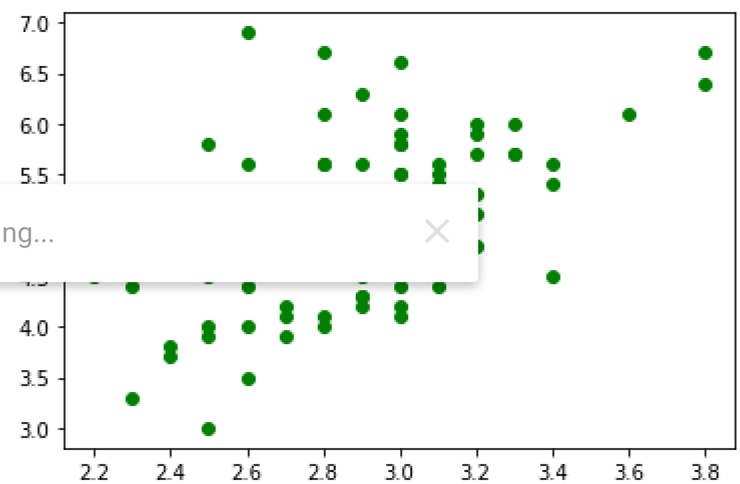
Saving...


7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8

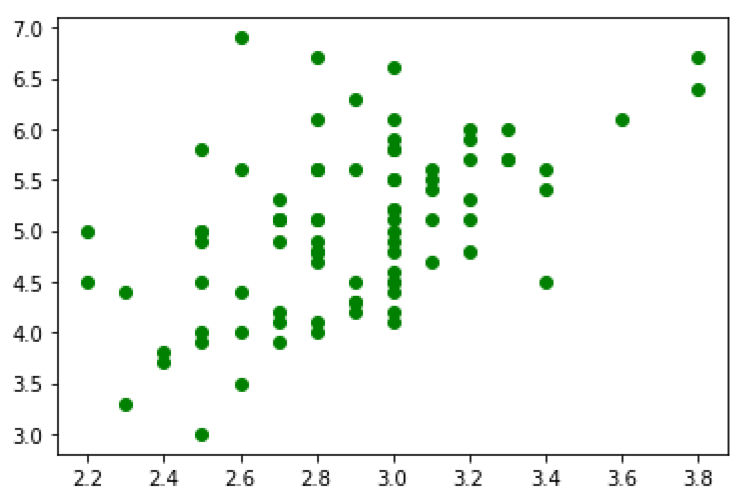

7.0
6.5

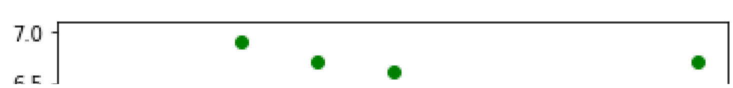

6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8

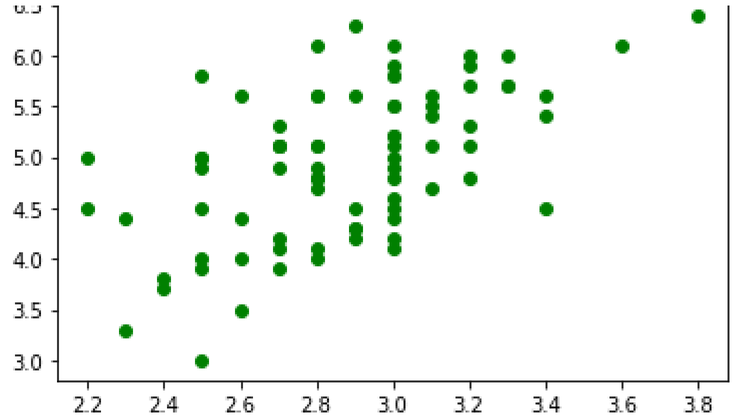

7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8

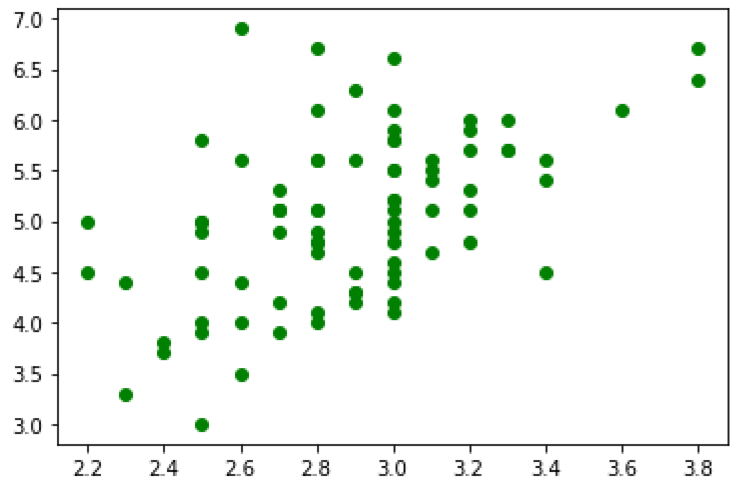

7.0
6.5
6.0
5.5
4.0
3.5
3.0
2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8

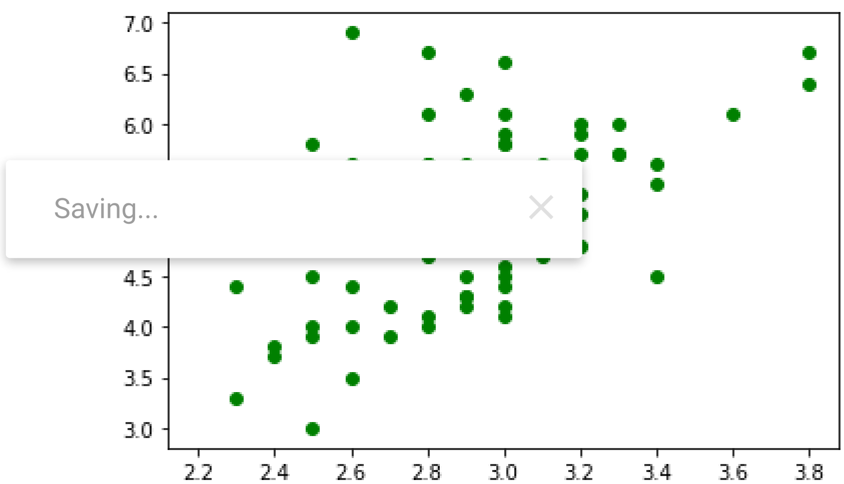
Saving...

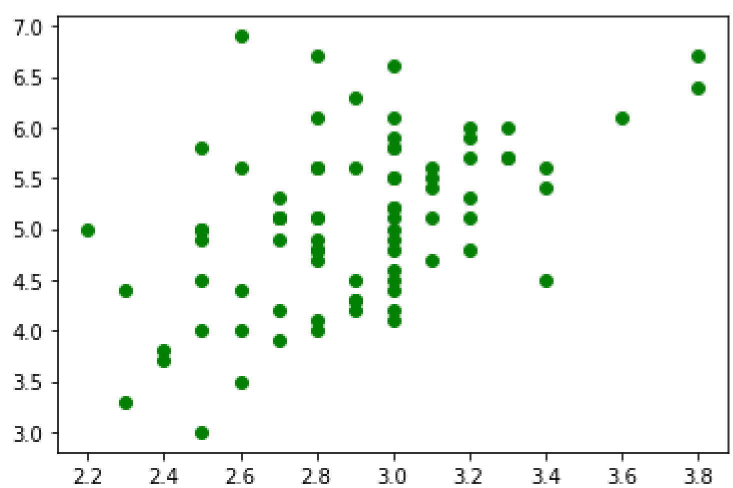

7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8


7.0

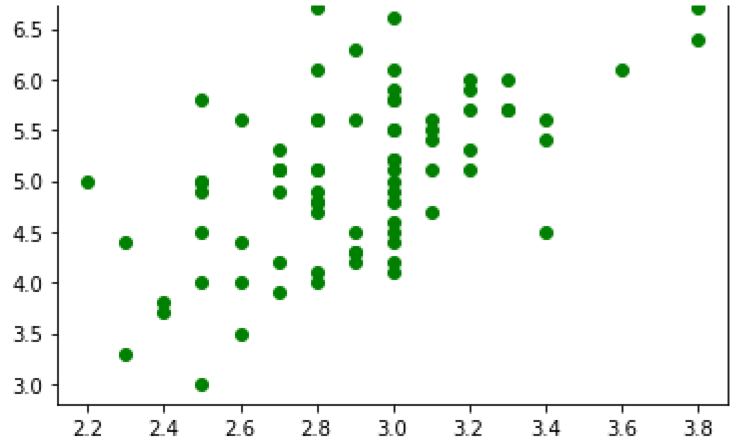

6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8

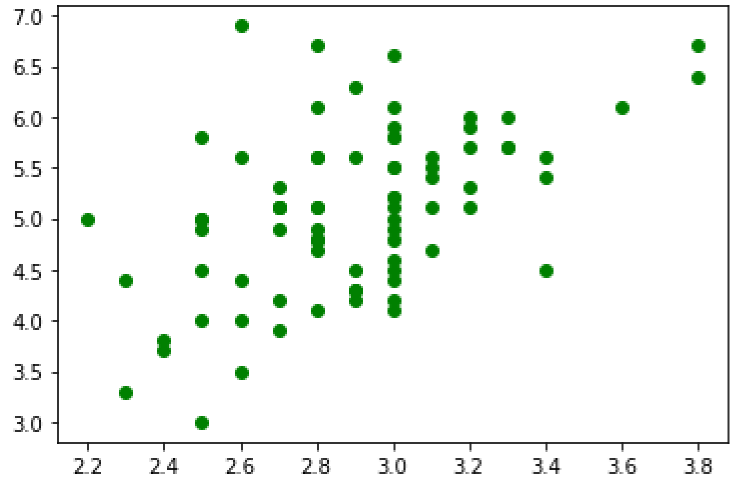

7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8

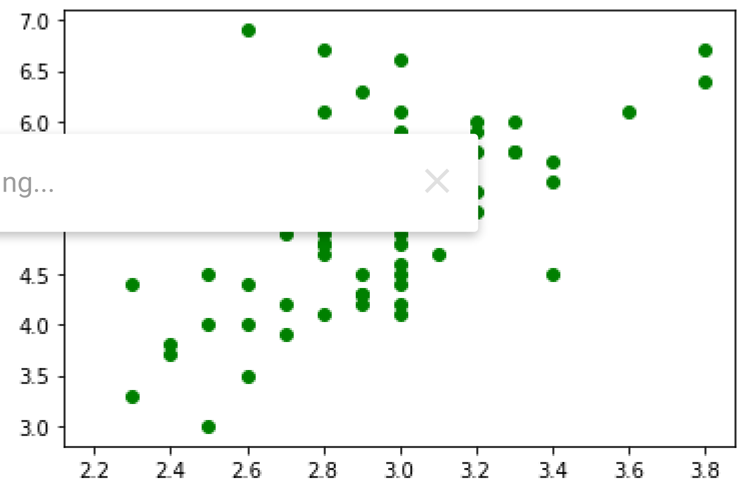

7.0
6.5
6.0
Saving...
4.5
4.0
3.5
3.0
2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8


7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8

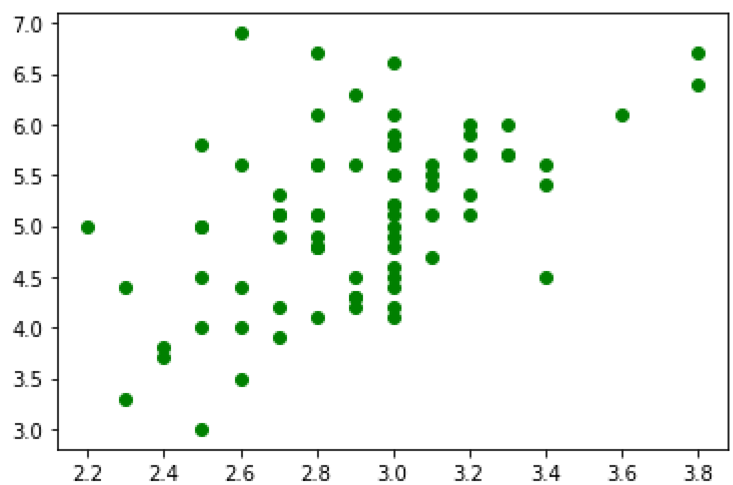

7.0

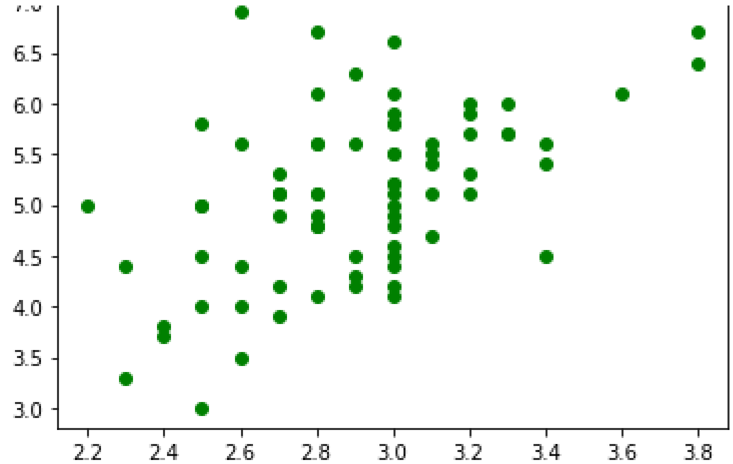

6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8

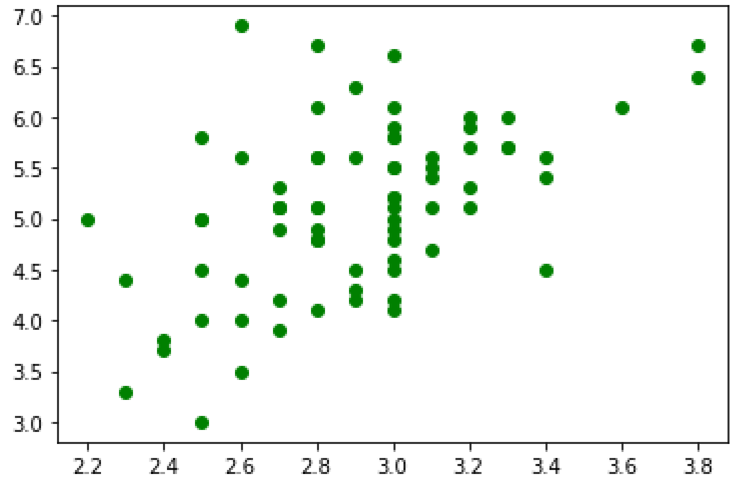

7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8

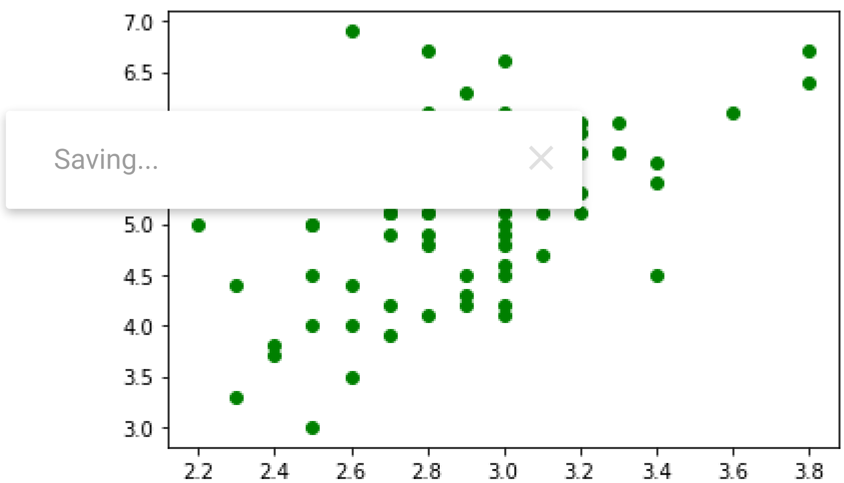

7.0
6.5
6.0
4.5
4.0
3.5
3.0
2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8

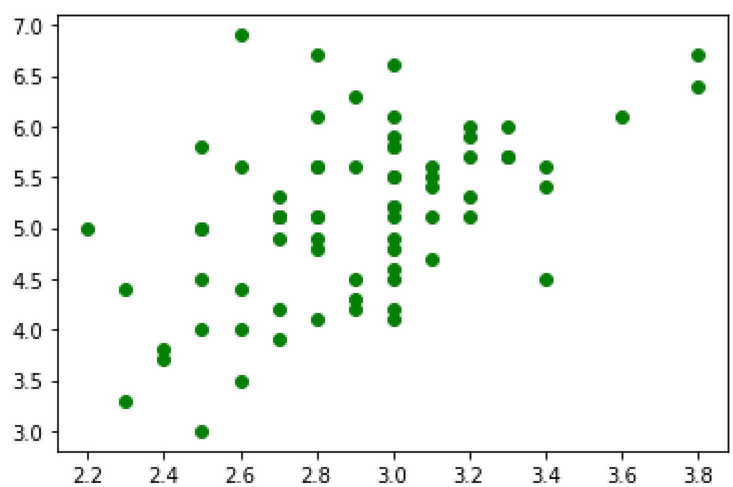
Saving...

