classification

January 25, 2024

1 Import required libraries and load dataset

[ ]:
```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
```

[ ]:
```
df = pd.read_csv("datasets/iris/Iris.csv")
```

2 Explore the dataset

[ ]:
```
df.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
```

[ ]:
```
df.shape
```

[ ]:
```
(150, 6)
```

[ ]:
```
df.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
```

[ ]:
```
df.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
```

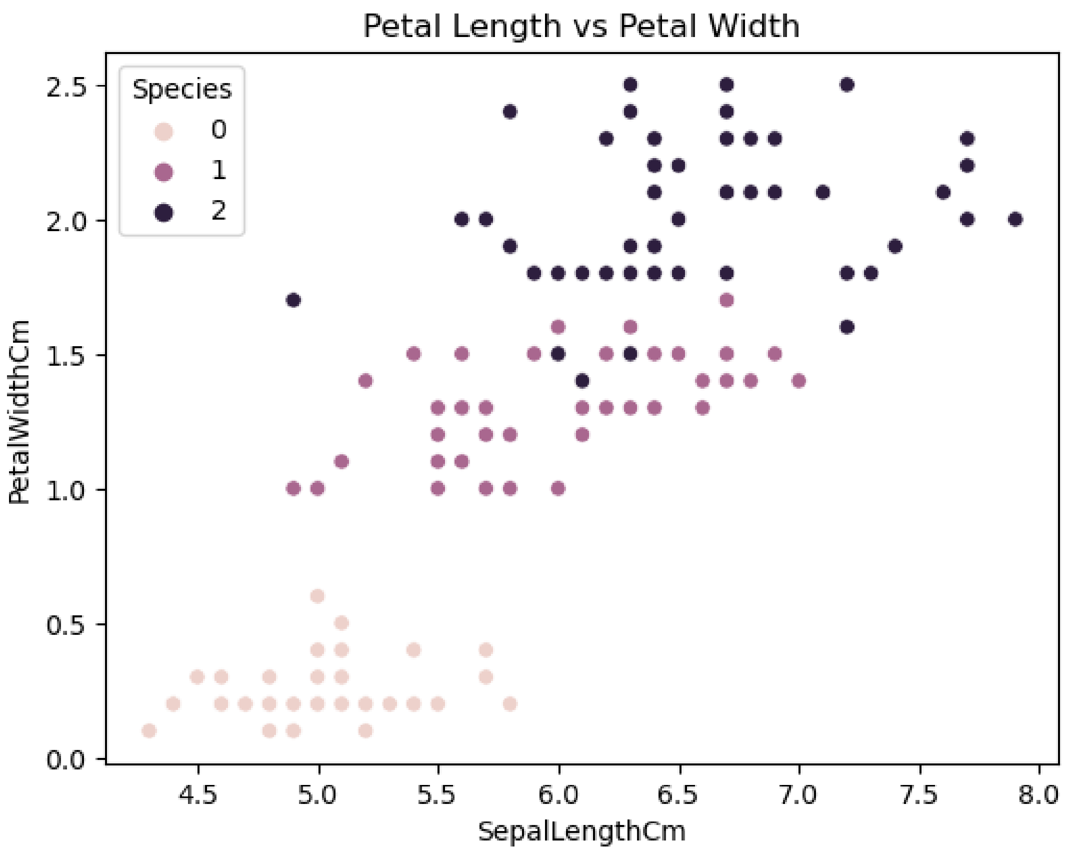
3 Null value check

[ ]:
```
df.isnull().sum()
```

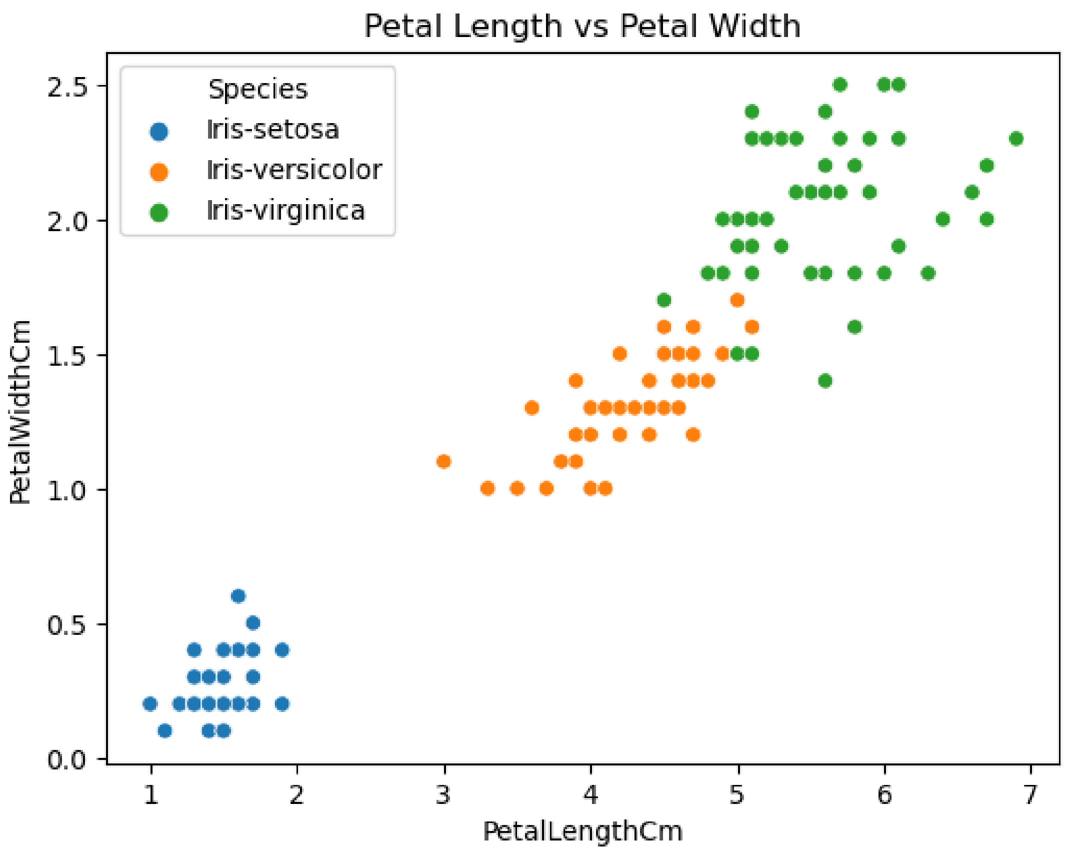
[ ]:
```
Id                 0
SepalLengthCm      0
SepalWidthCm       0
PetalLengthCm      0
PetalWidthCm       0
Species            0
dtype: int64
```

4 Some plot to visualize the data

[ ]:
```
sns.scatterplot(x = 'SepalLengthCm', y = 'PetalWidthCm', data = df ,hue␣
 ↪='Species')
plt.title('Petal Length vs Petal Width')
plt.show()
```



```
[ ]: sns.scatterplot(x = 'PetalLengthCm', y = 'PetalWidthCm', data = df ,hue␣
      ↪='Species')
     plt.title('Petal Length vs Petal Width')
     plt.show()
```



5 lets label encode all the categorical problems

```
[ ]: from sklearn.preprocessing import LabelEncoder
     le = LabelEncoder()
     df["Species"] = le.fit_transform(df["Species"])
     df.head()
```

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

```
[ ]: X = df.drop(columns=["Species","Id"])
     y = df.Species
```

6 Do the test train split

```
