Iris-Unsupervised Machine Learning¶

July 21, 2022

1 Iris - Unsupervised Machine Learning-GRIP

[100]:

```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
from sklearn.cluster import KMeans
%matplotlib inline
import warnings
warnings.filterwarnings('ignore')
```

[101]:

```
#Importing the iris dataset

from sklearn.datasets import load_iris

df = load_iris()
```

[102]:

```
Iris_df =  pd.DataFrame(df.data,columns=df.feature_names)
Iris_df.head()
```

[102]:

```
   sepal length (cm)  sepal width (cm)  petal length (cm)  petal width (cm)
0                5.1               3.5                1.4               0.2
1                4.9               3.0                1.4               0.2
2                4.7               3.2                1.3               0.2
3                4.6               3.1                1.5               0.2
4                5.0               3.6                1.4               0.2
```

[103]:

```
#checking on the available lables

df.target
```

[103]:

```
array([0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
       0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
       0, 0, 0, 0, 0, 0, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1,
       1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1,
       1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2,
       2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2,
       2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2])
```

[104]:
```
Iris_df['Target'] = df.target
Iris_df.head()
```

[104]:
```
   sepal length (cm)  sepal width (cm)  petal length (cm)  petal width (cm)  \
0                5.1               3.5                1.4               0.2
1                4.9               3.0                1.4               0.2
2                4.7               3.2                1.3               0.2
3                4.6               3.1                1.5               0.2
4                5.0               3.6                1.4               0.2

   Target
0       0
1       0
2       0
3       0
4       0
```