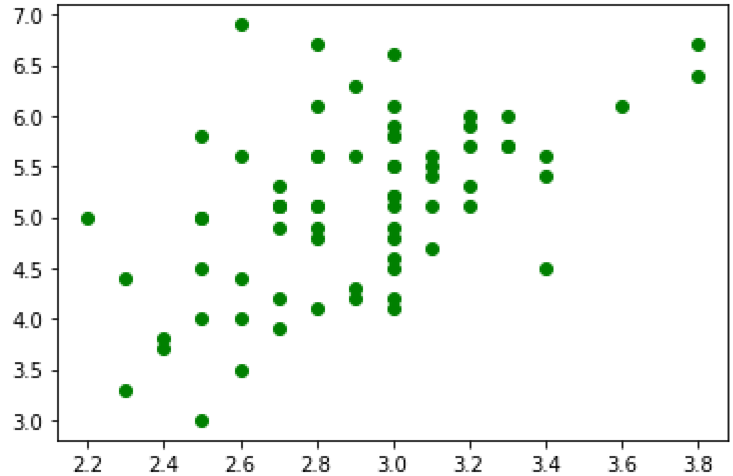

7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8

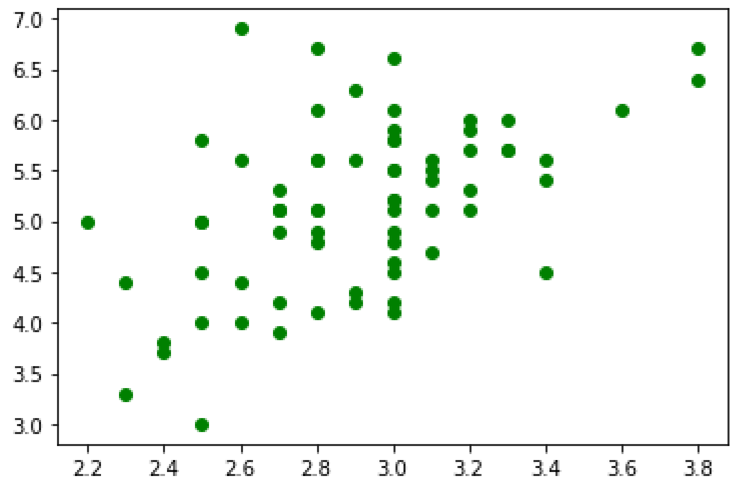

6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8

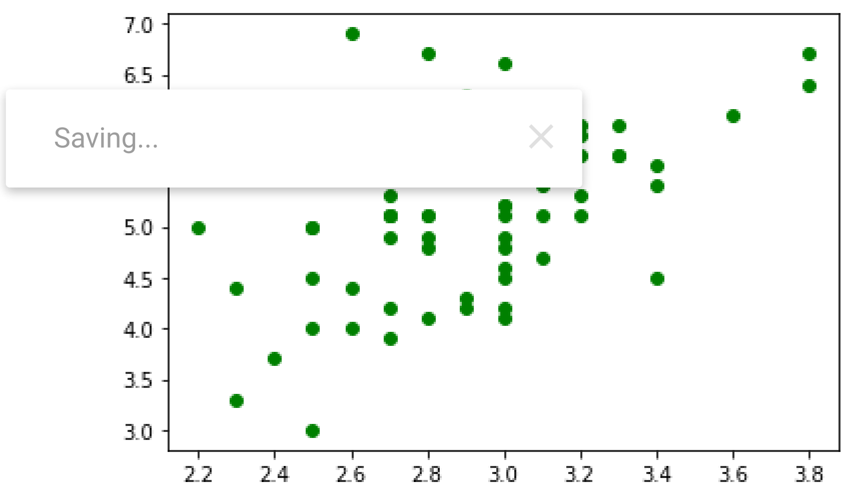

7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8

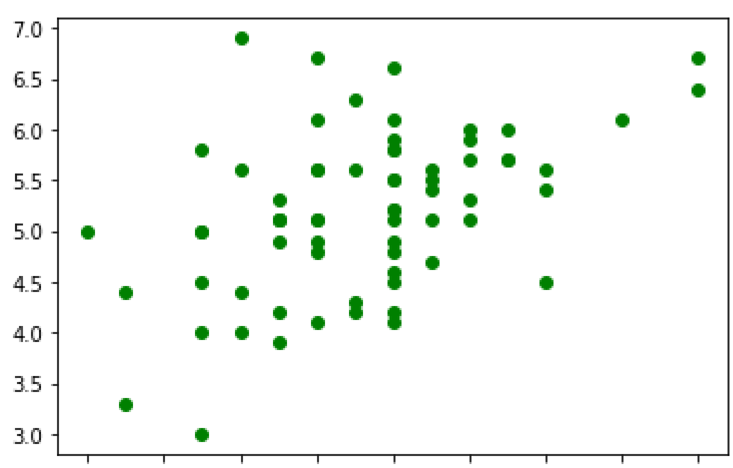

7.0
6.5
Saving...
5.0
4.5
4.0
3.5
3.0
2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8

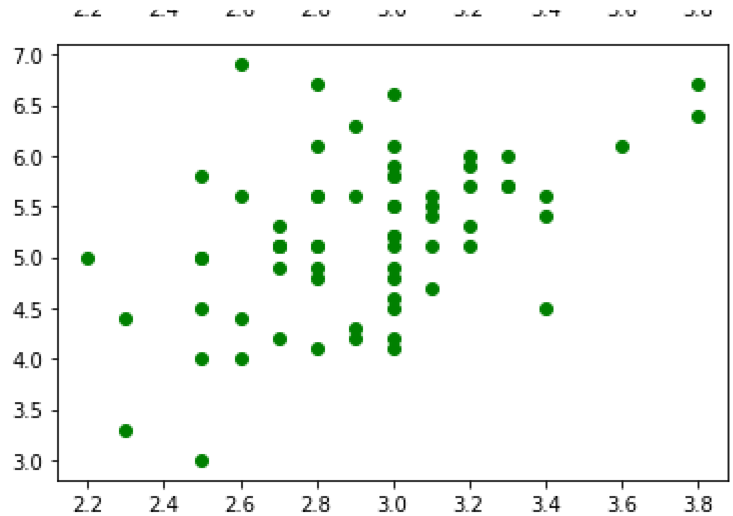

7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8

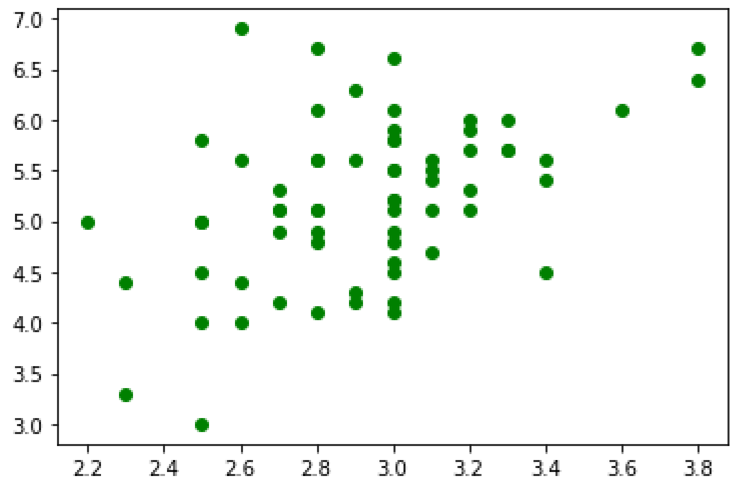

7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.2
2.4
2.6
2.8
3.0
3.2
3.4
3.6
3.8

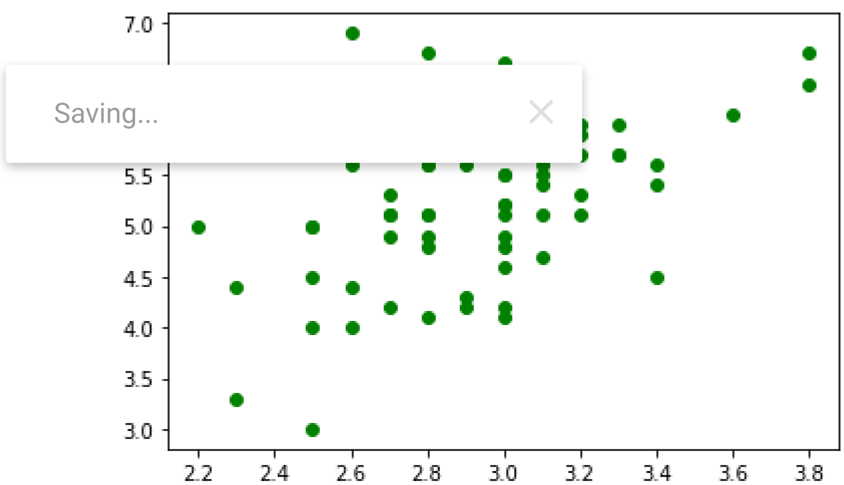

7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.2
2.4
2.6
2.8
3.0
3.2
3.4
3.6
3.8

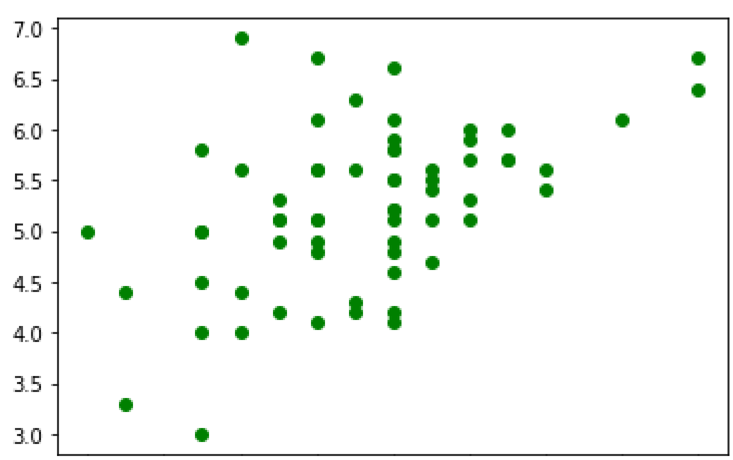

7.0
6.5
Saving...
5.0
4.5
4.0
3.5
3.0
2.2
2.4
2.6
2.8
3.0
3.2
3.4
3.6
3.8


7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0

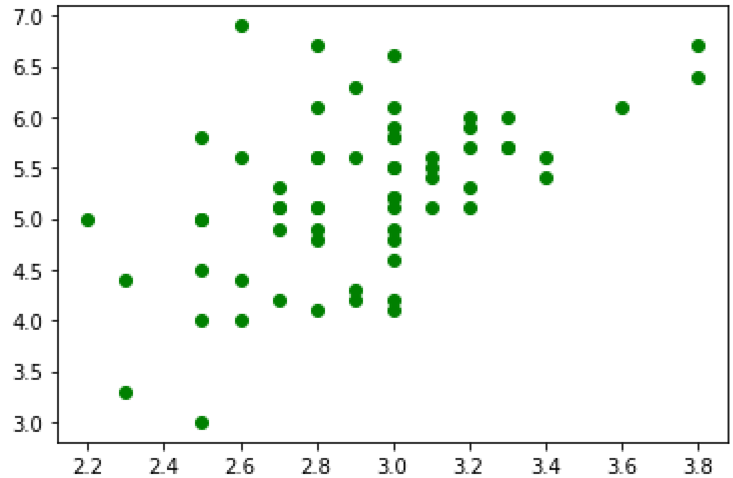

7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.2
2.4
2.6
2.8
3.0
3.2
3.4
3.6
3.8

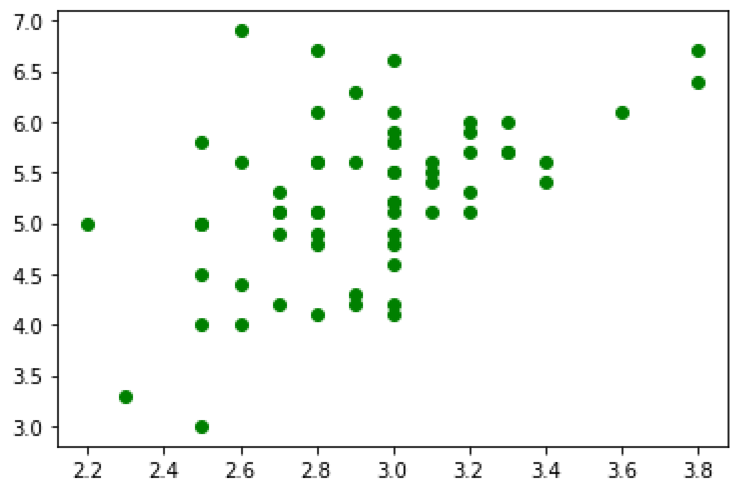

7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.2
2.4
2.6
2.8
3.0
3.2
3.4
3.6
3.8

