SPARKS FOUNDATION

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DATA SCIENCE AND BUSINESS ANALYTICS INTERN

TASK 2: PREDICTION USING UNSUPERVISED ML

From the given 'Iris' dataset, predict the optimum number of clusters and represent it visually.

In [1]:

```
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import matplotlib as mpl
import seaborn as sns
from sklearn import datasets
```

In [2]:

```
iris=pd.read_csv('Iris.csv')
```

In [3]:

```
iris.head(10)
```

Out[3]:

	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
5	6	5.4	3.9	1.7	0.4	Iris-setosa
6	7	4.6	3.4	1.4	0.3	Iris-setosa
7	8	5.0	3.4	1.5	0.2	Iris-setosa
8	9	4.4	2.9	1.4	0.2	Iris-setosa
9	10	4.9	3.1	1.5	0.1	Iris-setosa

In [4]:

```
iris.tail(10)
```

Out[4]:

	Id	SepalLengthCm	SepalWidthCm	PetalLengthCm	PetalWidthCm	Species
140	141	6.7	3.1	5.6	2.4	Iris-virginica
141	142	6.9	3.1	5.1	2.3	Iris-virginica
142	143	5.8	2.7	5.1	1.9	Iris-virginica
143	144	6.8	3.2	5.9	2.3	Iris-virginica
144	145	6.7	3.3	5.7	2.5	Iris-virginica
145	146	6.7	3.0	5.2	2.3	Iris-virginica
146	147	6.3	2.5	5.0	1.9	Iris-virginica
147	148	6.5	3.0	5.2	2.0	Iris-virginica
148	149	6.2	3.4	5.4	2.3	Iris-virginica
149	150	5.9	3.0	5.1	1.8	Iris-virginica

In [6]:

```
iris.isnull().sum()
```

Out[6]:

```
Id               0
SepalLengthCm    0
SepalWidthCm     0
PetalLengthCm    0
PetalWidthCm     0
Species          0
dtype: int64
```

In [7]:

```
iris.shape
```

Out[7]:

```
(150, 6)
```

In [8]:

```
iris.describe()
```

Out[8]:

	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

In [9]:

```
iris.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 150 entries, 0 to 149
Data columns (total 6 columns):
 #   Column         Non-Null Count  Dtype  
---  ------         --------------  -----  
 0   Id             150 non-null    int64  
 1   SepalLengthCm  150 non-null    float64
 2   SepalWidthCm   150 non-null    float64
 3   PetalLengthCm  150 non-null    float64
 4   PetalWidthCm   150 non-null    float64
 5   Species        150 non-null    object 
dtypes: float64(4), int64(1), object(1)
memory usage: 7.2+ KB
```

CHECK FOR UNIQUE CLASS IN DATASET

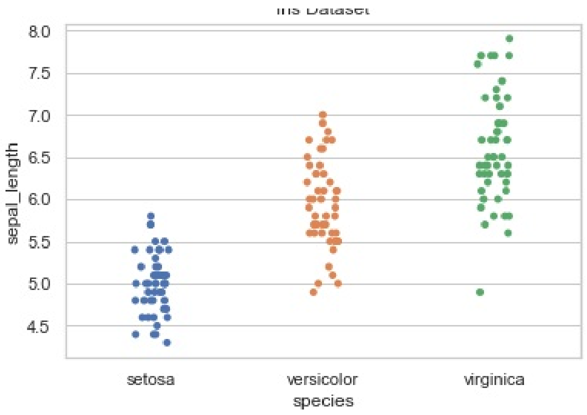
In [10]:

```
print(iris.Species.nunique())
print(iris.Species.value_counts())
```

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

In [13]:

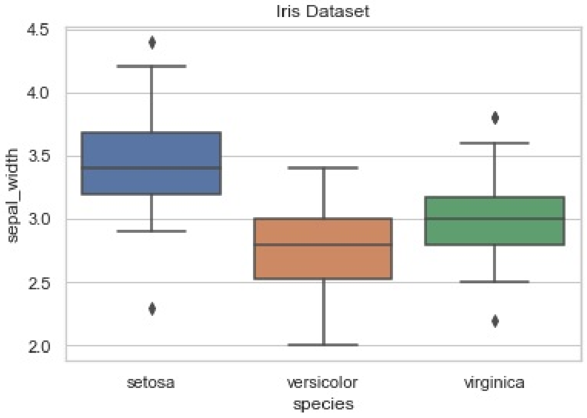
```
sns.set(style ='whitegrid')
iris=sns.load_dataset('iris');
ax=sns.stripplot(x='species',y='sepal_length',data= iris);
plt.title('Iris Dataset')
plt.show()
```



BOX PLOT FOR SPECIES TO SEPAL_WIDTH

In [14]:

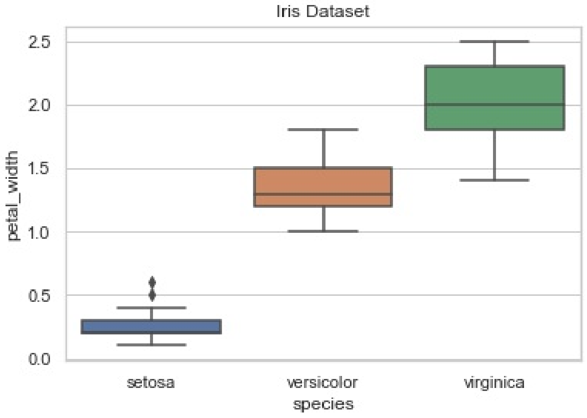
```
sns.boxplot(x='species',y='sepal_width',data=iris)
plt.title("Iris Dataset")
plt.show()
```



BOX PLOT FOR SPECIES TO PETAL_WIDTH

In [15]:

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

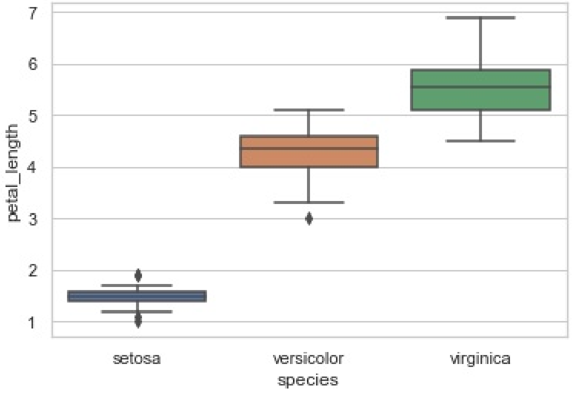


BOX PLOT FOR SPECIES TO PETAL_LENGTH

In [16]:

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

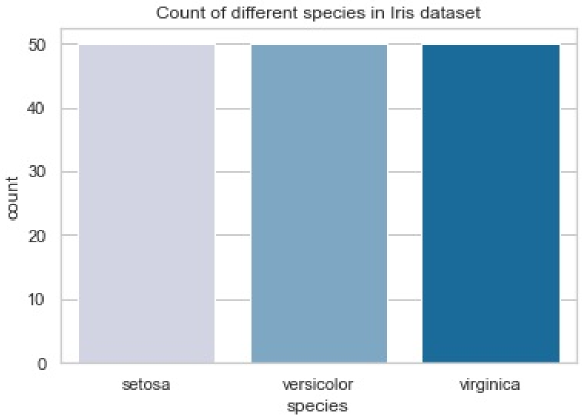
Iris Dataset



COUNT PLOT

In [17]:

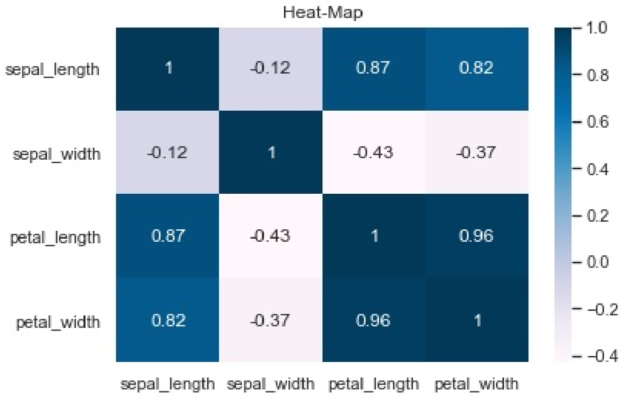
```
sns.countplot(x='species',data=iris,palette="PuBu")
plt.title("Count of different species in Iris dataset")
plt.show()
```



DETERMINING THE RELATIONSHIP BETWEEN TWO VARIABLE BY ANALYSING

In [19]:

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



FINDING CLUSTERS USING K-MEANS

In [25]:

```
x=iris.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, random_state=0)
    kmeans.fit(x)
    wcss.append(kmeans.inertia_)
    print('k:',i ,"wcss:",kmeans.inertia_)
```

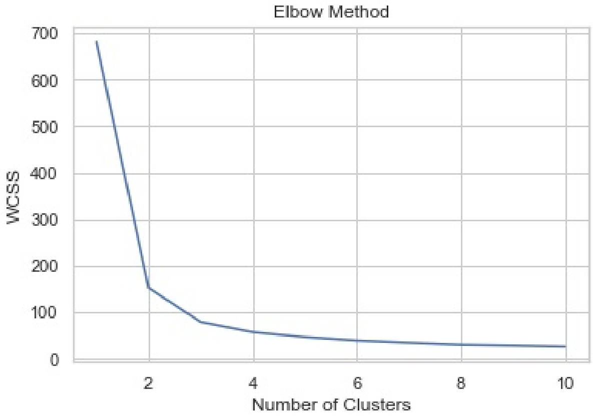
```
C:\Users\hp\anaconda3\lib\site-packages\sklearn\cluster\_kmeans.py:881: UserWarning: KMeans is known to have a me
mory leak on Windows with MKL, when there are less chunks than available threads. You can avoid it by setting the
environment variable OMP_NUM_THREADS=1.
  warnings.warn(
```

```
k: 1 wcss: 681.3705999999996
k: 2 wcss: 152.34795176035797
k: 3 wcss: 78.851441426146
k: 4 wcss: 57.22847321428572
k: 5 wcss: 46.47223015873018
k: 6 wcss: 39.03998724608725
k: 7 wcss: 34.299712121212146
k: 8 wcss: 30.063110617452732
k: 9 wcss: 28.27172172856384
k: 10 wcss: 26.094324740540422
```