2 EDA

[105]:
```
Iris_df.shape
```

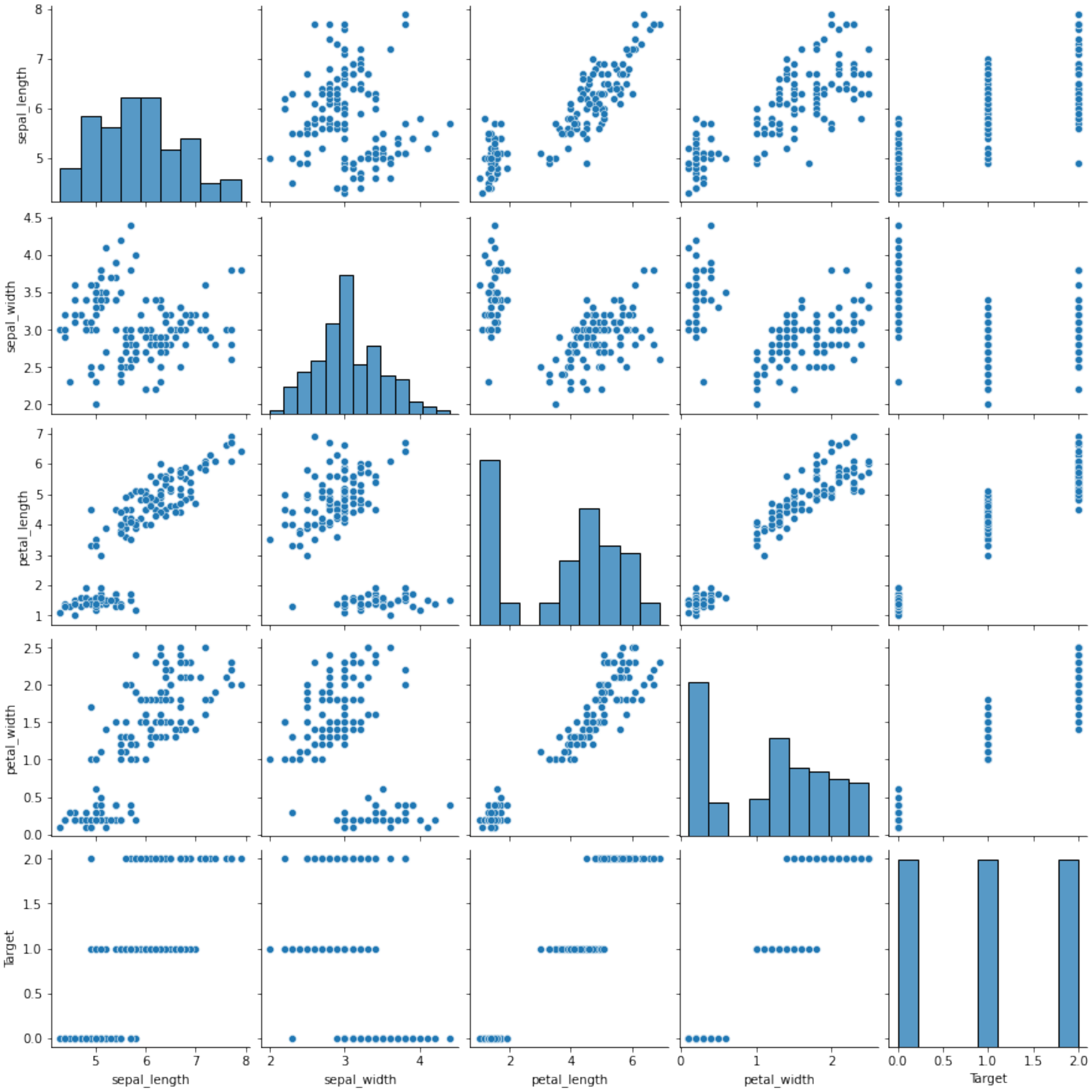
[105]:
```
(150, 5)
```

[106]:
```
#Renaming the column for better understanding

Iris_df.rename(columns={'sepal length (cm)': 'sepal_length','sepal width (cm)':
 ↪'sepal_width','petal length (cm)':'petal_length','petal width (cm)':
 ↪'petal_width'},inplace=True)
Iris_df.head()
```

[106]:
```
   sepal_length  sepal_width  petal_length  petal_width  Target
0           5.1          3.5           1.4          0.2       0
1           4.9          3.0           1.4          0.2       0
2           4.7          3.2           1.3          0.2       0
3           4.6          3.1           1.5          0.2       0
4           5.0          3.6           1.4          0.2       0
```