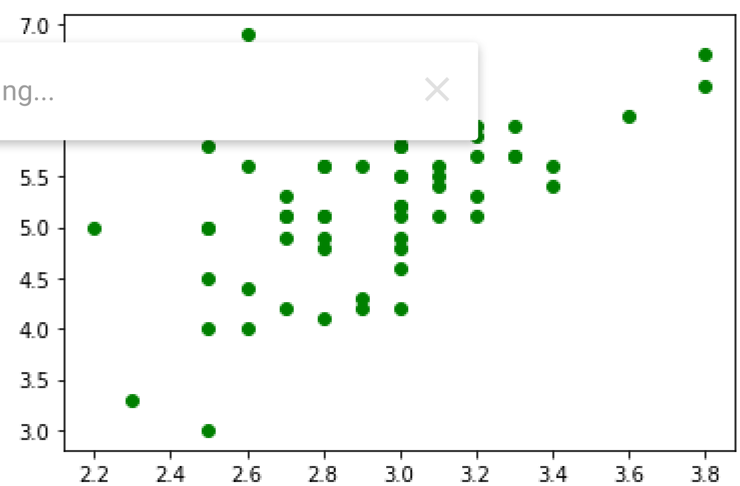

7.0
Saving...
5.5
5.0
4.5
4.0
3.5
3.0
2.2
2.4
2.6
2.8
3.0
3.2
3.4
3.6
3.8


7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0

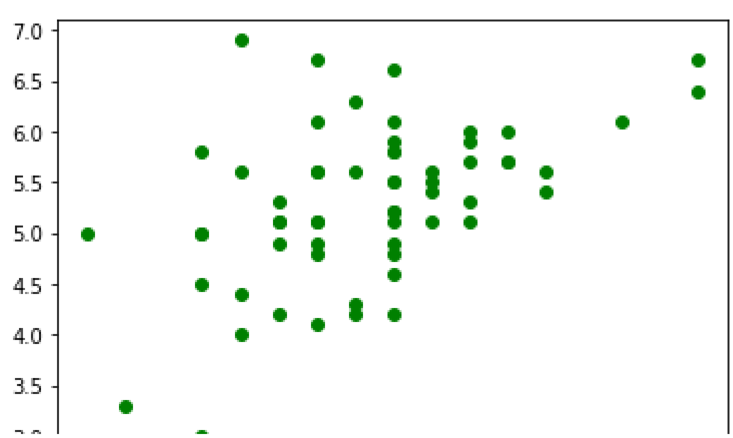

2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8


7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0
2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8

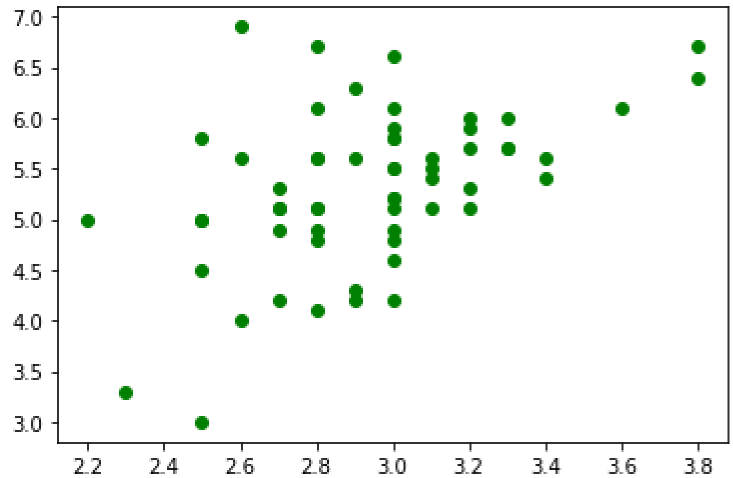

7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0
2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8

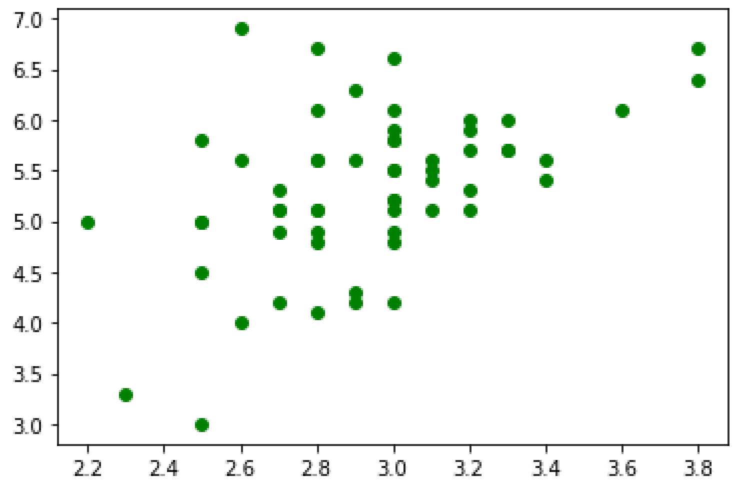

7.0 5.5 5.0 4.5 4.0 3.5 3.0
2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8

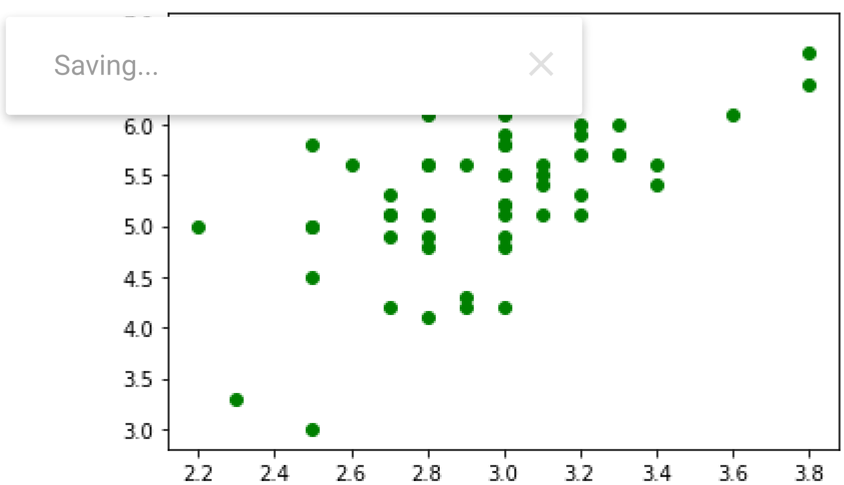
Saving...

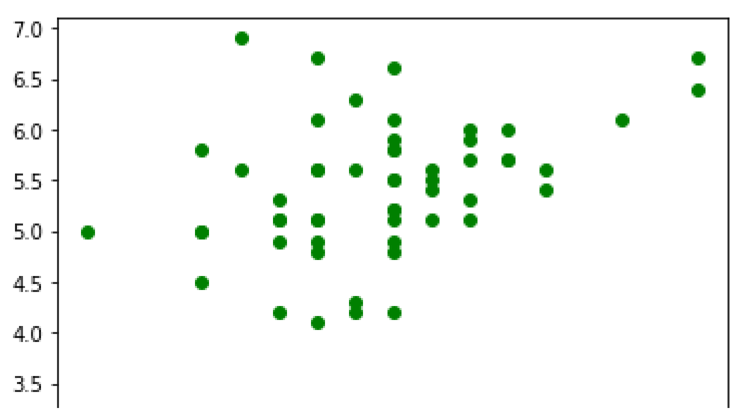

7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5

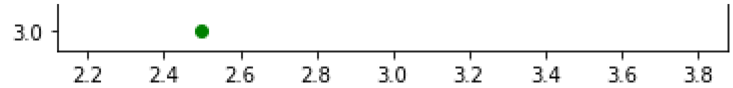

3.0
2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8

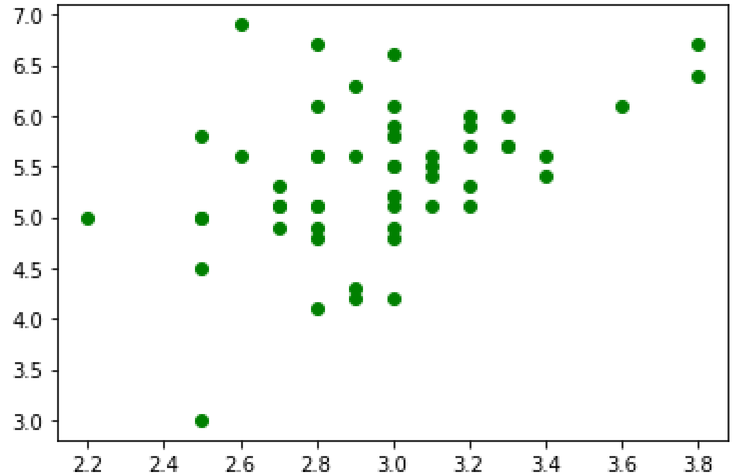

7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0
2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8

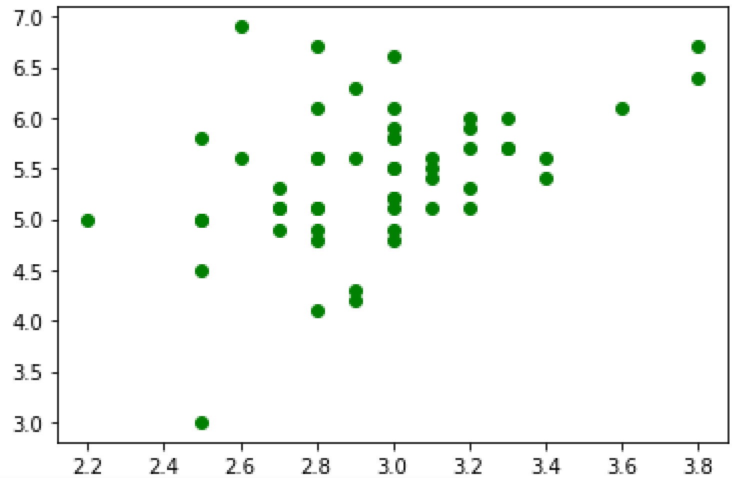

7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0
2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8


Saving...
6.0 5.5 5.0 4.5 4.0 3.5 3.0
2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8

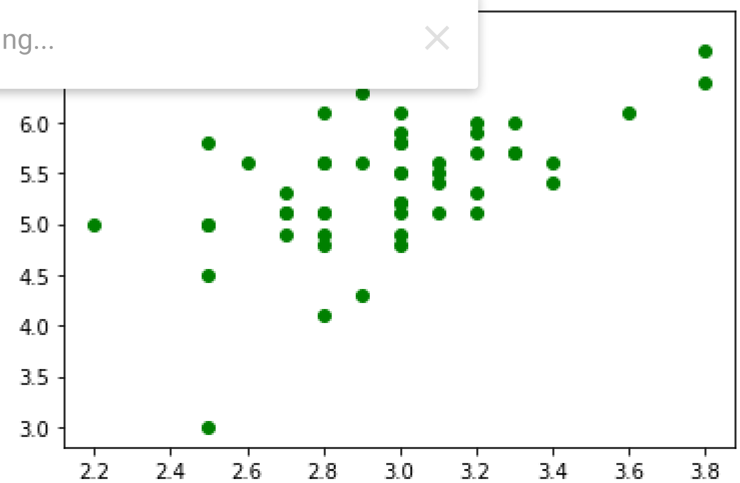

7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5

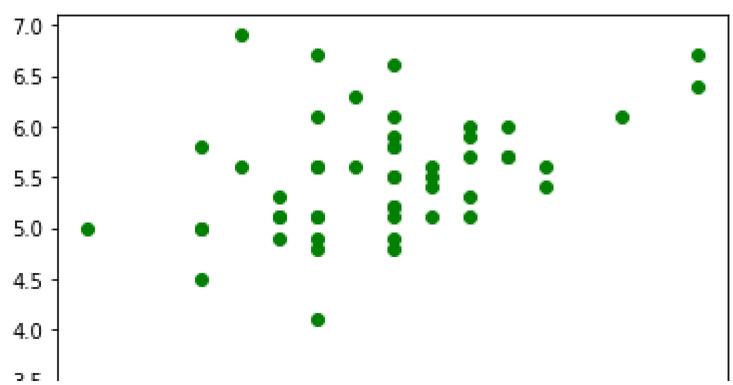

3.0
2.2
2.4
2.6
2.8
3.0
3.2
3.4
3.6
3.8

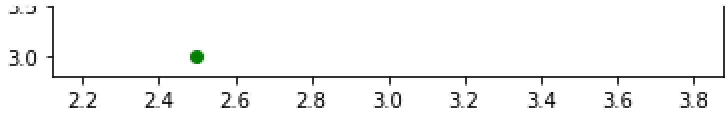

7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.2
2.4
2.6
2.8
3.0
3.2
3.4
3.6
3.8

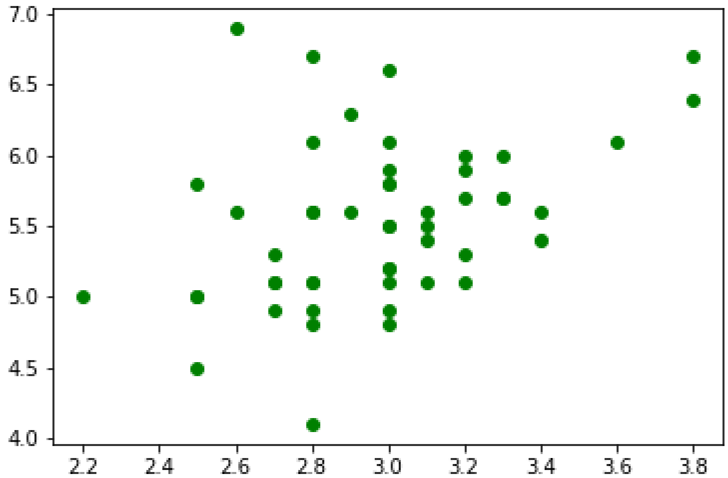

7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.2
2.4
2.6
2.8
3.0
3.2
3.4
3.6
3.8

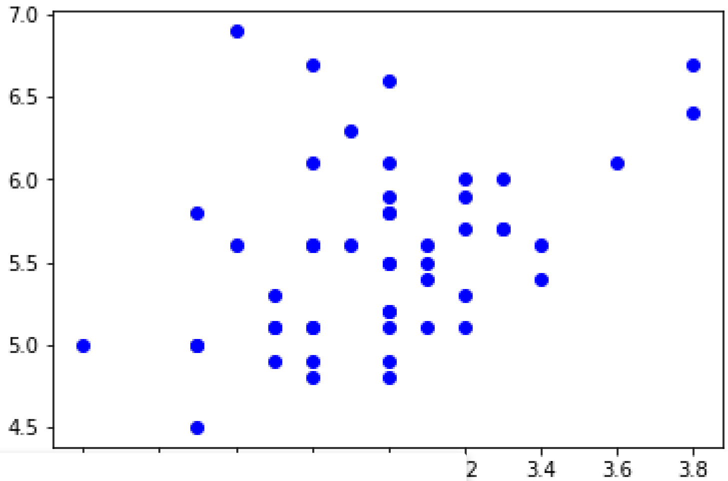
Saving...


