Prediction using Unsupervised ML (Level - Beginner)

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# TSF GRIP Data Science & Business Analytics
Tasks 2 :- From the given ‘Iris’ dataset, predict the optimum number of clusters
and represent it visually.

Dataset Link :- https://bit.ly/3kXTdox
```

```
# Importing all the libraries
import numpy as np
import pandas as pd
import seaborn as sns
import matplotlib.pyplot as plt
from sklearn import datasets


# Data available at the link - 'https://bit.ly/3kXTdox'
# Reading data from Github url
# Loading and Reading the iris dataset

url = 'https://raw.githubusercontent.com/PatilNarayan/Data_Science_-_Business_Analy

data = pd.read_csv(url)
print('Data import successfull')
```

```
Data import successfull
```

```
#loads the first five rows
print(data.head())
```

```
   Id  SepalLengthCm  SepalWidthCm  PetalLengthCm  PetalWidthCm      Species
0   1            5.1           3.5            1.4           0.2  Iris-setosa
1   2            4.9           3.0            1.4           0.2  Iris-setosa
2   3            4.7           3.2            1.3           0.2  Iris-setosa
3   4            4.6           3.1            1.5           0.2  Iris-setosa
4   5            5.0           3.6            1.4           0.2  Iris-setosa
```

```
# Checking for Not a Number (NaN) values
print(data.isna().sum())
```

```
Id               0
SepalLengthCm    0
SepalWidthCm     0
PetalLengthCm    0
PetalWidthCm     0
```

```
Species          0
dtype: int64
```

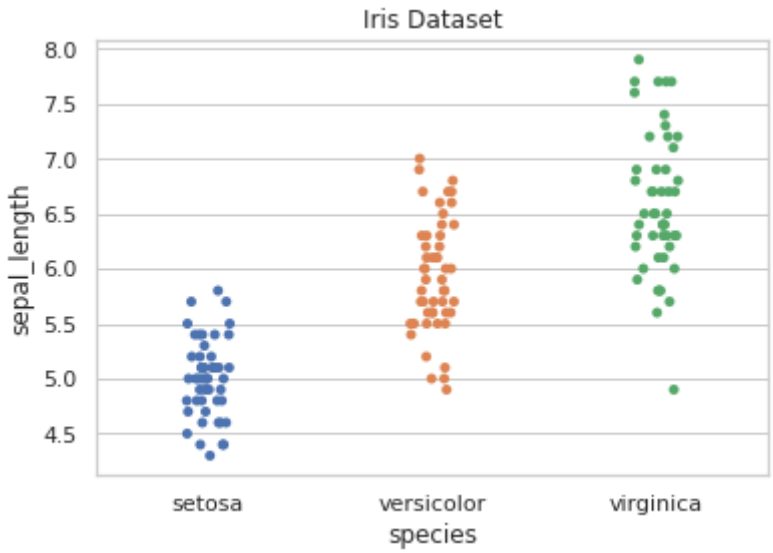
```
# Checking statistical description
print(data.describe())
```