[107]:
```
sns.pairplot(Iris_df)
```

[107]:
```
<seaborn.axisgrid.PairGrid at 0x178b66b35e0>
```

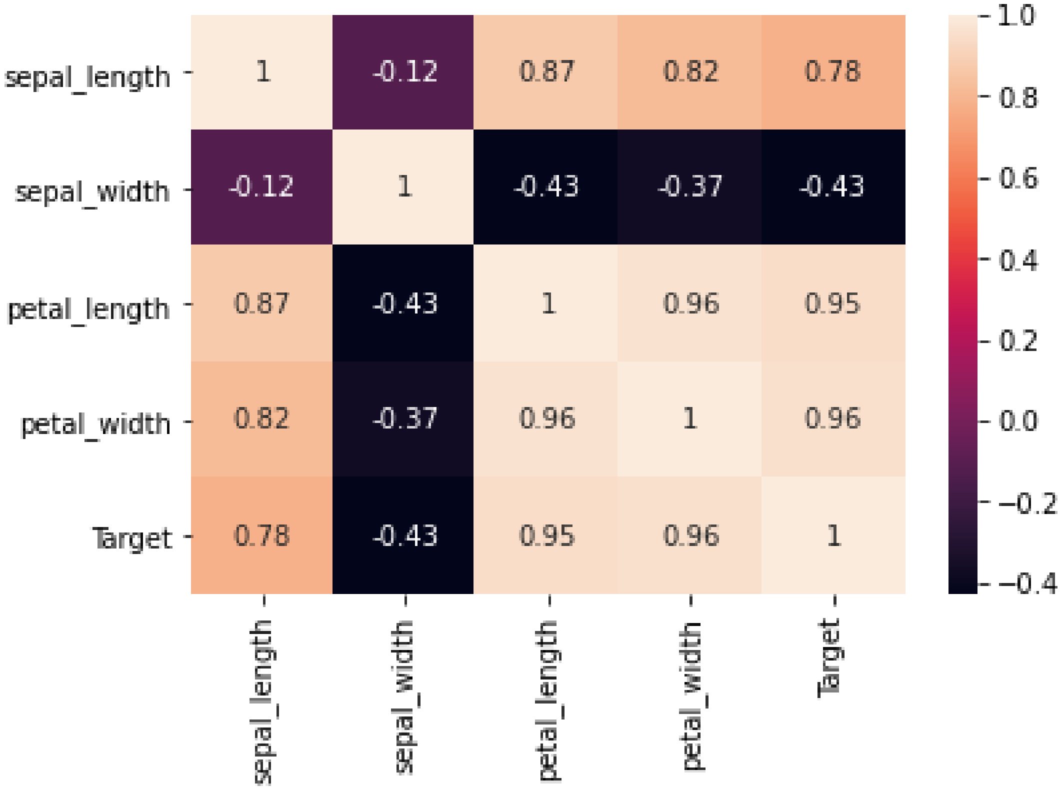


[108]:

```
#check the correlation between each columns using a heat map

sns.heatmap(Iris_df.corr(), annot = True )
```

[108]:

```
<AxesSubplot:>
```



[109]:

```
sample_df = Iris_df[['sepal_length','sepal_width']]
sample_df
```

[109]:

```
     sepal_length  sepal_width
0             5.1          3.5
1             4.9          3.0
2             4.7          3.2
3             4.6          3.1
4             5.0          3.6
..            …            …
145           6.7          3.0
146           6.3          2.5
147           6.5          3.0
148           6.2          3.4
149           5.9          3.0

[150 rows x 2 columns]
```

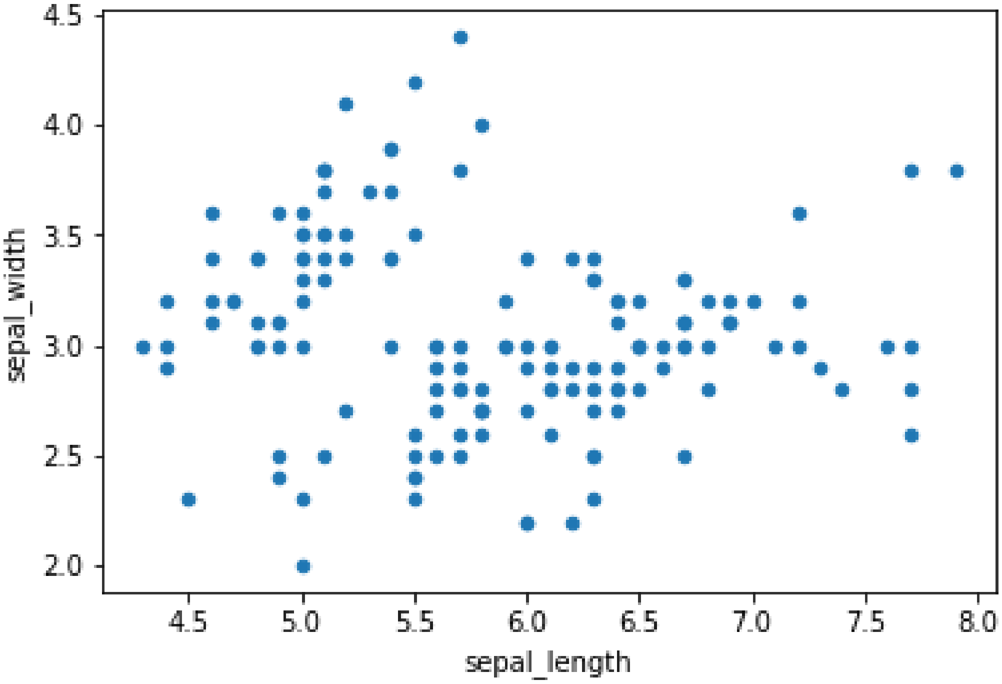
[110]:

```
#prediction based on the target values that we got as cluster counts

km = KMeans(n_clusters=3)
```