PLOTTING RESULTS ON LINE GRAPH

In [22]:

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



FITTING K-MEANS TO THE DATA SET

In [23]:

```
kmeans = KMeans(n_clusters = 3, init = 'k-means++',max_iter = 300, n_init = 10, random_state = 0)
y_kmeans = kmeans.fit_predict(x)
```

In [26]:

```
y_kmeans
```

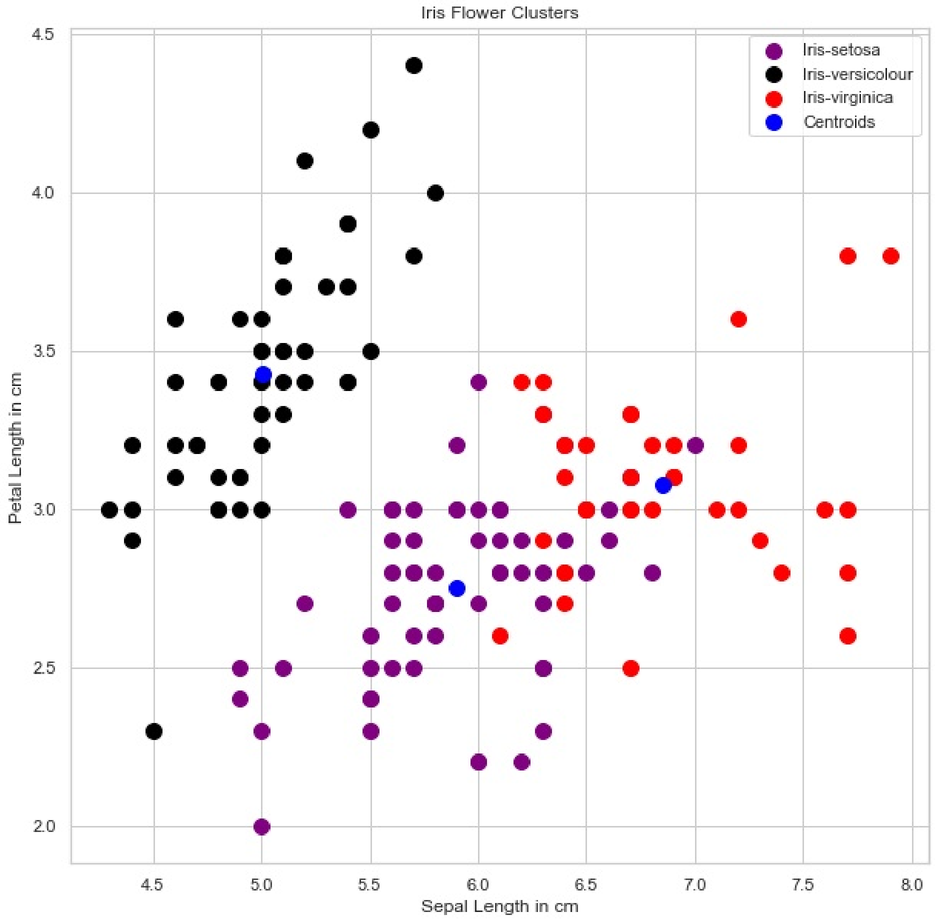
Out[26]:

```
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, 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, 2, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
       0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 2, 0, 2, 2, 2, 2, 0, 2, 2, 2,
       2, 2, 2, 0, 0, 2, 2, 2, 2, 0, 2, 0, 2, 0, 2, 2, 0, 0, 2, 2, 2, 2,
       2, 0, 2, 2, 2, 2, 0, 2, 2, 2, 0, 2, 2, 2, 0, 2, 2, 0])
```

VISUALISING AND PLOTTING THE CLUSTERS

In [24]:

```
plt.figure(figsize=(10,10))
plt.scatter(x[y_kmeans==0,0],x[y_kmeans==0,1],s=100,c='purple',label='Iris-setosa')
plt.scatter(x[y_kmeans==1,0],x[y_kmeans==1,1],s=100,c='black',label='Iris-versicolour')
plt.scatter(x[y_kmeans==2,0],x[y_kmeans==2,1],s=100,c='red',label='Iris-virginica')
plt.scatter(kmeans.cluster_centers_[:,0],kmeans.cluster_centers_[:,1],s=100,c='blue',label='Centroids')
plt.title('Iris Flower Clusters')
plt.xlabel('Sepal Length in cm')
plt.ylabel('Petal Length in cm')
plt.legend()
plt.show()
```



In [ ]:

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