```
                Id  SepalLengthCm  SepalWidthCm  PetalLengthCm  PetalWidthCm
count  150.000000     150.000000    150.000000     150.000000    150.000000
mean    75.500000       5.843333      3.054000       3.758667      1.198667
std     43.445368       0.828066      0.433594       1.764420      0.763161
min      1.000000       4.300000      2.000000       1.000000      0.100000
25%     38.250000       5.100000      2.800000       1.600000      0.300000
50%     75.500000       5.800000      3.000000       4.350000      1.300000
75%    112.750000       6.400000      3.300000       5.100000      1.800000
max    150.000000       7.900000      4.400000       6.900000      2.500000
```

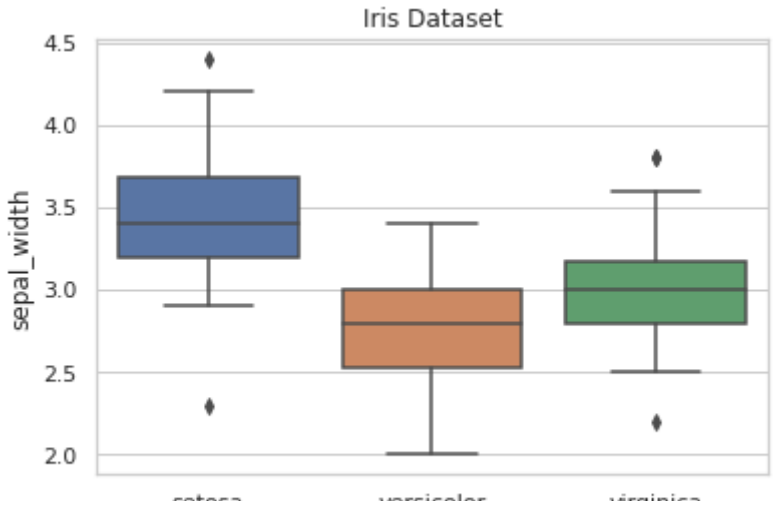
```
# Check for unique classes in the dataset.
print(data.Species.nunique())
print(data.Species.value_counts())
```

```
3
Iris-setosa        50
Iris-versicolor    50
Iris-virginica     50
Name: Species, dtype: int64
```

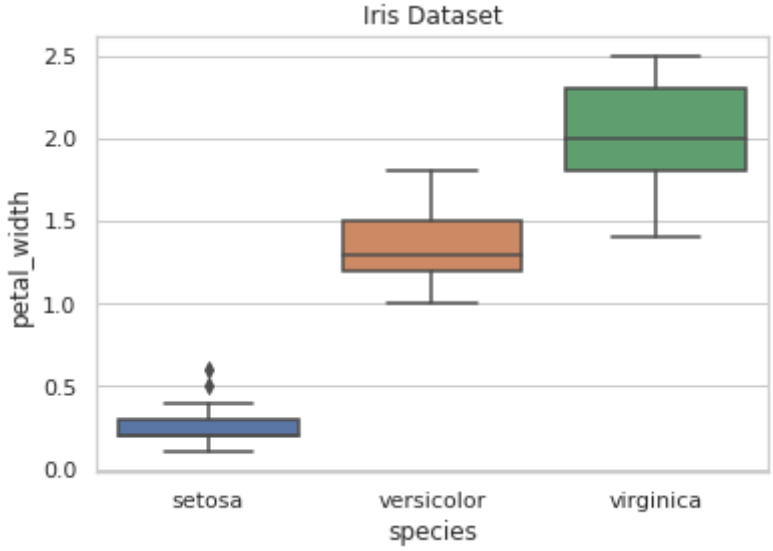
```
# Data Visualization
sns.set(style = 'whitegrid')
iris = sns.load_dataset('iris');
ax = sns.stripplot(x ='species',y = 'sepal_length',data = iris);
plt.title('Iris Dataset')
plt.show()
```



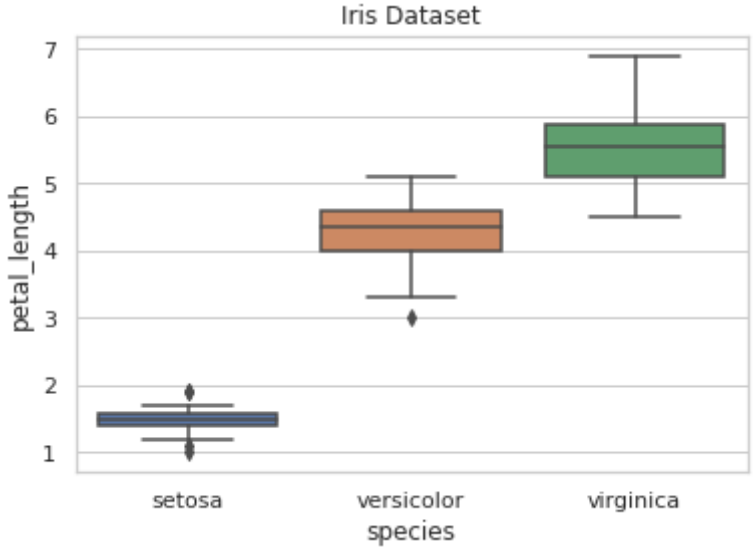