6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.2
2.4
2.6
2.8
3.0
3.2
3.4
3.6
3.8

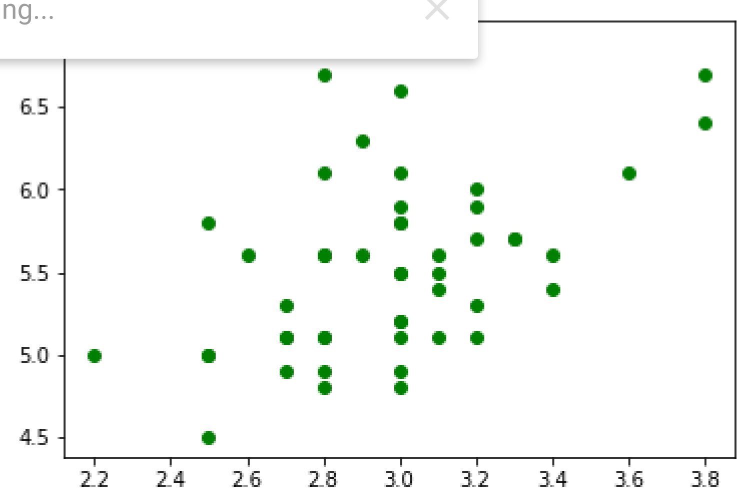

7.0
6.5
6.0
5.5
5.0
4.5
4.0

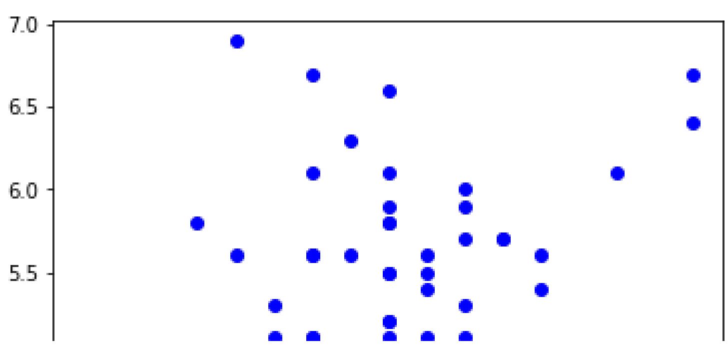

3.0
2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8

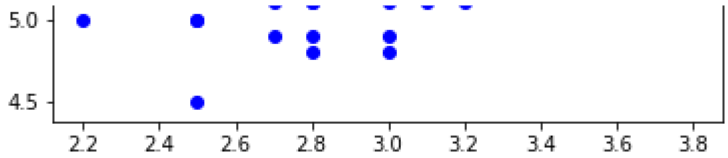

7.0 6.5 6.0 5.5 5.0 4.5 4.0
2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8

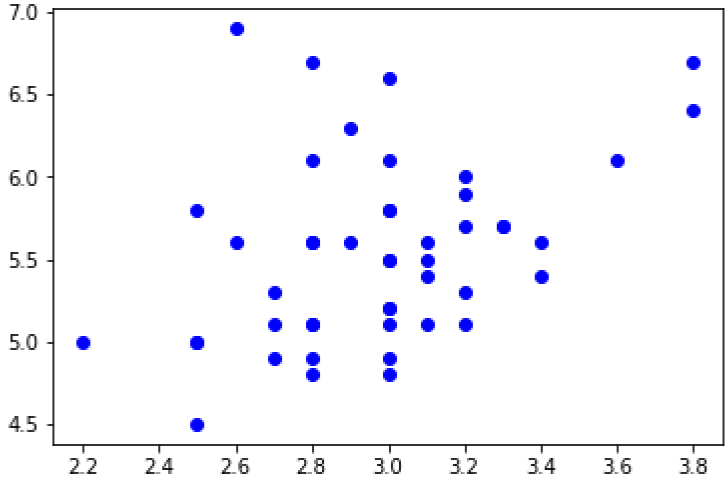

7.0 6.5 6.0 5.5 5.0 4.5
2 3.4 3.6 3.8

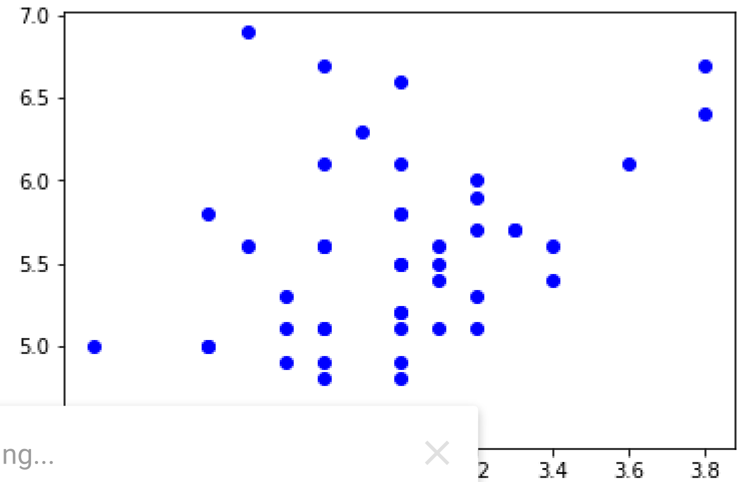
Saving...


6.5 6.0 5.5 5.0 4.5
2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8

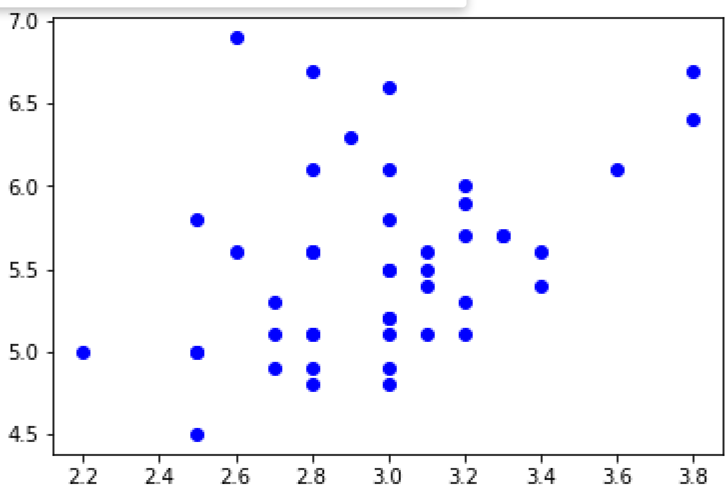

7.0 6.5 6.0 5.5

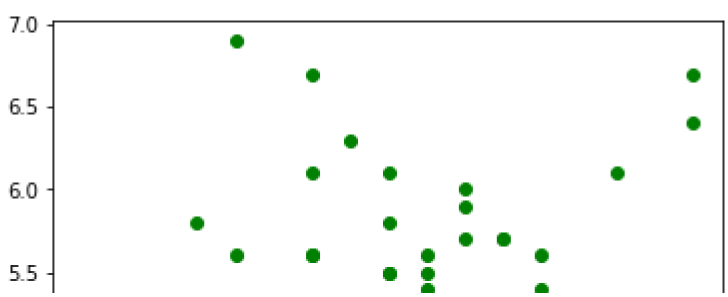

5.0
4.5
2.2
2.4
2.6
2.8
3.0
3.2
3.4
3.6
3.8

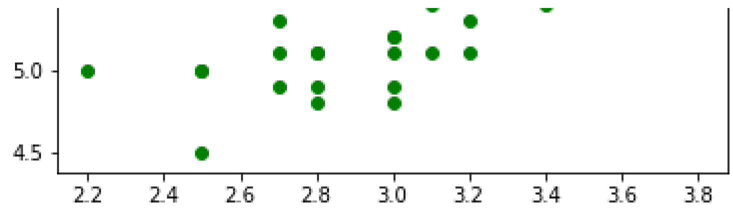

7.0
6.5
6.0
5.5
5.0
4.5
2.2
2.4
2.6
2.8
3.0
3.2
3.4
3.6
3.8

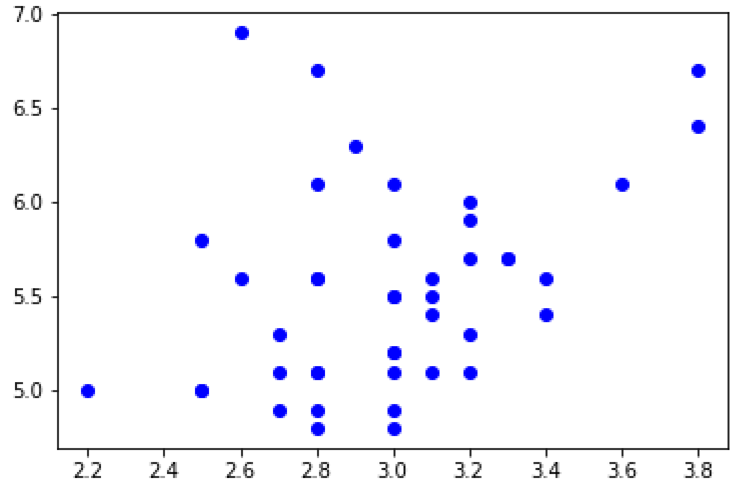

7.0
6.5
6.0
5.5
5.0
2
3.4
3.6
3.8

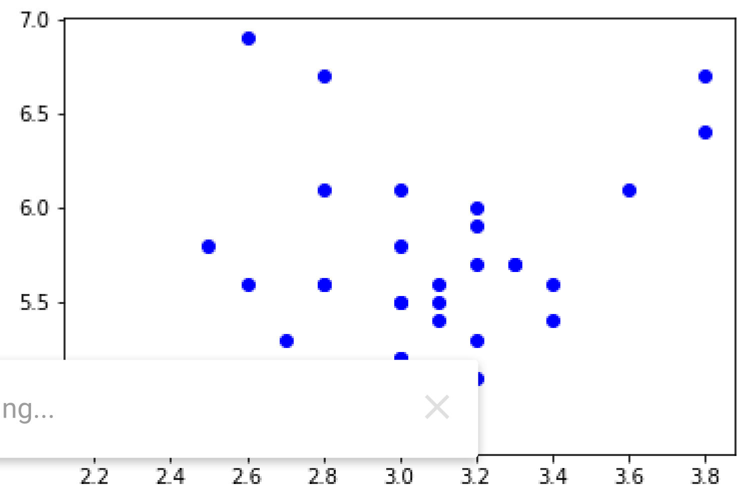
Saving...