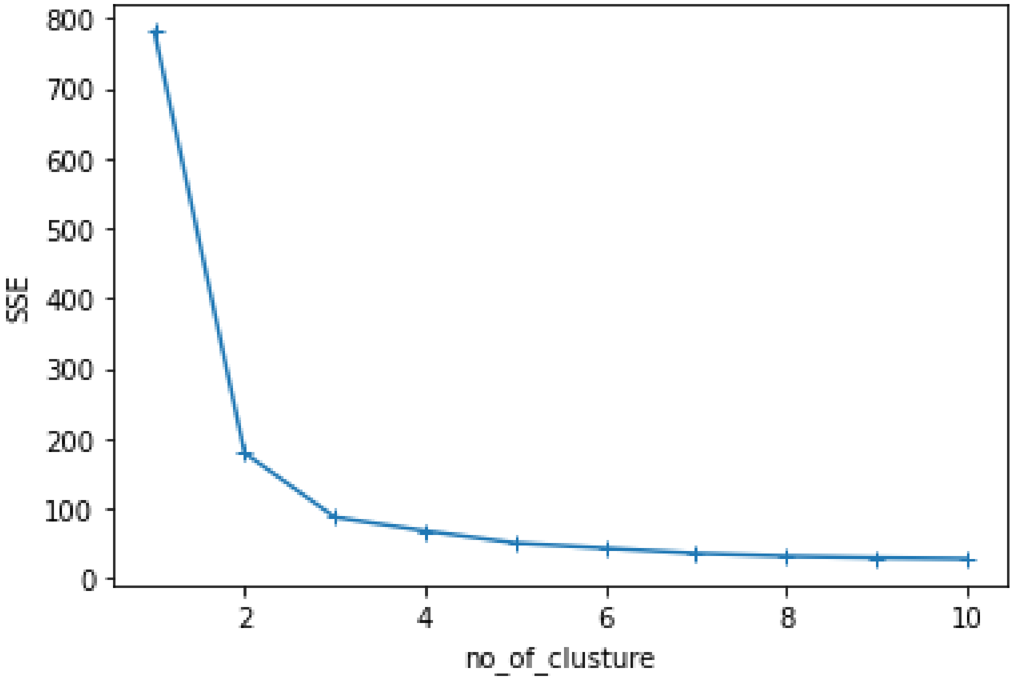
```
m_km = km.fit_predict(Iris_df)
m_km
```

[110]:
```
array([1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1,
       1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1,
       1, 1, 1, 1, 1, 1, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2,
       2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2,
       2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 0, 0, 0, 0, 0, 0, 2, 0, 0, 0,
       0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
       0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0])
```

[111]:
```
#plotting the sample data as a refernce for the final output

Iris_df.plot(kind='scatter', x='sepal_length', y='sepal_width');
plt.show()
```



[118]:
```
#Identifying the optimum cluster using Elbow Method

SSE = []
no_of_cluster = range(1,11)

for i in no_of_clustures :
    km = KMeans(n_clusters=i ,random_state = 0)
    km.fit(Iris_df.values)
    SSE.append(km.inertia_)

plt.plot(no_of_cluster,SSE,marker='+')
plt.xlabel('no_of_clusture')
plt.ylabel('SSE')
plt.show()
```



We can see that the line starts to become linear from the elbow poin 3 , so we can take 3 as our clusture going further

[113]:
```
New_df = pd.DataFrame({'Clustures': no_of_cluster , 'SSE':SSE})
New_df
```

[113]:
```
   Clustures         SSE
0          1  781.370600
1          2  179.053583
2          3   87.220628
3          4   67.662919
4          5   50.357621
5          6   42.874793
6          7   35.502632
7          8   31.563856
8          9   29.235285
9         10   27.617062
```

In the above dataframe we can see that when the number clusture is less the SSE is high i.e huge number of data point around a centroid. As the number of centroids(clustures) increases the data points are evenly distributed

3 Training Data

[114]:

```
#Providing the clustures to the model using kMean algorithm
km = KMeans(n_clusters=3,random_state=0)
centroids = km.fit_predict(Iris_df.values) #Training the model
```

[115]:

```
centroids #The o/p shows us the Labels available with the data
```

[115]:

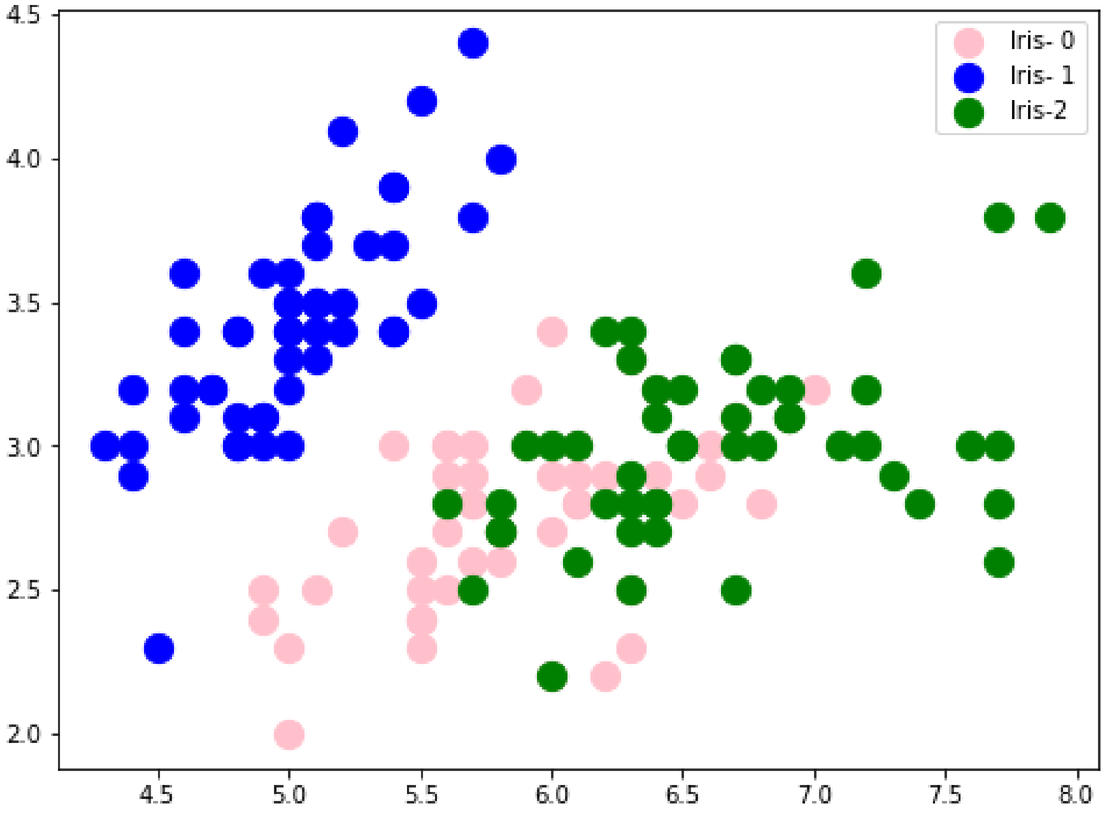
```
array([1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1,
       1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1,
       1, 1, 1, 1, 1, 1, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
       0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
       0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 2, 2, 2, 2, 2, 2, 0, 2, 2, 2,
       2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2,
       2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2])
```

[116]:

```
#Plotting the data to identify the clustures

plt.figure(figsize=(8,6))
plt.scatter( Iris_df.values[centroids == 0,0], Iris_df.values[centroids ==␣
 ↪0,1],s=150, c='pink', label = 'Iris- 0')
plt.scatter( Iris_df.values[centroids == 1,0], Iris_df.values[centroids ==␣
 ↪1,1],s=150, c='blue', label = 'Iris- 1')
plt.scatter( Iris_df.values[centroids == 2,0], Iris_df.values[centroids ==␣
 ↪2,1],s=150, c='green', label = 'Iris-2')
plt.legend()
```

[116]:

```
<matplotlib.legend.Legend at 0x178b88ac490>
```



we can see 3 clusters in the plot