```
sns.boxplot(x='species',y='sepal_width',data=iris)
plt.title("Iris Dataset")
plt.show()
```



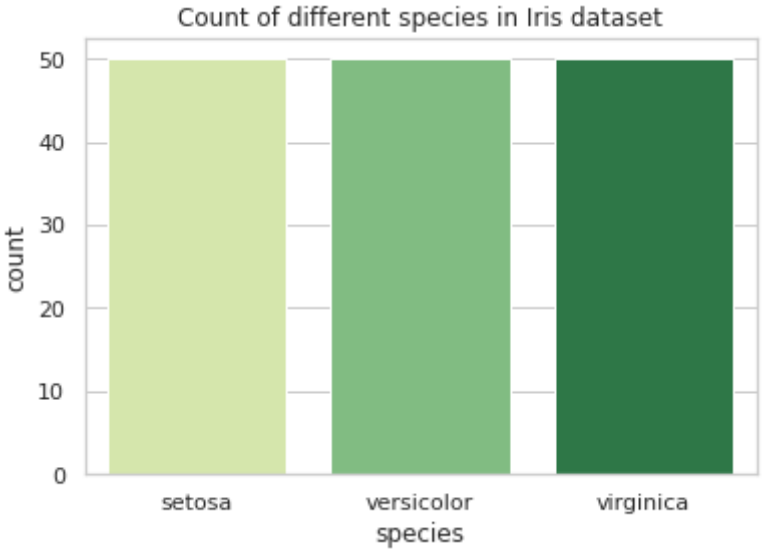

```
sns.boxplot(x='species',y='petal_width',data=iris)
plt.title("Iris Dataset")
plt.show()
```



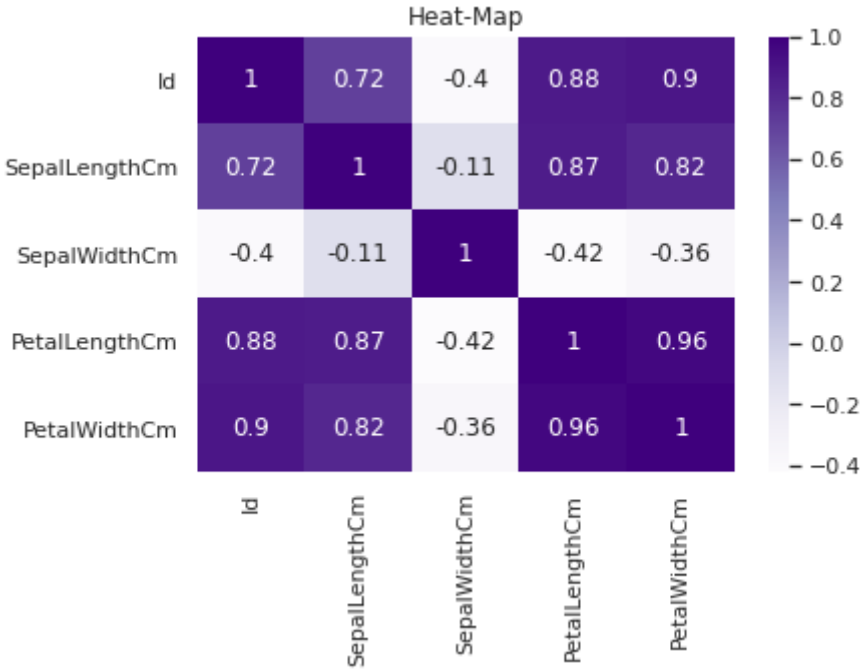

```
sns.boxplot(x='species',y='petal_length',data=iris)
plt.title("Iris Dataset")
plt.show()
```



```
# Count plot
sns.countplot(x='species', data=iris, palette="YlGn")
plt.title("Count of different species in Iris dataset")
plt.show()
```




