GRIP @ The Sparks Foundation

Task 2 : Prediction using Unsupervised Machine Learning In this K-means clustering task I tried to predict the optimum number of clusters and represent it visually from the given Iris dataset

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Technical Stack: Scikit Learn,Numpy Array,Scipy,Pandas,Matplotlib

1.Importing all the required libraries

In [1]:
```
from sklearn import datasets
import matplotlib.pyplot as plt
import pandas as pd
import numpy as np
from sklearn.cluster import KMeans
import matplotlib.patches as mpatches
import sklearn.metrics as sm
from mpl_toolkits.mplot3d import Axes3D
from scipy.cluster.hierarchy import linkage,dendrogram
from sklearn.cluster import DBSCAN
from sklearn.decomposition import PCA
```

2.Loading the Dataset

In [2]:
```
iris = datasets.load_iris()
iris_df = pd.DataFrame(iris.data, columns = iris.feature_names)
iris_df.head(10)  #displaying first 10 rows
```

Out[2]:

	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
5	5.4	3.9	1.7	0.4
6	4.6	3.4	1.4	0.3
7	5.0	3.4	1.5	0.2
8	4.4	2.9	1.4	0.2
9	4.9	3.1	1.5	0.1

In [3]:
```
print(iris.target_names)
```

```
['setosa' 'versicolor' 'virginica']
```