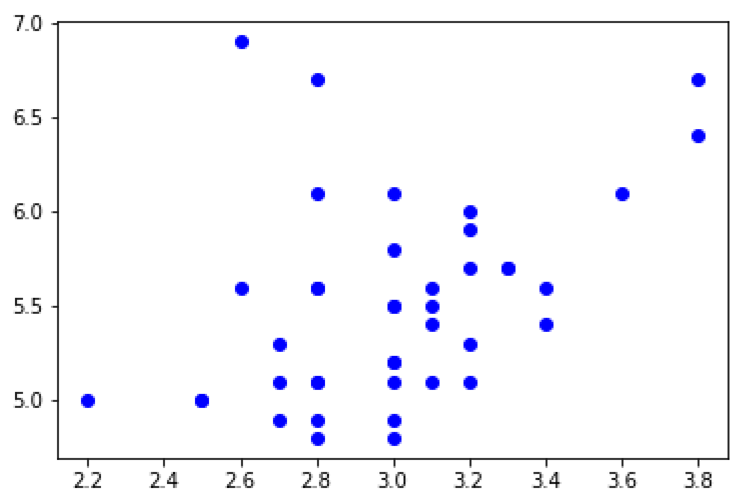

7.0
6.5
6.0
5.5
5.0
4.5
2.2
2.4
2.6
2.8
3.0
3.2
3.4
3.6
3.8

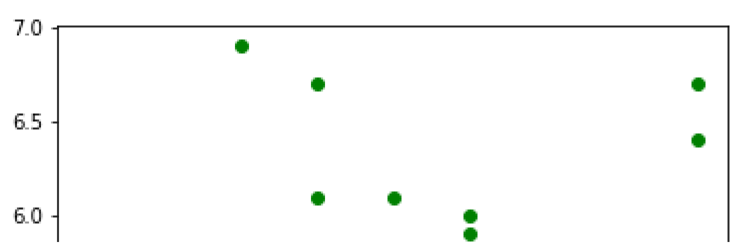

7.0
6.5
6.0
5.5

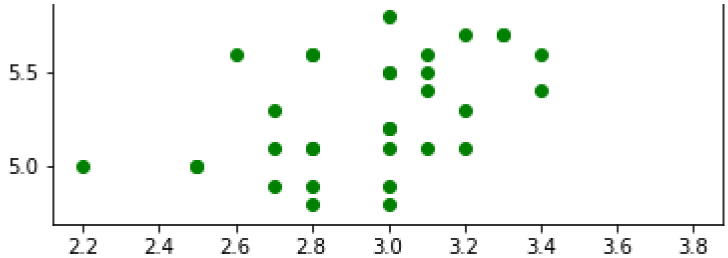

5.0
4.5
2.2
2.4
2.6
2.8
3.0
3.2
3.4
3.6
3.8

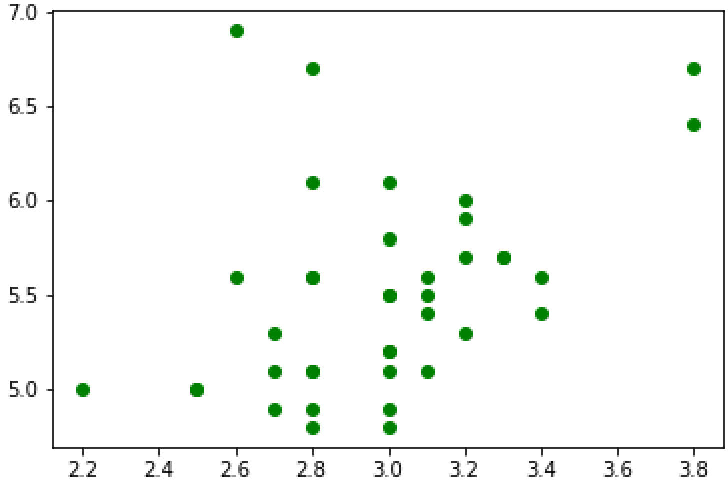

7.0
6.5
6.0
5.5
5.0
2.2
2.4
2.6
2.8
3.0
3.2
3.4
3.6
3.8

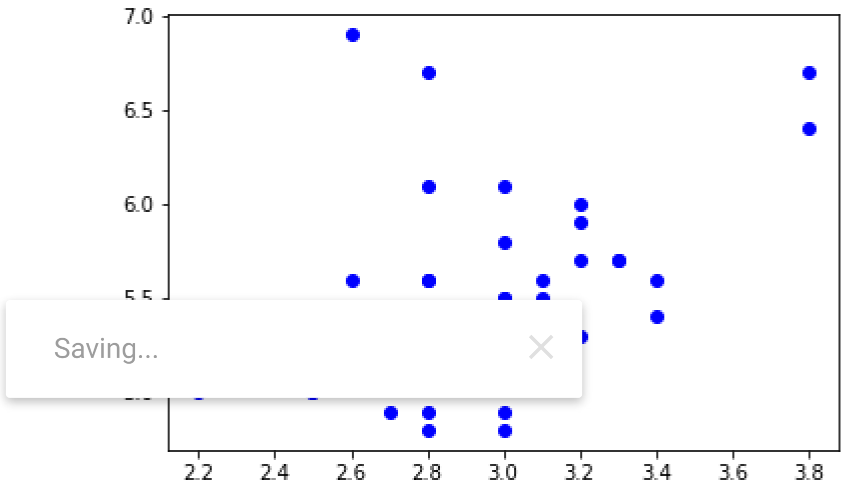

7.0
6.5
6.0
5.5
2.2
2.4
2.6
2.8
3.0
3.2
3.4
3.6
3.8

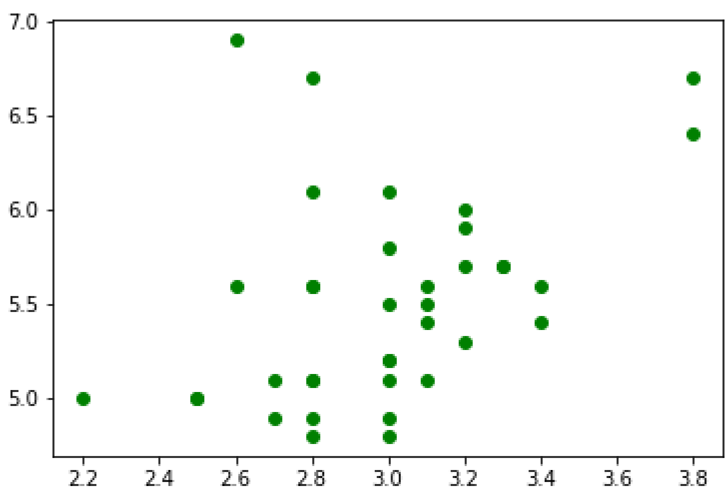

7.0
6.5
6.0
5.5
5.0
2.2
2.4
2.6
2.8
3.0
3.2
3.4
3.6
3.8

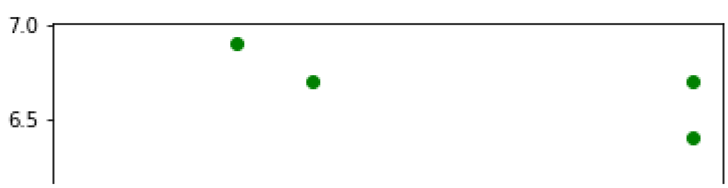

7.0
6.5
6.0

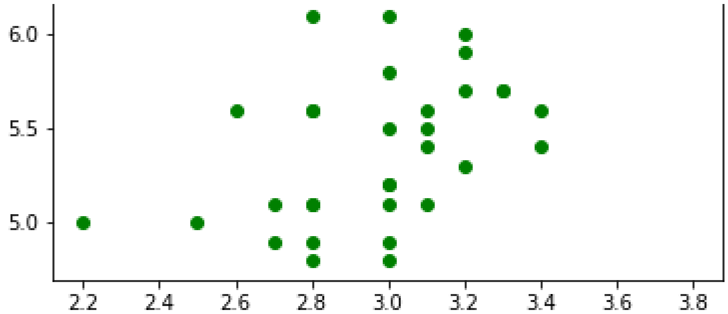

5.5
5.0
2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8

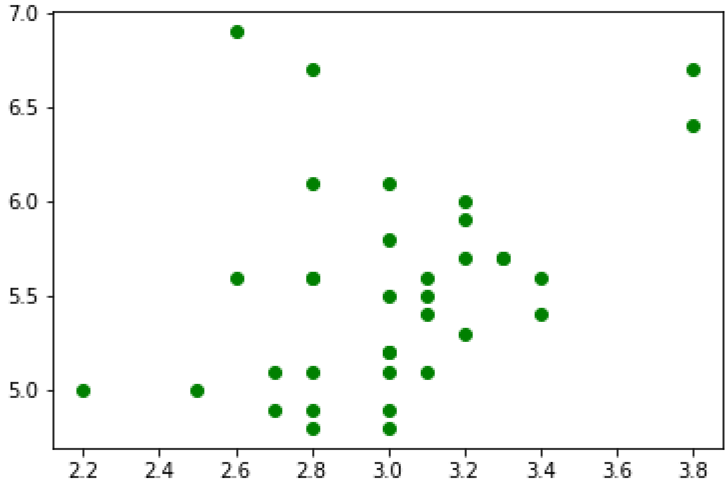

7.0
6.5
6.0
5.5
5.0
2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8

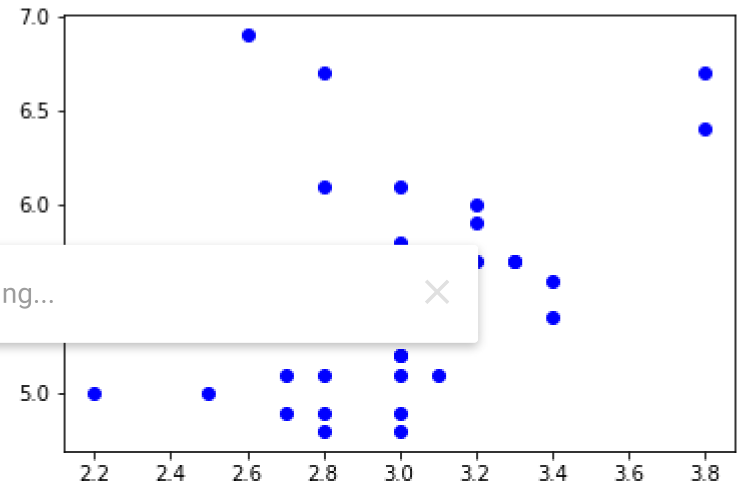

7.0
6.5
6.0
Saving...
2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8


7.0
6.5
6.0
5.5
5.0
2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8

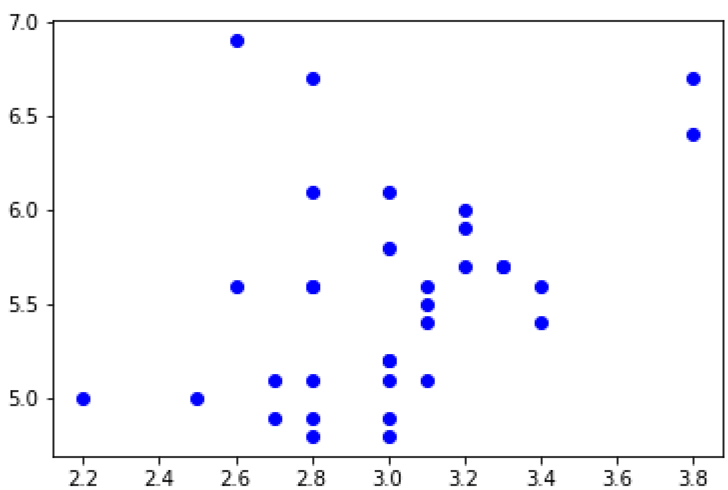

7.0
6.5

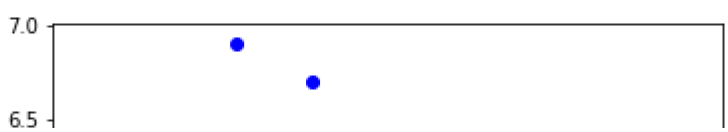

6.0
5.5
5.0
2.2
2.4
2.6
2.8
3.0
3.2
3.4
3.6
3.8

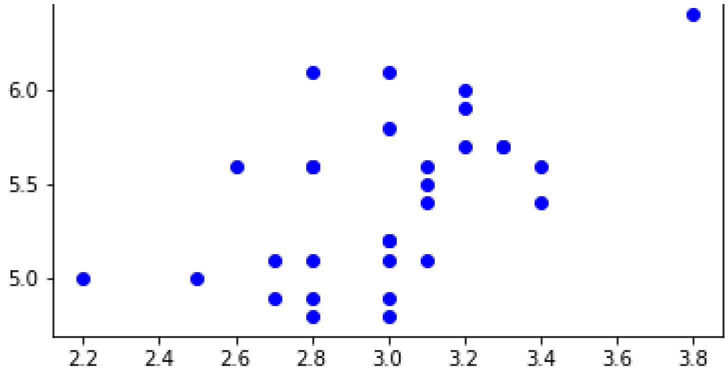

7.0
6.5
6.0
5.5
5.0
2.2
2.4
2.6
2.8
3.0
3.2
3.4
3.6
3.8

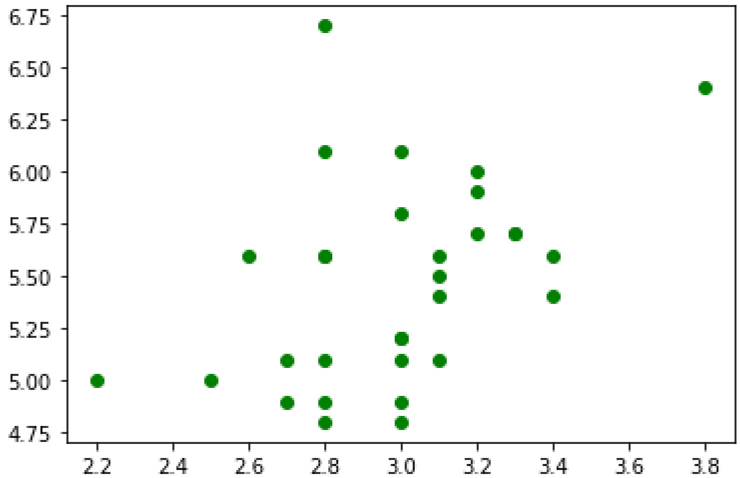

7.0
6.5
6.0
5.0
2.2
2.4
2.6
2.8
3.0
3.2
3.4
3.6
3.8

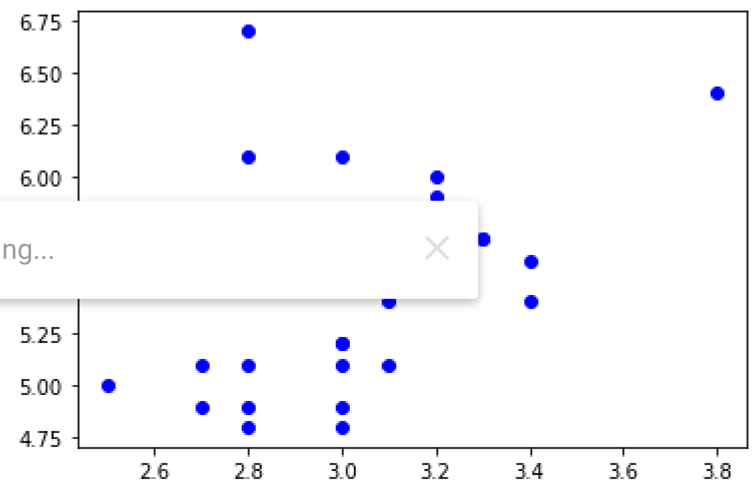
Saving...


7.0
6.5
6.0
5.5
5.0
2.2
2.4
2.6
2.8
3.0
3.2
3.4
3.6
3.8

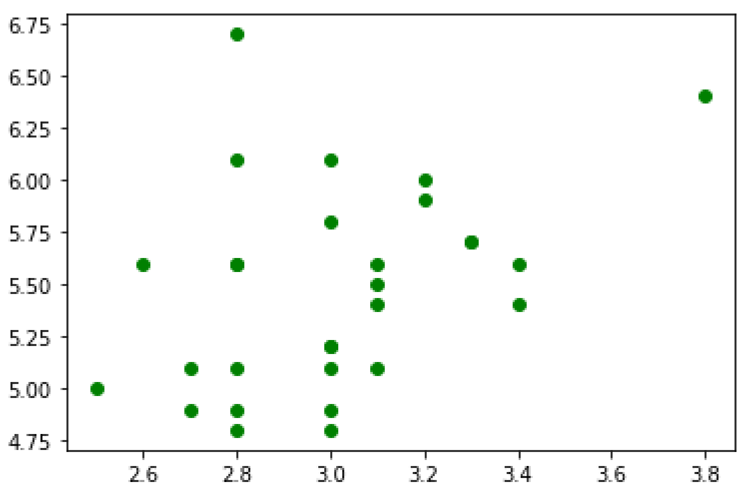

7.0
6.5


6.0
5.5
5.0
2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8

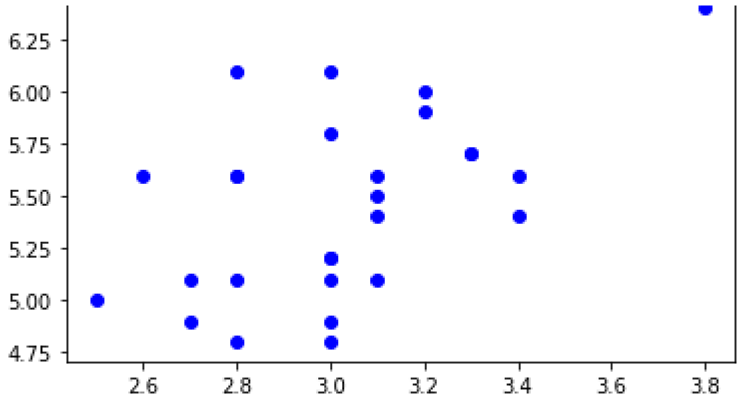

6.75
6.50
6.25
6.00
5.75
5.50
5.25
5.00
4.75
2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8

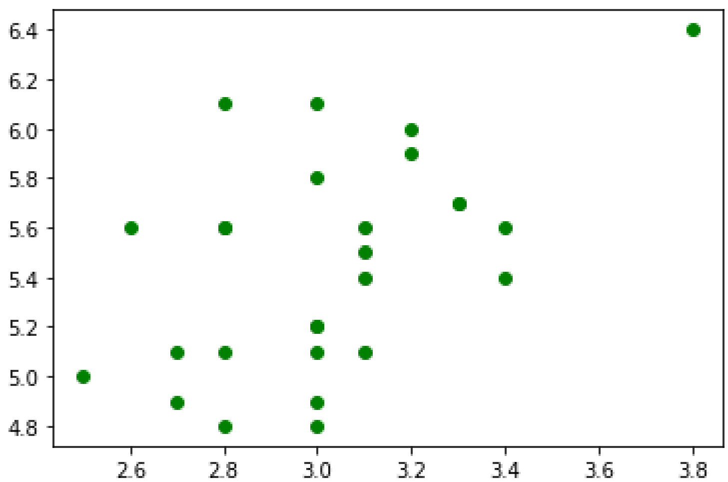

6.75
6.50
6.25
6.00
5.25
5.00
4.75
2.6 2.8 3.0 3.2 3.4 3.6 3.8

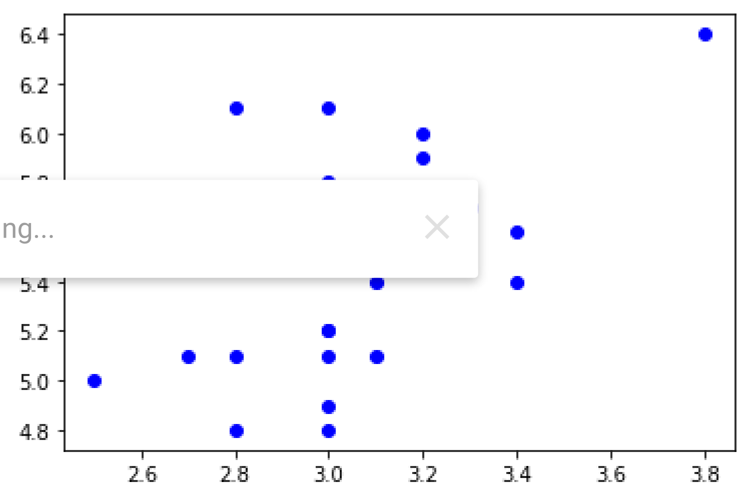
Saving...