```
# Heat Map
sns.heatmap(data.corr(), annot=True,cmap='Purples')
plt.title("Heat-Map")
plt.show()
```




```
# Finding the optimum number of clusters using k-means

x = data.iloc[:,[0,1,2,3]].values

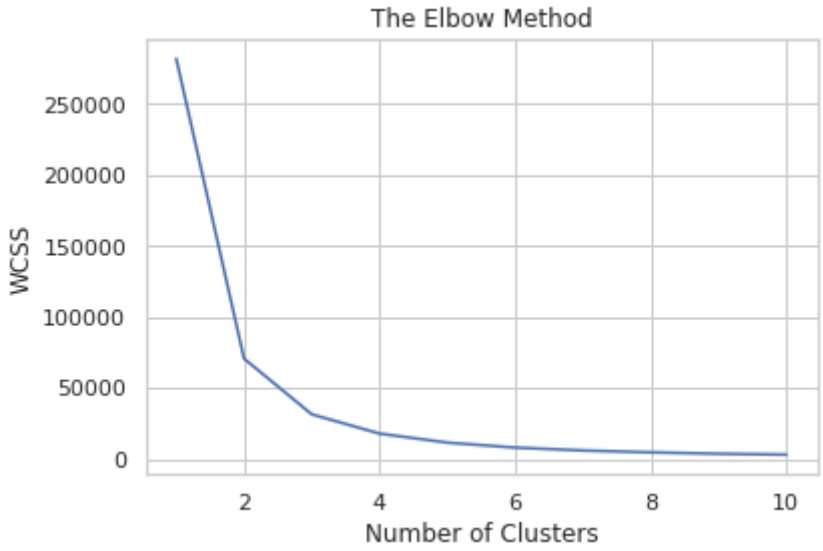
from sklearn.cluster import KMeans
wcss = []
for i in range(1,11):
    kmeans = KMeans(n_clusters=i, init='k-means++', max_iter=300, n_init=10, rando
```

```
    kmeans = KMeans(n_clusters=i, init='k-means++', max_iter=300, n_init=10, randor
    kmeans.fit(x)
    ## appending the WCSS to the list (kmeans.inertia_ returns the WCSS value for a
    wcss.append(kmeans.inertia_)
    print('k:',i ,"wcss:",kmeans.inertia_)
```

```
k: 1 wcss: 281831.54466666665
k: 2 wcss: 70581.3808
k: 3 wcss: 31320.711199999998
k: 4 wcss: 17762.657226173542
k: 5 wcss: 11423.238080088988
k: 6 wcss: 7909.530673076923
k: 7 wcss: 5881.448116883117
k: 8 wcss: 4562.7800793650795
k: 9 wcss: 3579.72056127451
k: 10 wcss: 2968.491432665374
```

```
# Plotting the results onto a line graph, allowing us to observe 'The elbow'