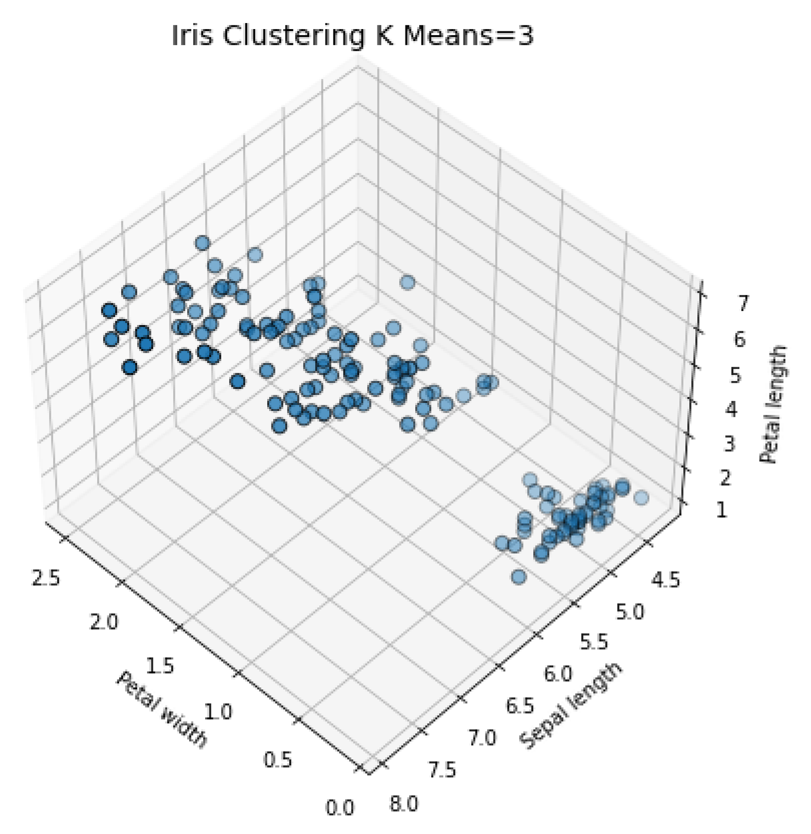
In [4]:
```
print(iris.target)
```

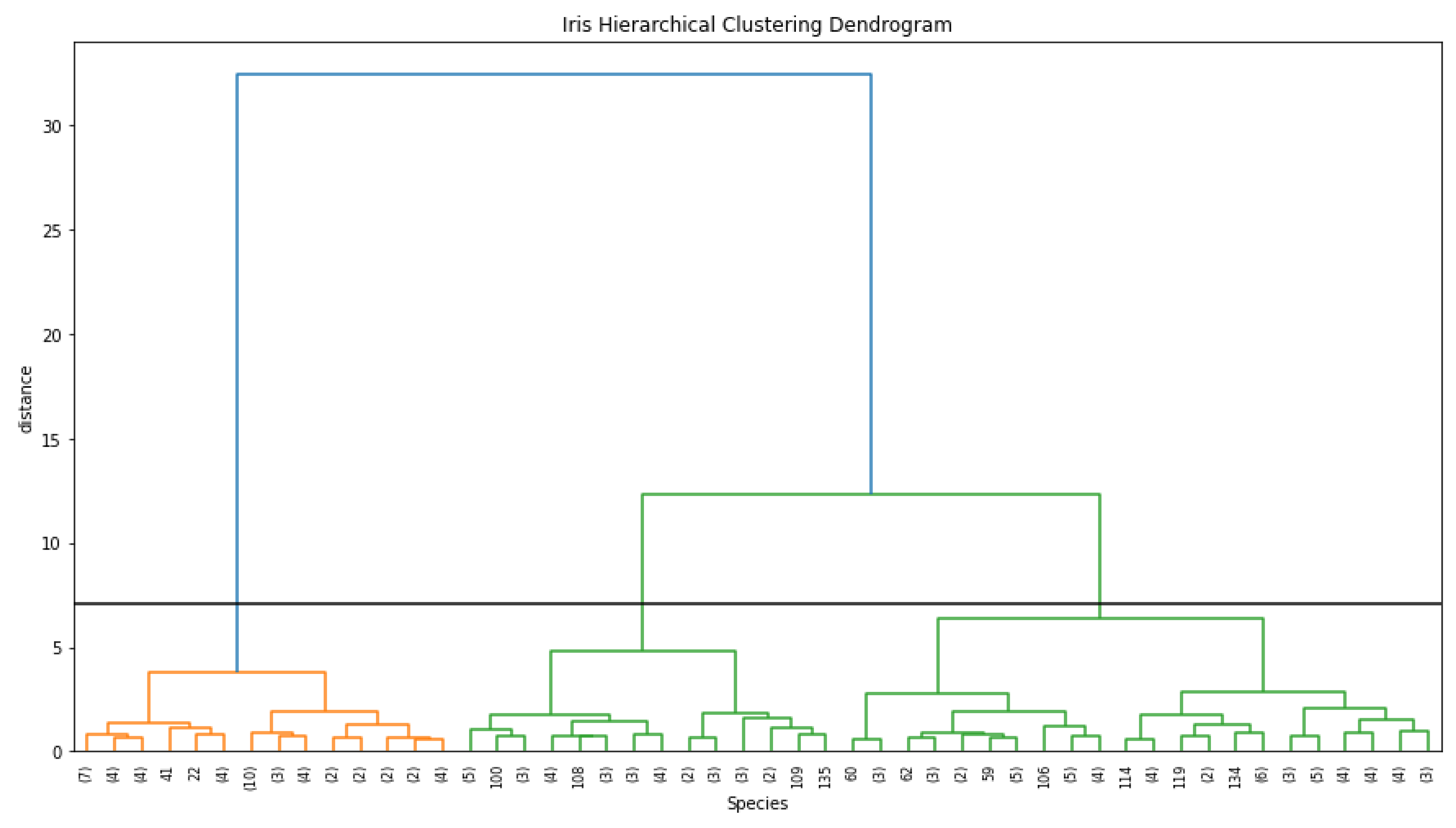
```
[0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
 0 0 0 0 0 0 0 0 0 0 0 0 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 2 2 2 2 2 2 2 2 2 2 2
 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2
 2 2]
```