6.75
6.50
6.25
6.00
5.75
5.50
5.25
5.00
4.75
2.6 2.8 3.0 3.2 3.4 3.6 3.8

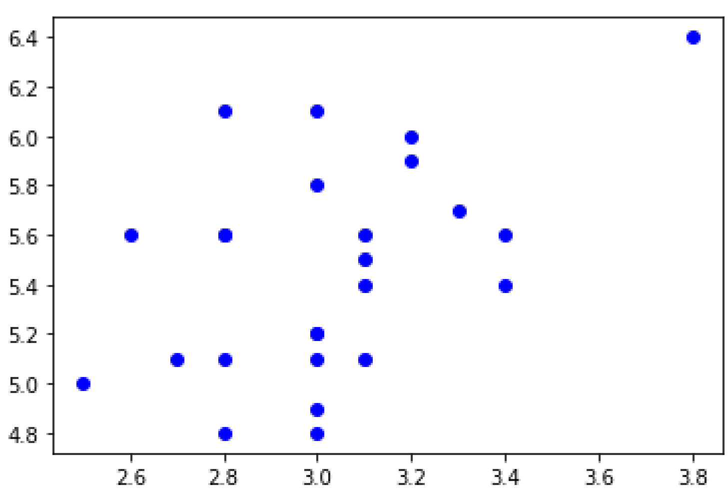

6.75
6.50


6.25
6.00
5.75
5.50
5.25
5.00
4.75
2.6
2.8
3.0
3.2
3.4
3.6
3.8

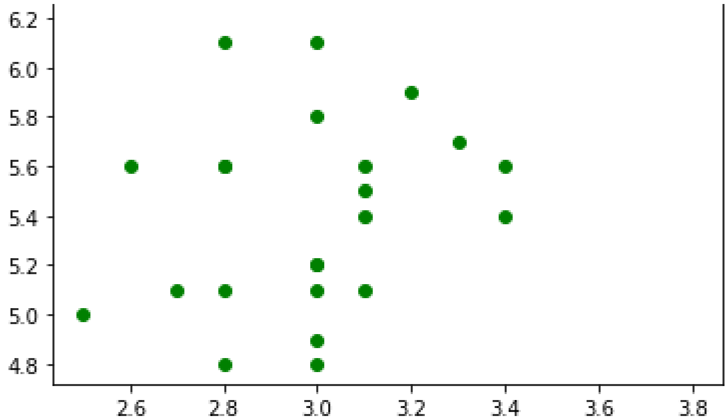

6.4
6.2
6.0
5.8
5.6
5.4
5.2
5.0
4.8
2.6
2.8
3.0
3.2
3.4
3.6
3.8

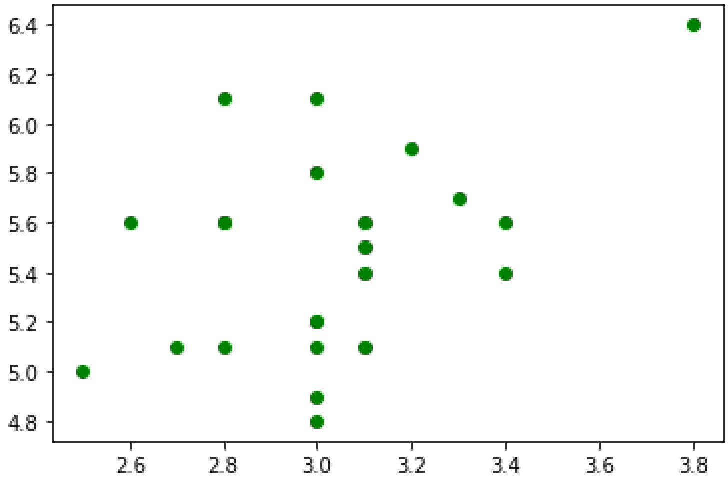

6.4
6.2
6.0
5.4
5.2
5.0
4.8
2.6
2.8
3.0
3.2
3.4
3.6
3.8

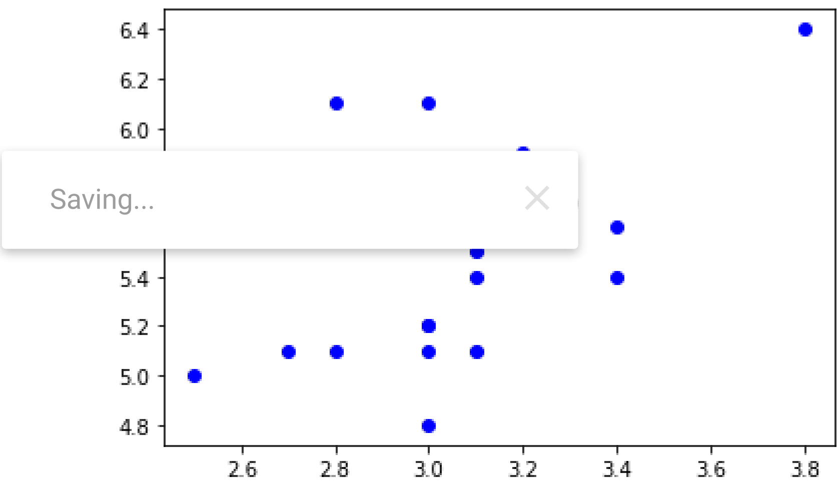
Saving...

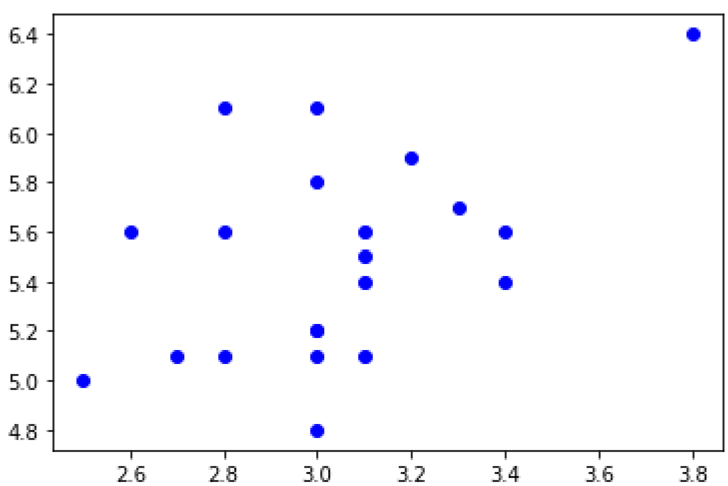

6.4
6.2
6.0
5.8
5.6
5.4
5.2
5.0
4.8
2.6
2.8
3.0
3.2
3.4
3.6
3.8


6.4

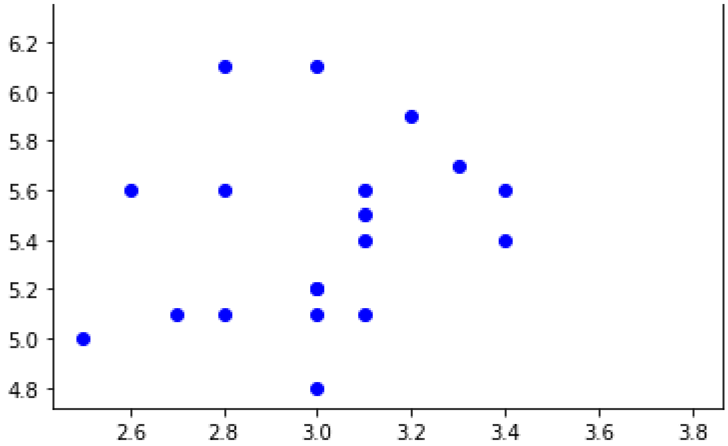

6.2
6.0
5.8
5.6
5.4
5.2
5.0
4.8
2.6
2.8
3.0
3.2
3.4
3.6
3.8

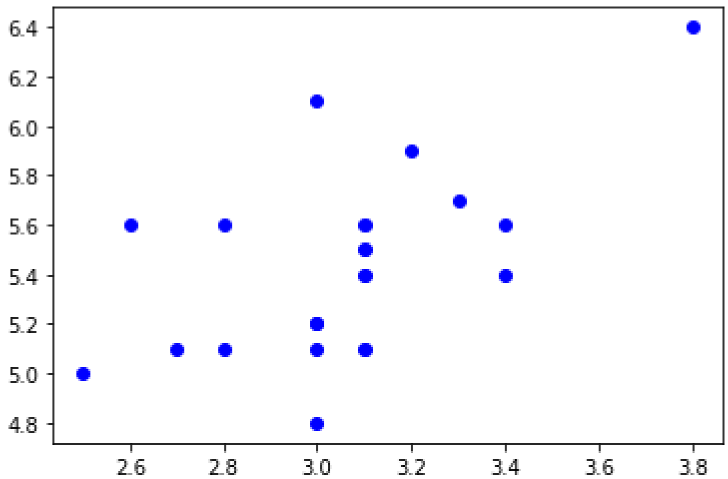

6.4
6.2
6.0
5.8
5.6
5.4
5.2
5.0
4.8
2.6
2.8
3.0
3.2
3.4
3.6
3.8

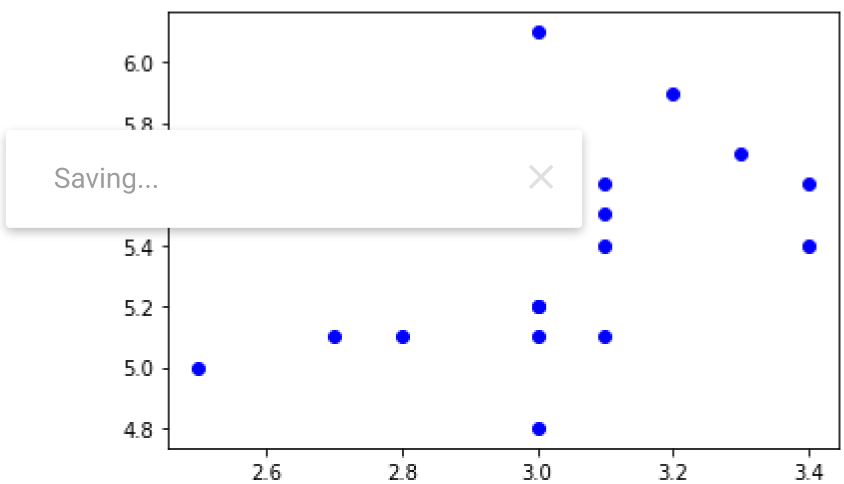

6.4
6.2
6.0
Saving...
5.4
5.2
5.0
4.8
2.6
2.8
3.0
3.2
3.4
3.6
3.8

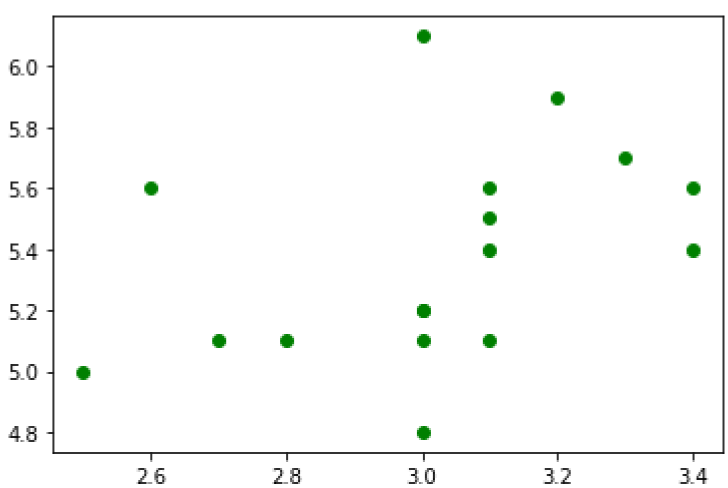

6.4
6.2
6.0
5.8
5.6
5.4
5.2
5.0
4.8
2.6
2.8
3.0
3.2
3.4
3.6
3.8

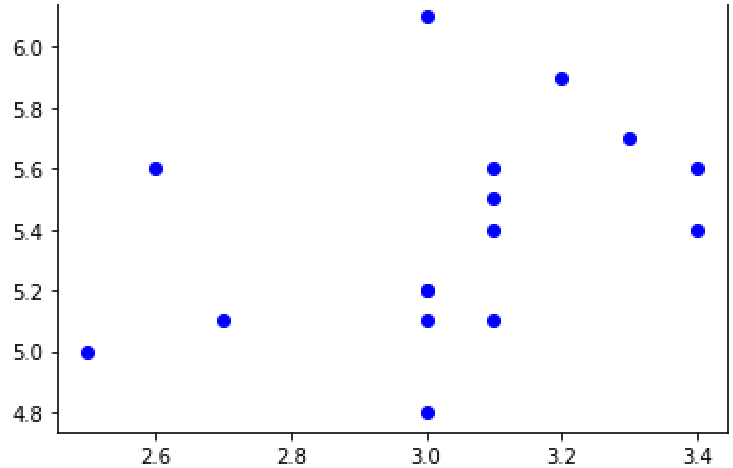

6.4

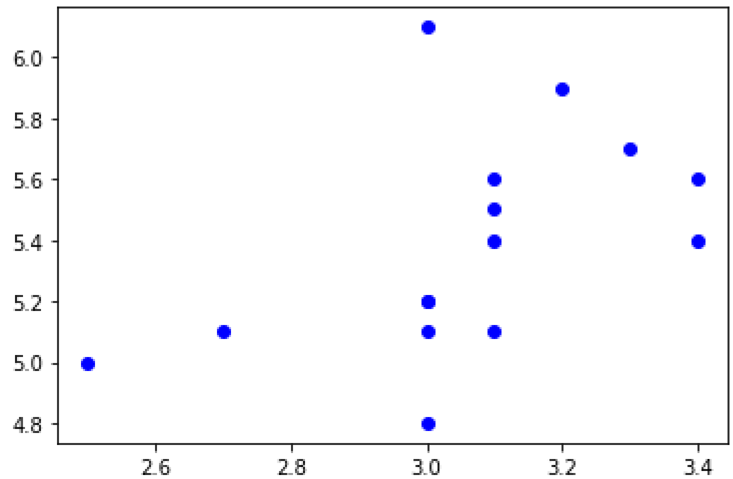

6.2
6.0
5.8
5.6
5.4
5.2
5.0
4.8
2.6
2.8
3.0
3.2
3.4
3.6
3.8

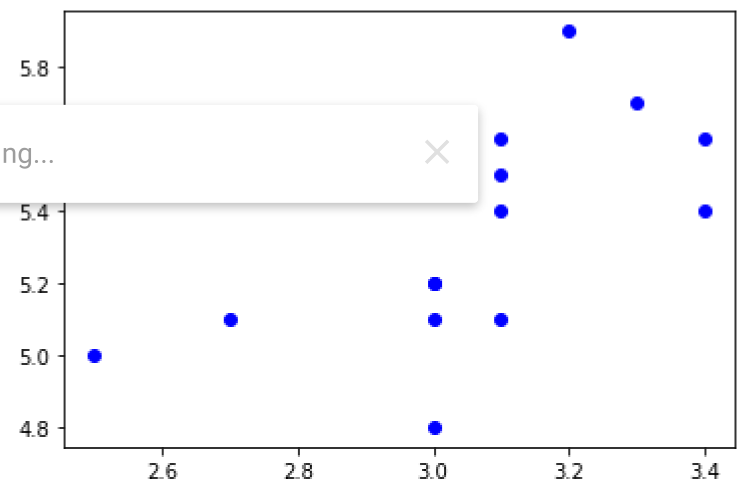

6.4
6.2
6.0
5.8
5.6
5.4
5.2
5.0
4.8
2.6
2.8
3.0
3.2
3.4
3.6
3.8


6.0
5.4
5.2
5.0
4.8
2.6
2.8
3.0
3.2
3.4

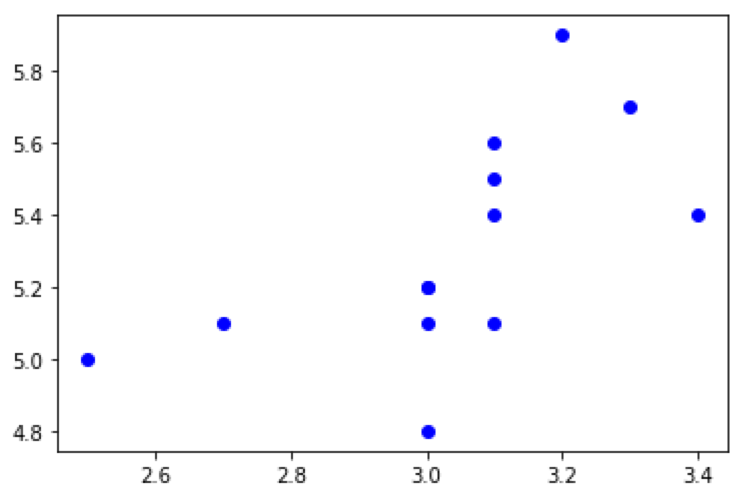

6.0
5.8
5.6
5.4
5.2
5.0
4.8
2.6
2.8
3.0
3.2
3.4

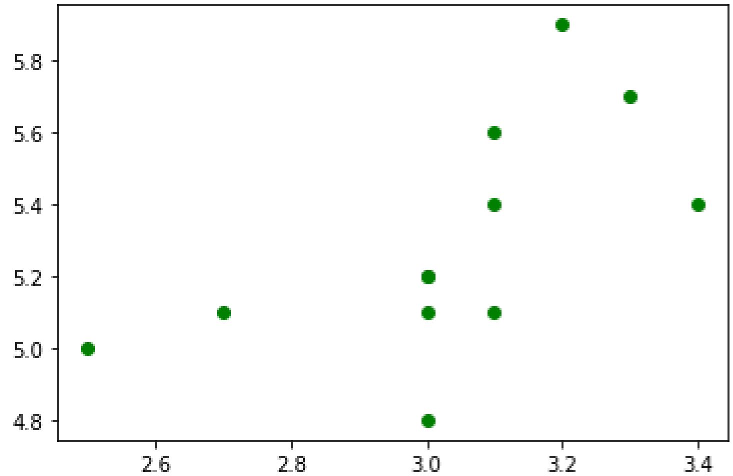

6.0
5.8
5.6
5.4
5.2
5.0
4.8
2.6
2.8
3.0
3.2
3.4

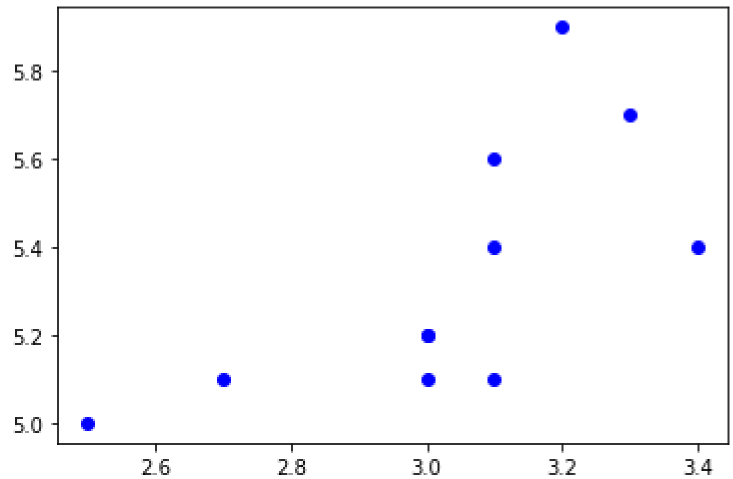

6.0
5.8
5.6
5.4
5.2
5.0
4.8
2.6
2.8
3.0
3.2
3.4

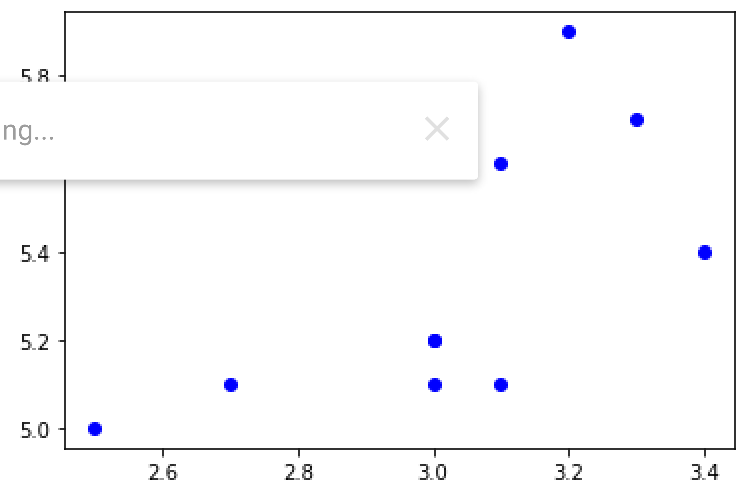

5.8
5.4
5.2
5.0
4.8
2.6
2.8
3.0
3.2
3.4

Saving...

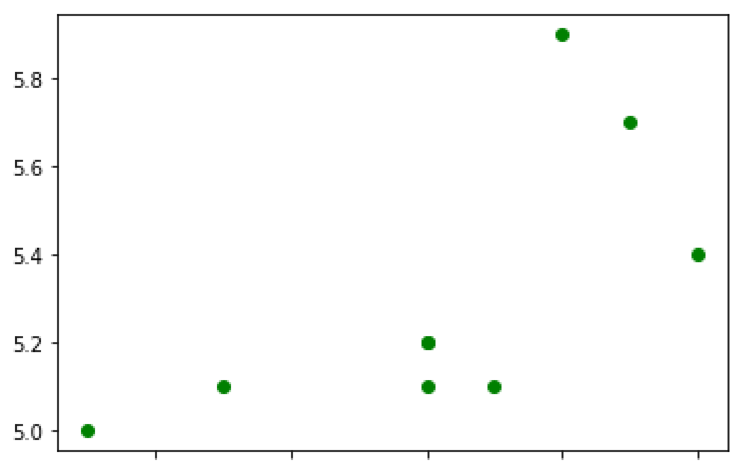

5.8
5.6
5.4
5.2
5.0
4.8
2.6
2.8
3.0
3.2
3.4


5.8
5.6
5.4
5.2
5.0
4.8
2.6
2.8
3.0
3.2
3.4

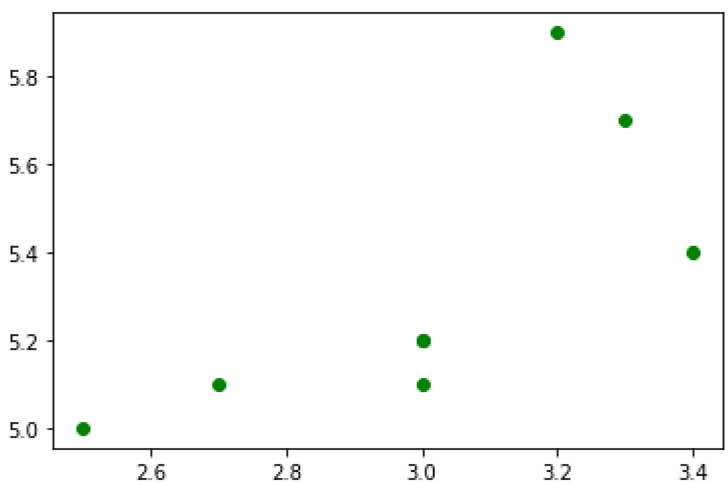

5.8
5.6
5.4
5.2
5.0
2.6
2.8
3.0
3.2
3.4

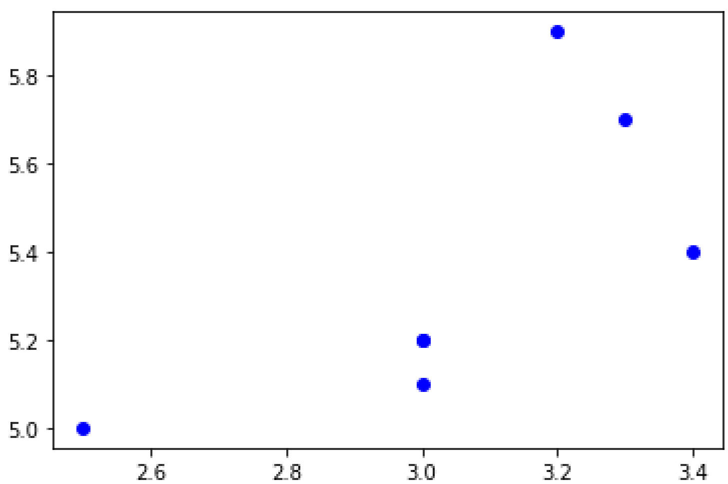

5.4
5.2
5.0
2.6
2.8
3.0
3.2
3.4

Saving...

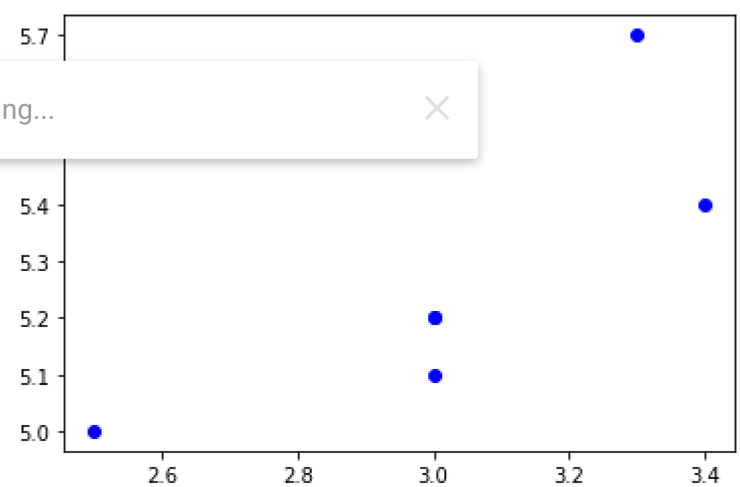

5.8
5.6
5.4
5.2
5.0

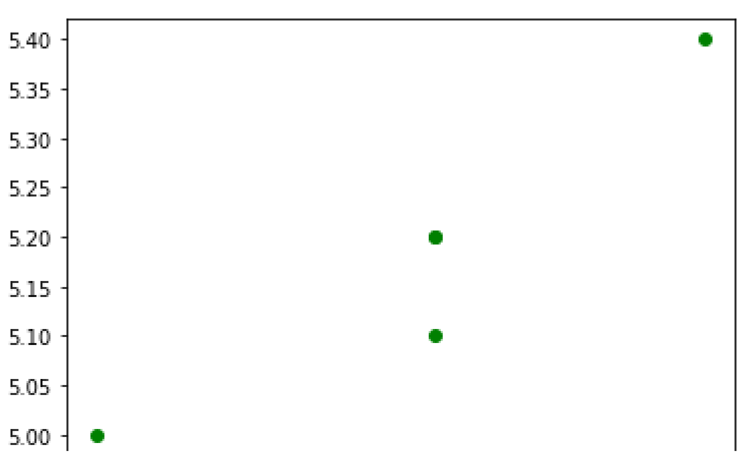
2.6
2.8
3.0
3.2
3.4

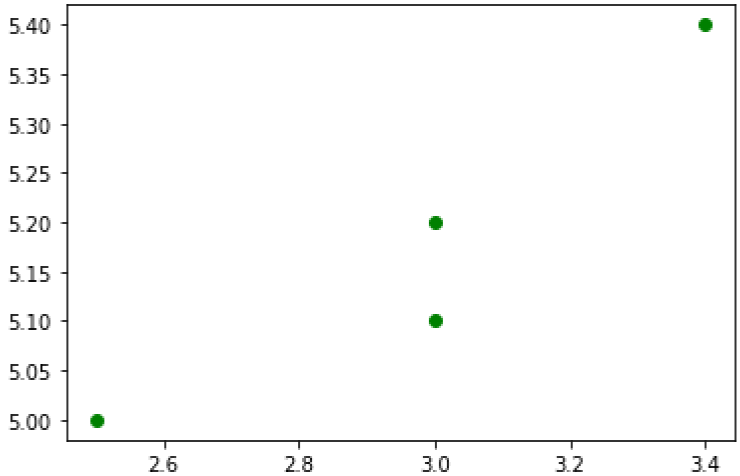

5.8
5.6
5.4
5.2
5.0
2.6
2.8
3.0
3.2
3.4

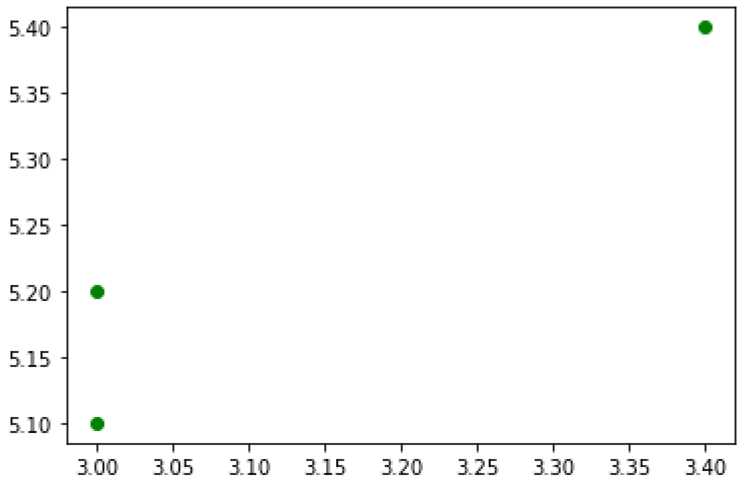

5.8
5.6
5.4
5.2
5.0
2.6
2.8
3.0
3.2
3.4

Saving...


