Data science Task 1

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IRIS FLOWER CLASSIFICATION

Iris flower has three species; setosa, versicolor, and virginica, which differs according to their measurements. Now assume that you have the measurements of the iris flowers according to their species, and here your task is to train a machine learning model that can learn from the measurements of the iris species and classify them.

Although the Scikit-learn library provides a dataset for iris flower classification, you can also download the same dataset from here for the task of iris flower classification with Machine Learning.

```
import numpy as np
import pandas as pd
from sklearn.cluster import KMeans
import matplotlib.pyplot as plt
import seaborn as sns
```

```
df = sns.load_dataset('iris')
df.head()
```

	sepal_length	sepal_width	petal_length	petal_width	species
0	5.1	3.5	1.4	0.2	setosa
1	4.9	3.0	1.4	0.2	setosa
2	4.7	3.2	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

Next steps: Generate code with df | View recommended plots

```
df['species'],categories =pd.factorize(df['species'])
df.head()
```

	sepal_length	sepal_width	petal_length	petal_width	species
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

Next steps: Generate code with `df` View recommended plots

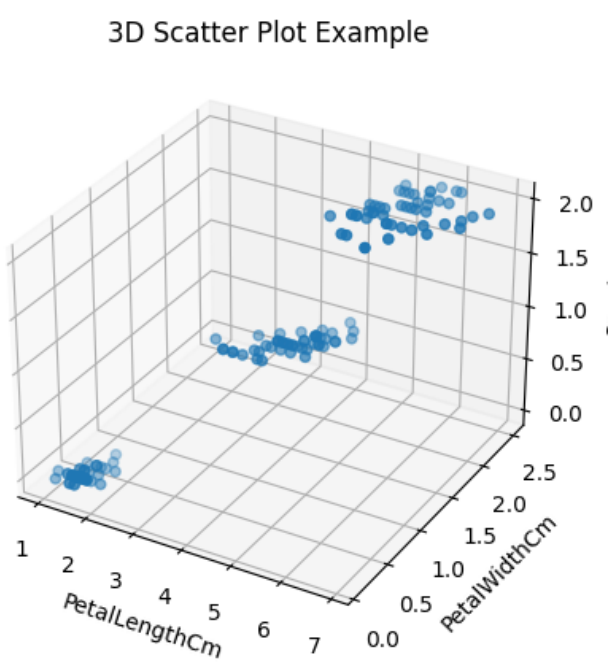
```
df.describe
```

```
pandas.core.generic.NDFrame.describe
def describe(percentiles=None, include=None, exclude=None) -> NDFrameT

/usr/local/lib/python3.10/dist-packages/pandas/core/generic.py
Generate descriptive statistics.

Descriptive statistics include those that summarize the central
tendency, dispersion and shape of a
dataset's distribution, excluding ``NaN`` values.
```

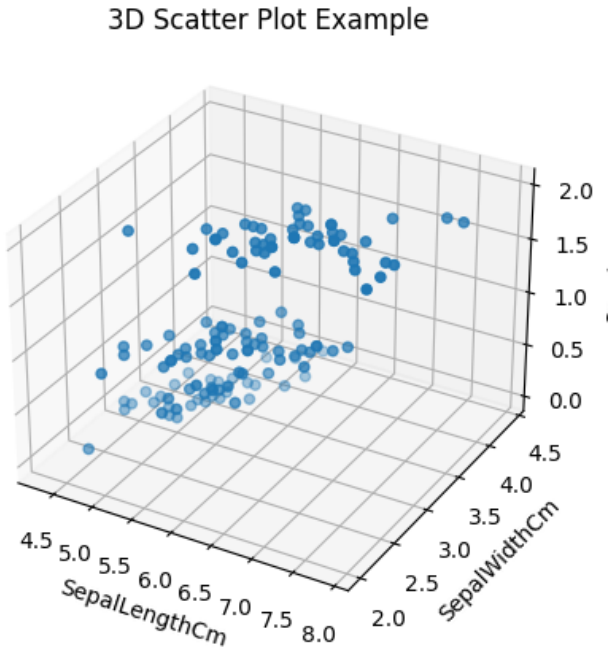
```
df.isna().sum()
```

```
sepal_length    0
sepal_width     0
petal_length    0
petal_width     0
species         0
dtype: int64
```

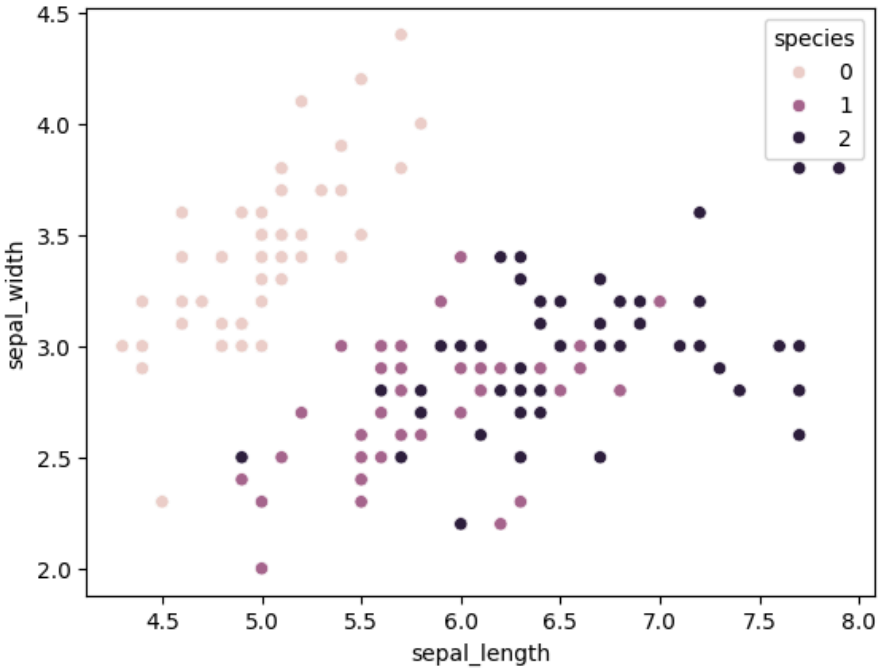
```
from mpl_toolkits.mplot3d import Axes3D
fig = plt.figure()
ax = fig.add_subplot(111, projection='3d')
ax.scatter(df.petal_length, df.petal_width, df.species)
ax.set_xlabel('PetalLengthCm')
ax.set_ylabel('PetalWidthCm')
ax.set_zlabel('Species')
plt.title('3D Scatter Plot Example')
plt.show()
```



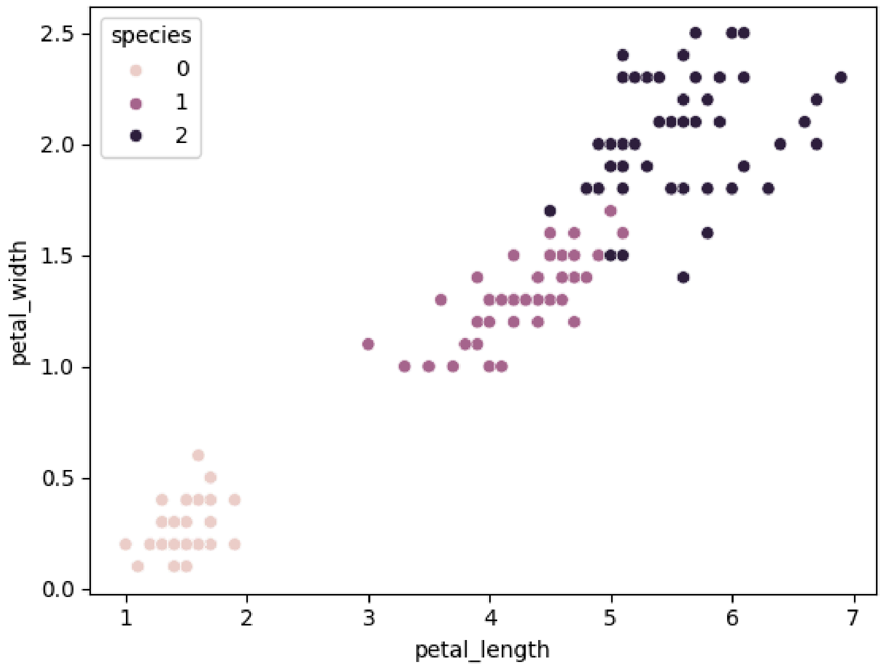

```
from mpl_toolkits.mplot3d import Axes3D
fig = plt.figure()
ax = fig.add_subplot(111, projection='3d')
ax.scatter(df.sepal_length, df.sepal_width, df.species)
ax.set_xlabel('SepalLengthCm')
ax.set_ylabel('SepalWidthCm')
ax.set_zlabel('Species')
plt.title('3D Scatter Plot Example')
plt.show()
```




```
sns.scatterplot(data=df, x="sepal_length", y="sepal_width",hue="species");
```



```
sns.scatterplot(data=df, x="petal_length", y="petal_width",hue="species");
```




```
k_rng = range(1,10)
sse=[]

for k in k_rng:
  km = KMeans(n_clusters=k)
  km.fit(df[[ 'petal_length', 'petal_width']])
  sse.append(km.inertia_)
```

```
/usr/local/lib/python3.10/dist-packages/sklearn/cluster/_kmeans.py:870: FutureWarning: The default value of `n_init` will change from 10 to 'auto' in 1.4. Set the value of `n_
  warnings.warn(
/usr/local/lib/python3.10/dist-packages/sklearn/cluster/_kmeans.py:870: FutureWarning: The default value of `n_init` will change from 10 to 'auto' in 1.4. Set the value of `n_
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  warnings.warn(
```
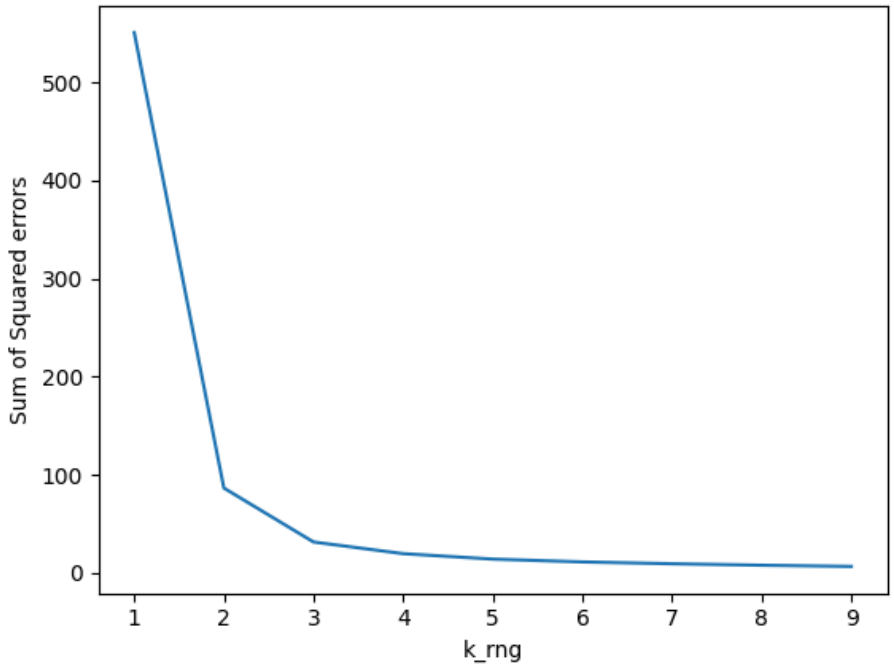

```
sse
```

```
[550.8953333333334,
 86.39021984551397,
 31.37135897435897,
 19.465989010989013,
 13.916908757908757,
 11.040239971910452,
 9.191170634920638,
 7.667019523446295,
 6.456494541406306]
```

```
plt.xlabel('k_rng')
plt.ylabel("Sum of Squared errors")
plt.plot(k_rng, sse)
```

```
[<matplotlib.lines.Line2D at 0x7eb0937d3220>]
```




```
km = KMeans(n_clusters=3,random_state=0,)
y_predicted = km.fit_predict(df[['petal_length','petal_width']])
y_predicted
```

```
/usr/local/lib/python3.10/dist-packages/sklearn/cluster/_kmeans.py:870: FutureWarning: The default value of `n_init` will change from 10 to 'auto' in 1.4. Set the value of `n_
  warnings.warn(
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, 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, 1, 2, 2, 2, 2, 2, 1, 2, 2, 2, 2,
2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 1, 1, 1, 1, 1, 1, 2, 1, 1, 1,
1, 1, 1, 1, 1, 1, 1, 1, 1, 2, 1, 1, 1, 1, 1, 1, 2, 1, 1, 1, 1, 1,
1, 1, 1, 1, 1, 1, 2, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1], dtype=int32)
```

```
df['cluster']=y_predicted
df.head(150)
```

	sepal_length	sepal_width	petal_length	petal_width	species	cluster
0	5.1	3.5	1.4	0.2	0	0
1	4.9	3.0	1.4	0.2	0	0
2	4.7	3.2	1.3	0.2	0	0
3	4.6	3.1	1.5	0.2	0	0
4	5.0	3.6	1.4	0.2	0	0
...	...	...	...	...	...	...
145	6.7	3.0	5.2	2.3	2	1
146	6.3	2.5	5.0	1.9	2	1
147	6.5	3.0	5.2	2.0	2	1
148	6.2	3.4	5.4	2.3	2	1
149	5.9	3.0	5.1	1.8	2	1

150 rows × 6 columns

Next steps: Generate code with df View recommended plots

```
from sklearn.metrics import confusion_matrix
cm = confusion_matrix(df.species, df.cluster)
cm
```

```
array([[50,  0,  0],
       [ 0,  2, 48],
       [ 0, 46,  4]])
```

```
true_labels = df.species
predicted_labels= df.cluster

cm = confusion_matrix(true_labels, predicted_labels)
class_labels = ['Setosa', 'versicolor', 'virginica']

# Plot confusion matrix
plt.imshow(cm, interpolation='nearest', cmap=plt.cm.Blues)
```

```
plt.title('Confusion Matrix')
plt.colorbar()
tick_marks = np.arange(len(class_labels))
plt.xticks(tick_marks, class_labels)
plt.yticks(tick_marks, class_labels)

# Fill matrix with values
for i in range(len(class_labels)):
    for j in range(len(class_labels)):
        plt.text(j, i, str(cm[i][j]), ha='center', va='center', color='white')

plt.xlabel('Predicted label')
plt.ylabel('True label')
plt.show()
```