[ ]: from sklearn.model_selection import train_test_split
     X_train, X_test, y_train, y_test = train_test_split(X,y,train_size=0.
      ↪80,random_state=0)
```

7 Train the model

```
[ ]: from sklearn.neighbors import KNeighborsClassifier
     knn = KNeighborsClassifier()
     knn.fit(X_train,y_train)
```

```
[ ]: KNeighborsClassifier()
```

8 Make some predictions

```
[ ]: y_pred = knn.predict(X_test)
```

9 Evaluate the model

```
[ ]: from sklearn.metrics import accuracy_score
     accuracy_score(y_test,y_pred)
```

```
[ ]: 0.9666666666666667
```

```
[ ]: from sklearn.metrics import classification_report
     print(classification_report(y_test, y_pred))
```

```
              precision    recall  f1-score   support

           0       1.00      1.00      1.00        11
           1       1.00      0.92      0.96        13
           2       0.86      1.00      0.92         6

    accuracy                           0.97        30
   macro avg       0.95      0.97      0.96        30
weighted avg       0.97      0.97      0.97        30
```

10 Conclusion: As the data is clustered as seen the plot's above that makes it clear to the conclusion that why knn can perform beeter on 0(Iris-setosa) and as both the other classes are kinda merging together at the end that would explain why there is some drop in recall ,f1-score and precision , KNN might be best model for the given dataset as the seems to be clustered giving out an accuracy of 96.6 and good scores in confusion matrix.