5.7
5.4
5.3
5.2
5.1
5.0
2.6
2.8
3.0
3.2
3.4


5.40
5.35
5.30
5.25
5.20
5.15
5.10
5.05
5.00





Saving...

```
MyDrive/HTRU_2.csv",header=None)
```

```
HRTU_2=HRTU_2.drop(columns=8)
SHRTU_2=pd.DataFrame(preprocessing.scale(HRTU_2))
print(SHRTU_2)
```

```
pca=PCA(n_components=2)
DHRTU_2=pca.fit_transform(SHRTU_2)
print(DHRTU_2)
```

```
e=list()
for i in np.arange(2,10):
  clusters=KMeans(n_clusters=i)
  clusters.fit(DHRTU_2)
  e.append(clusters.inertia_)
ax=plt.figure(dpi=180).gca()
plt.plot(np.arange(2,10),e)
plt.xlabel("Clusters")
plt.ylabel("Squared sum of Error")
plt.show()
```

```
plt.show()
```

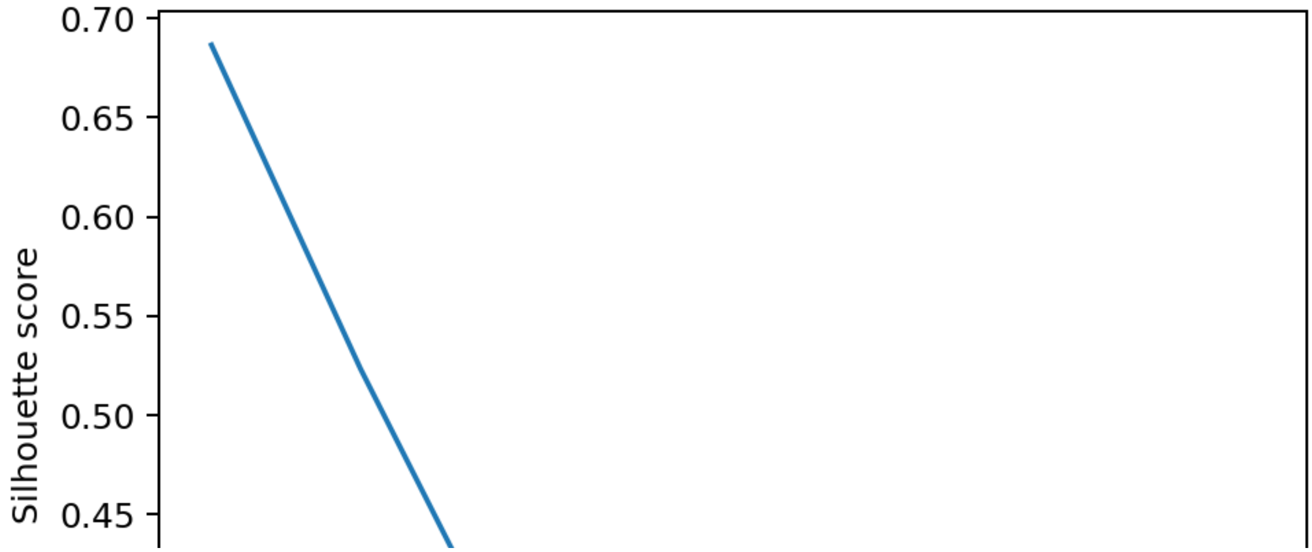

```
clusters= KMeans(n_clusters=3)
clusters.fit(DHRTU_2)
labels=clusters.labels_
ax=plt.figure(dpi=180).gca()
plt.scatter(DHRTU_2[:,0],DHRTU_2[:,1],c=labels,edgecolors='k',)
```

Silhouette Method

```
from sklearn.metrics import silhouette_score
from sklearn import cluster, datasets, mixture
from sklearn.neighbors import kneighbors_graph
from sklearn.preprocessing import StandardScaler
from itertools import cycle, islice
```

```
score=[]
for i in np.arange(2,10):
    clusters=KMeans(n_clusters=i)
    clusters.fit(DHRTU_2)
    score.append(silhouette_score(DHRTU_2,clusters.labels_))
```

```
ax=plt.figure(dpi=180).gca()
plt.plot(np.arange(2,10),score)
plt.xlabel("Clusters")
```



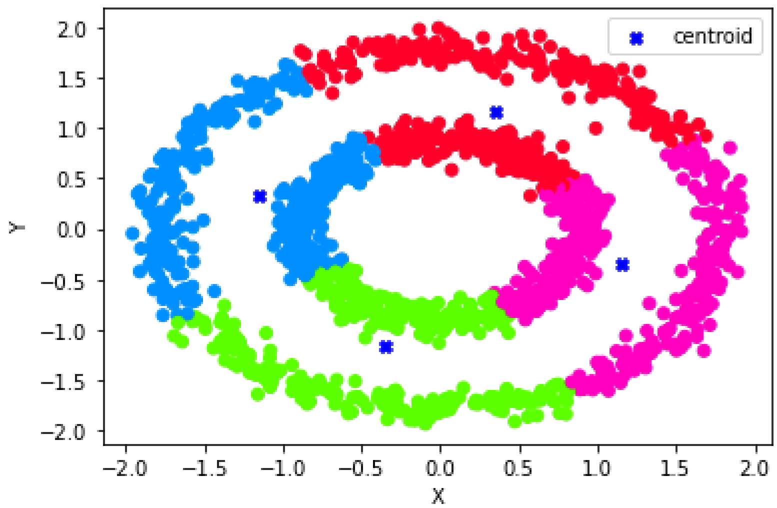

```
np.random.seed(0)
n_samples =1500
noisy_circles =datasets.make_circles(n_samples=n_samples, factor=0.5, noise=0.05)
print(noisy_circles)
noisy_moons=datasets.make_moons(n_samples=n_samples, noise=0.05)
print(noisy_moons)
blobs = datasets.make_blobs(n_samples=n_samples, random_state=8)
print(blobs)
no_structures =np.random.rand(n_samples,2),None
print(no_structures)
```

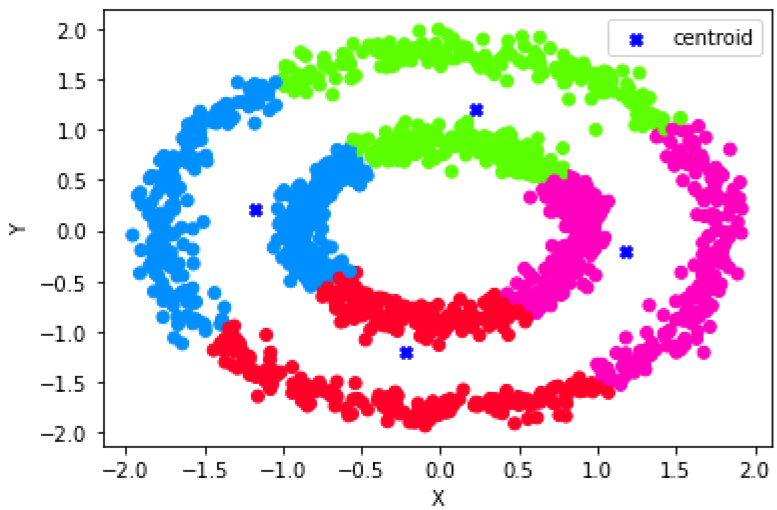
```
(array([[-0.67799938, -0.69875698],
       [ 0.93143746,  0.19139133],
Saving...                        5],

                                 7],
       [ 0.01719727, -0.94513802],
       [ 0.91377877, -0.59884164]]), array([0, 0, 1, ..., 1, 0, 0]))
(array([[ 0.49627131, -0.34275349],
       [-0.16629956,  0.92234209],
       [ 0.71895601,  0.66529038],
       ...,
       [ 1.90950927,  0.02989686],
       [ 0.54623069, -0.36003133],
       [ 0.04090016,  0.37069297]]), array([1, 0, 0, ..., 1, 1, 1]))
(array([[ 5.86749807,  8.17715188],
       [ 5.61369982,  9.93295527],
       [ 7.22508428, 10.44886194],
       ...,
       [ 7.73674097, 10.82855388],
       [-4.61701094, -9.64855983],
       [-3.48640175, -9.25766922]]), array([0, 0, 0, ..., 0, 2, 2]))
(array([[0.59945663, 0.24694133],
       [0.5173267 , 0.57255303],
       [0.55229185, 0.40567924],
       ...,
       [0.8384347 , 0.52906874],
```

```
            [0.84228843, 0.11517496],
            [0.91963613, 0.22592146]]), None)
```

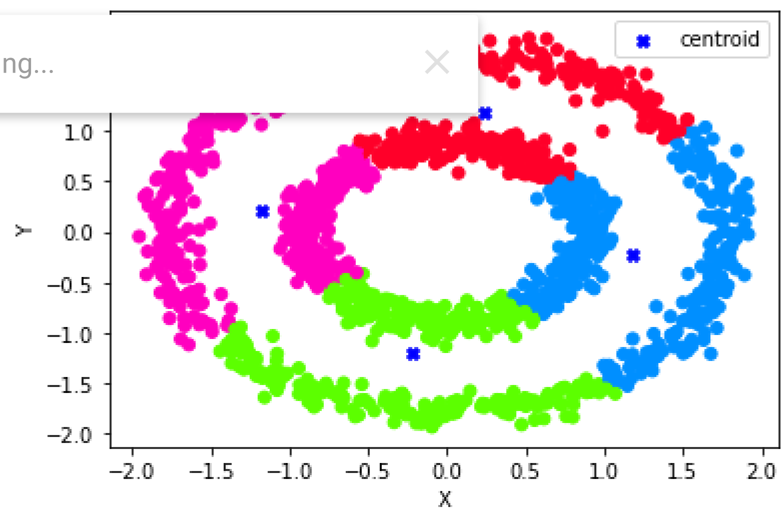
```
datasets=[noisy_circles,noisy_moons,blobs,no_structures]
for i,j in datasets:
  X=StandardScaler().fit_transform(i)
  for num in range(2,5):
    kmeans = KMeans(n_clusters=n)
    kmeans1=kmeans.fit(X)
    centroid=kmeans1.cluster_centers_
    l=kmeans1.labels_
    plt.scatter(X[:,0],X[:,1],c=l,cmap='gist_rainbow')
    plt.scatter(centroid[:,0],centroid[:,1],marker='X',color='blue',label='centroid')
    plt.xlabel('X')
    plt.ylabel('Y')
    plt.legend()
    plt.show()
```

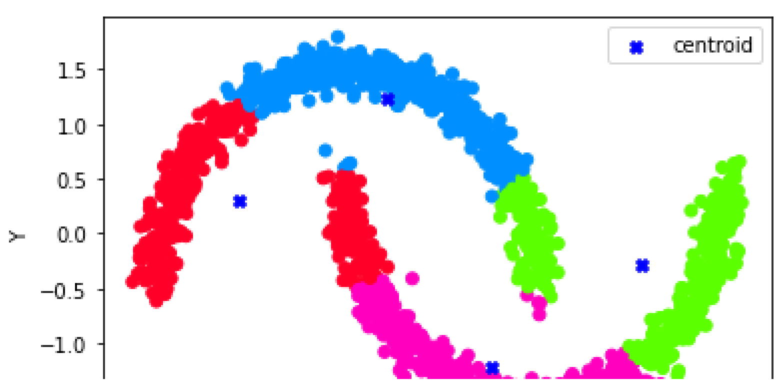
Saving...

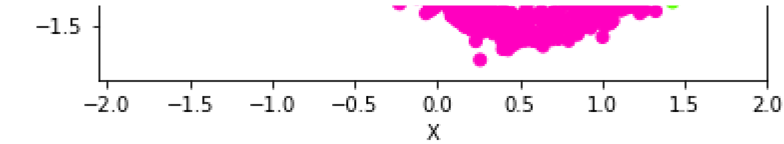

centroid
2.0 1.5 1.0 0.5 0.0 −0.5 −1.0 −1.5 −2.0
Y
−2.0 −1.5 −1.0 −0.5 0.0 0.5 1.0 1.5 2.0
X

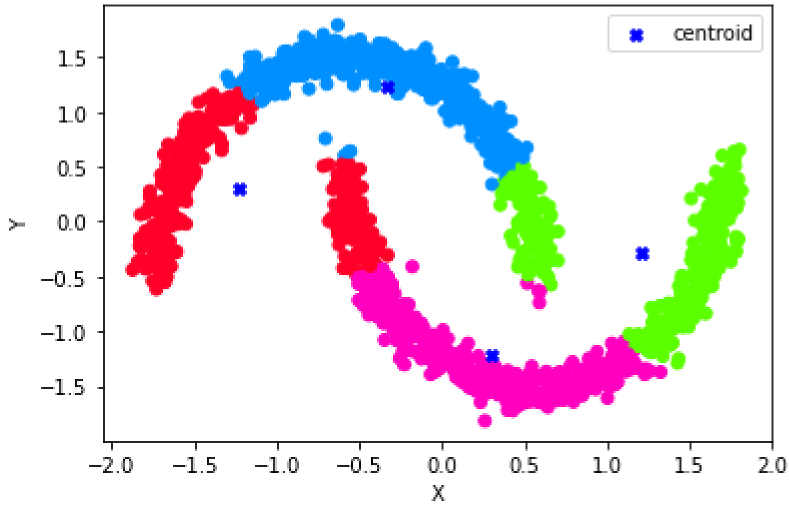

centroid
2.0 1.5 1.0 0.5 0.0 −0.5 −1.0 −1.5 −2.0
Y
−2.0 −1.5 −1.0 −0.5 0.0 0.5 1.0 1.5 2.0
X

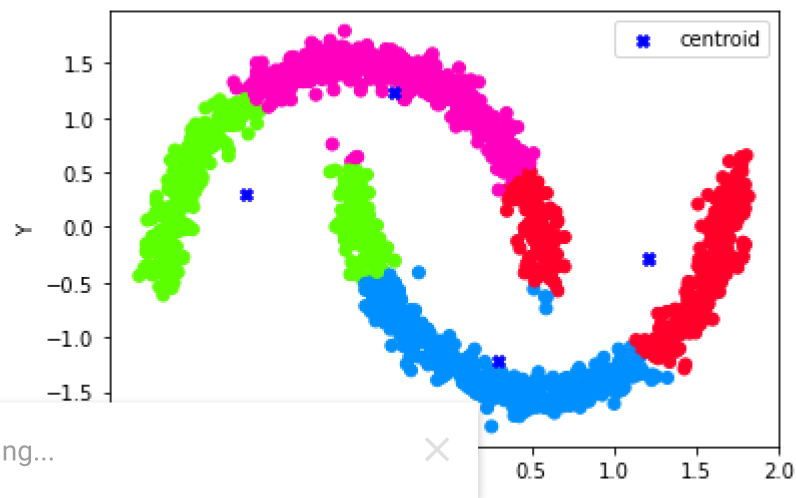
Saving...


centroid
1.0 0.5 0.0 −0.5 −1.0 −1.5 −2.0
Y
−2.0 −1.5 −1.0 −0.5 0.0 0.5 1.0 1.5 2.0
X

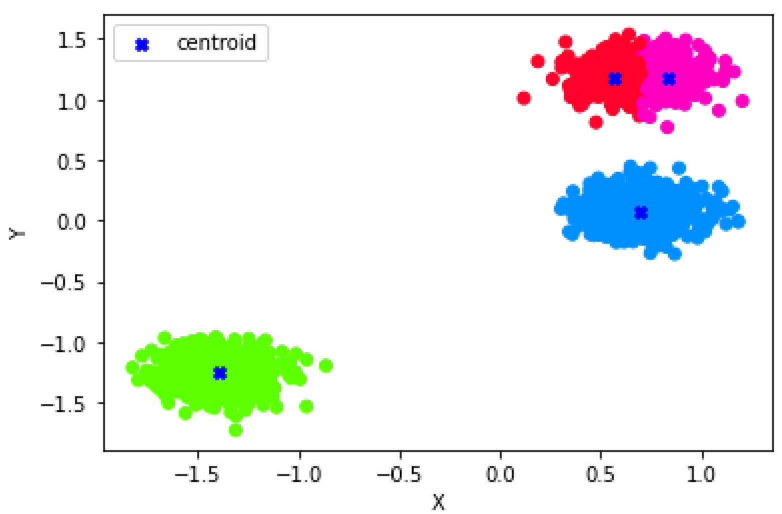

centroid
1.5 1.0 0.5 0.0 −0.5 −1.0
Y

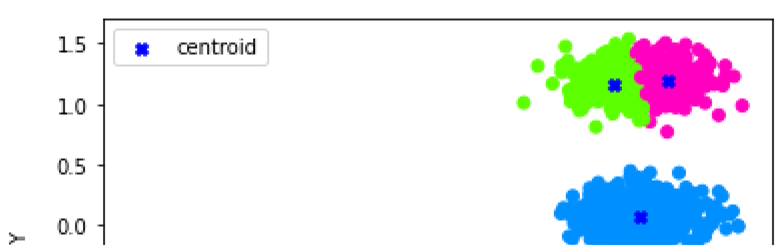

−1.5
−2.0 −1.5 −1.0 −0.5 0.0 0.5 1.0 1.5 2.0
X


centroid
1.5 1.0 0.5 0.0 −0.5 −1.0 −1.5
Y
−2.0 −1.5 −1.0 −0.5 0.0 0.5 1.0 1.5 2.0
X


centroid
1.5 1.0 0.5 0.0 −0.5 −1.0 −1.5
Y
0.5 1.0 1.5 2.0

Saving...


centroid
1.5 1.0 0.5 0.0 −0.5 −1.0 −1.5
Y
−1.5 −1.0 −0.5 0.0 0.5 1.0
X


centroid
1.5 1.0 0.5 0.0
Y