In [5]:
```
x = iris.data
y = iris.target
```

3.Visualizing the input and its Hierarchy

In [6]:
```
#Plotting
fig = plt.figure(1, figsize=(7,5))
ax = Axes3D(fig, rect=[0, 0, 0.95, 1], elev=48, azim=134)
ax.scatter(x[:, 3], x[:, 0], x[:, 2], edgecolor="k", s=50)
ax.set_xlabel("Petal width")
ax.set_ylabel("Sepal length")
ax.set_zlabel("Petal length")
plt.title("Iris Clustering K Means=3", fontsize=14)
plt.show()

#Hierachy Clustering
hier=linkage(x,"ward")
max_d=7.08
plt.figure(figsize=(15,8))
plt.title('Iris Hierarchical Clustering Dendrogram')
plt.xlabel('Species')
plt.ylabel('distance')
dendrogram(
    hier,
    truncate_mode='lastp',
    p=50,
    leaf_rotation=90.,
    leaf_font_size=8.,
)
plt.axhline(y=max_d, c='k')
plt.show()
```





4.Data Preprocessing

In [7]:
```
x = pd.DataFrame(iris.data, columns=['Sepal Length', 'Sepal Width', 'Petal Length', 'Petal Width'])
y = pd.DataFrame(iris.target, columns=['Target'])
```

In [8]:
```
x.head()
```

Out[8]:

	Sepal Length	Sepal Width	Petal Length	Petal Width
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

In [9]:
```
y.head()
```

Out[9]:

	Target
0	0
1	0
2	0
3	0
4	0

5.Model training

In [10]:
```
iris_k_mean_model = KMeans(n_clusters=3)
iris_k_mean_model.fit(x)
```

Out[10]:
```
KMeans(n_clusters=3)
```

In [11]:
```
print(iris_k_mean_model.labels_)
```

```
[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 2 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 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 2 1 2 2 2 2 1 2 2 2 2
 2 2 1 1 2 2 2 2 1 2 1 2 1 2 2 1 1 2 2 2 2 2 1 2 2 2 2 1 2 2 2 1 2 2 2 1 2
 2 1]
```