plt.plot(range(1,11),wcss)
plt.title('The Elbow Method')
plt.xlabel('Number of Clusters')
plt.ylabel('WCSS')
plt.show()
```



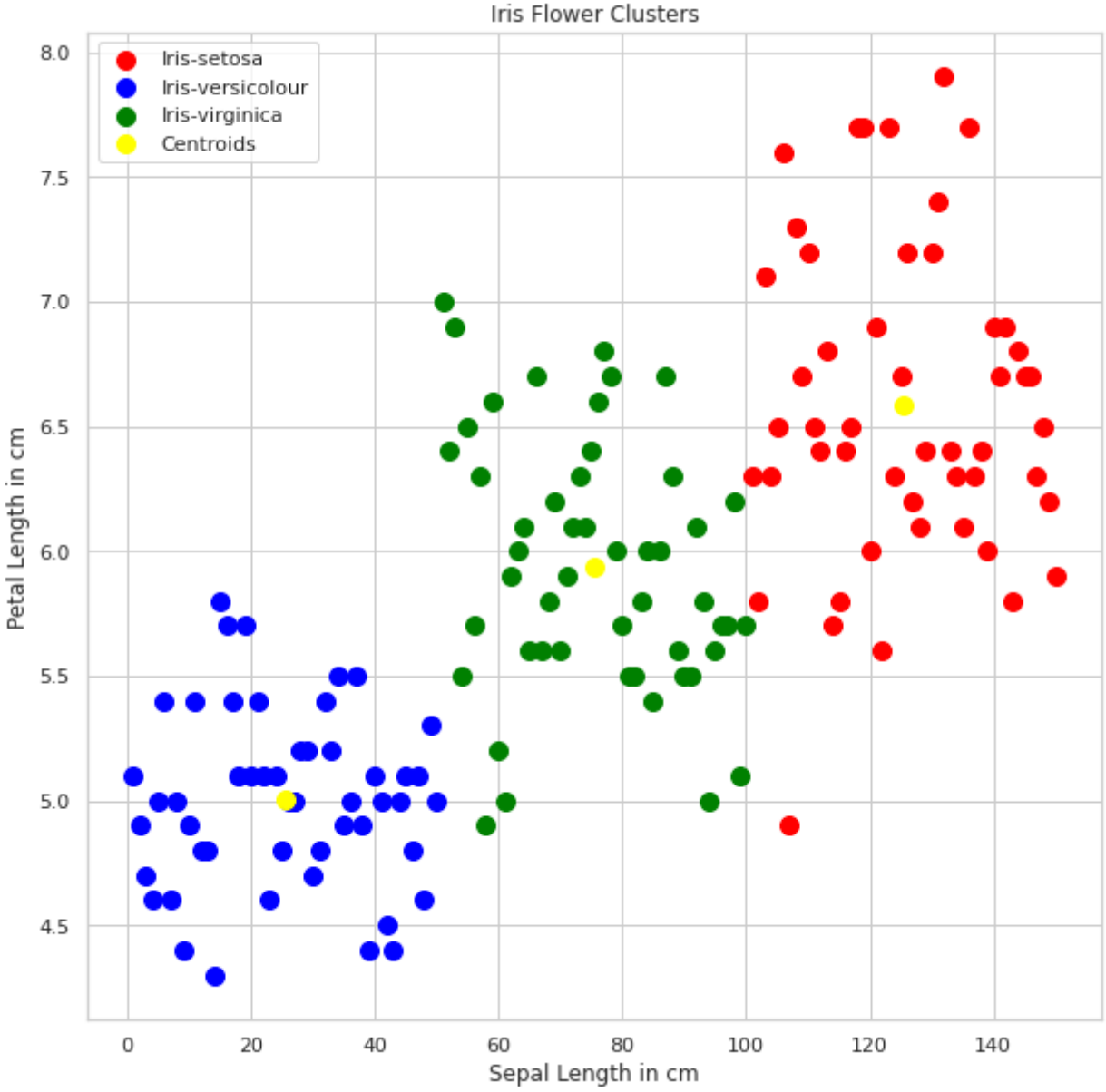

```
# Fitting K-Means to the Dataset
kmeans = KMeans(n_clusters = 3, init = 'k-means++',max_iter = 300, n_init = 10, ra
y_kmeans = kmeans.fit_predict(x)
```

```
# Predicting Values
y_kmeans
```

```
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, 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, 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], dtype=int32)
```

```
# Visualising the clusters
plt.figure(figsize=(10,10))
plt.scatter(x[y_kmeans==0,0],x[y_kmeans==0,1],s=100,c='red',label='Iris-setosa')
plt.scatter(x[y_kmeans==1,0],x[y_kmeans==1,1],s=100,c='blue',label='Iris-versicolou
plt.scatter(x[y_kmeans==2,0],x[y_kmeans==2,1],s=100,c='green',label='Iris-virginic

# Plotting the centroids of the clusters
plt.scatter(kmeans.cluster_centers_[:,0],kmeans.cluster_centers_[:,1],s=100,c='yel
plt.title('Iris Flower Clusters')
plt.xlabel('Sepal Length in cm')
plt.ylabel('Petal Length in cm')
plt.legend()
plt.show()
```



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