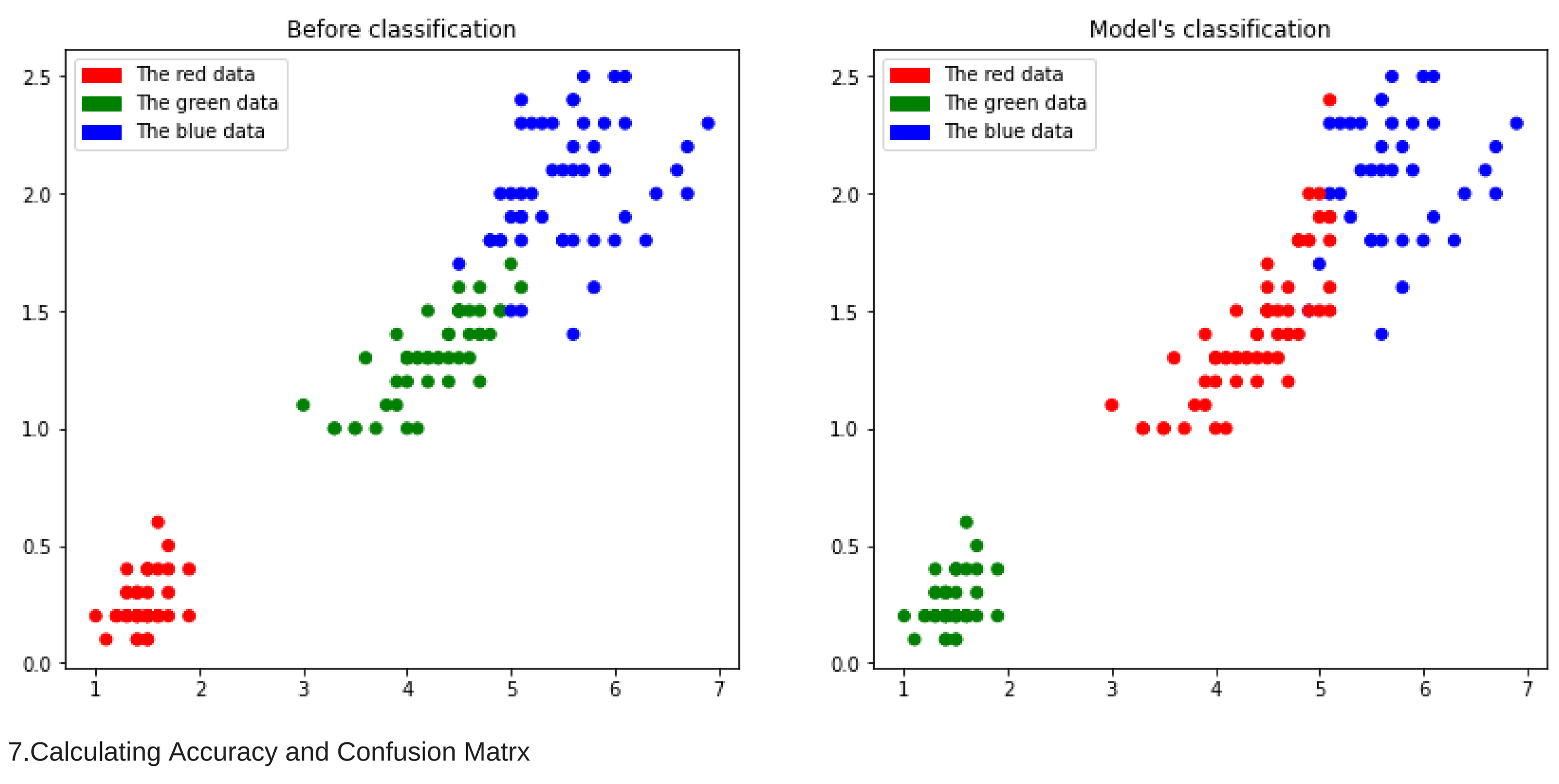
In [12]:
```
print(iris_k_mean_model.cluster_centers_)
```

```
[[5.006      3.428      1.462      0.246     ]
 [5.9016129  2.7483871  4.39354839 1.43387097]
 [6.85       3.07368421 5.74210526 2.07105263]]
```

6.Visualising the model cluster

In [13]:
```
plt.figure(figsize=(14,6))

colors = np.array(['red', 'green', 'blue'])

predictedY = np.choose(iris_k_mean_model.labels_, [1, 0, 2]).astype(np.int64)

plt.subplot(1, 2, 1)
plt.scatter(x['Petal Length'], x['Petal Width'], c=colors[y['Target']])
plt.title('Before classification')

red_patch = mpatches.Patch(color='red', label='The red data')

green_patch = mpatches.Patch(color='green', label='The green data')

blue_patch = mpatches.Patch(color='blue', label='The blue data')
plt.legend(handles=[red_patch, green_patch, blue_patch])

plt.subplot(1, 2, 2)
plt.scatter(x['Petal Length'], x['Petal Width'], c=colors[predictedY])
plt.title("Model's classification")
plt.legend(handles=[red_patch, green_patch, blue_patch])
```

Out[13]:
```
<matplotlib.legend.Legend at 0x216e7c99460>
```



7.Calculating Accuracy and Confusion Matrx

In [14]:
```
sm.accuracy_score(predictedY, y['Target'])
```

Out[14]:
```
0.24
```

In [15]:
```
sm.confusion_matrix(predictedY, y['Target'])
```

Out[15]:
```
array([[ 0, 48, 14],
       [50,  0,  0],
       [ 0,  2, 36]], dtype=int64)
```

In a confusion matrix, the predicted class labels (0, 1, 2) are written along the top (column names). The true class labels (Iris-setosa, etc.) are written along the right side. Each cell in the matrix is a count of how many instances of a true class where classified as each of the predicted classes.

THANK YOU

In [ ]: