About Dataset

The Iris dataset was used in R.A. Fisher's classic 1936 paper, The Use of Multiple Measurements in Taxonomic Problems, and can also be found on the UCI Machine Learning Repository.

It includes three iris species with 50 samples each as well as some properties about each flower. One flower species is linearly separable from the other two, but the other two are not linearly separable from each other.

The columns in this dataset are:

Id

SepalLengthCm

SepalWidthCm

PetalLengthCm

PetalWidthCm

Species

In [ ]:
```
# Import Libraries
import numpy as np
import pandas as pd
import seaborn as sns
import matplotlib.pyplot as plt
from  sklearn.model_selection import train_test_split,GridSearchCV
from sklearn.metrics import accuracy_score, precision_score, recall_score, f1_score
from sklearn.linear_model import LogisticRegression
from sklearn.tree import DecisionTreeClassifier
from sklearn.ensemble import RandomForestClassifier
from sklearn.svm import SVC
from sklearn.neighbors import KNeighborsClassifier
from sklearn.naive_bayes import GaussianNB
from sklearn.neural_network import MLPClassifier
```

```
from sklearn.metrics import confusion_matrix
from sklearn.metrics import accuracy_score,precision_score,recall_score,f1_score
```

In [ ]:
```
#Load Data
data= pd.read_csv(r'F:\IT Learning\MY PROJECTS\Data Science And ML Projects\IRIS Flower ML Project\Iris.csv')
```

In [ ]:
```
# Create DataFrame
data= pd.DataFrame(data)
data
```

Out[ ]:

	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
...	...	...	...	...	...	...
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

150 rows × 6 columns

EDA

In [ ]:
```
# Data Shape (Rows,Columns)
data.shape
```

Out[ ]: (150, 6)

In [ ]:
```
# Check Null Values
data.isna().sum()
```

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

In [ ]:
```
# Data Information About Null Values, columns, Data Type
data.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
```

In [ ]:
```
# Some Stats Terms
data.describe()
```

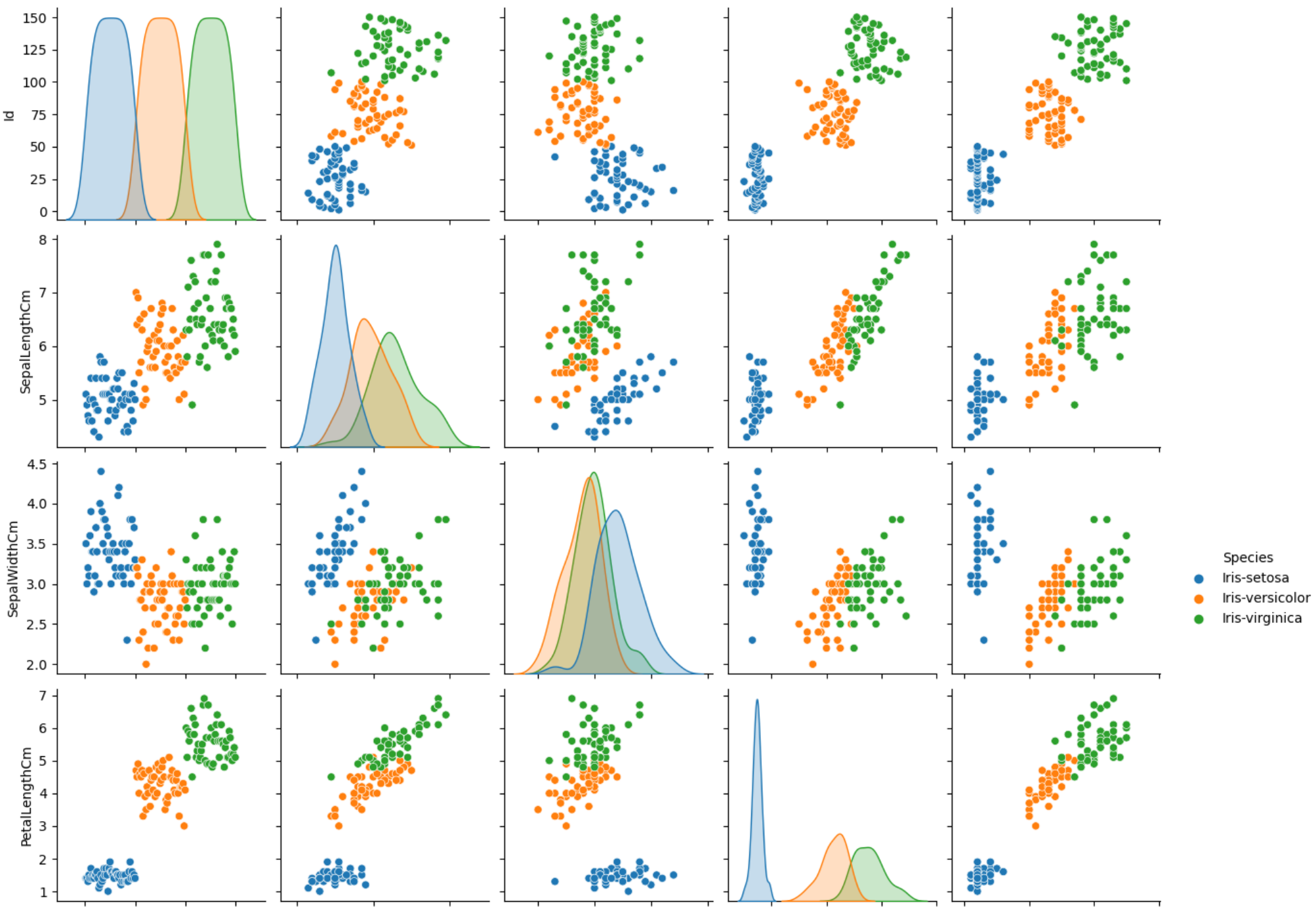
Out[ ]:

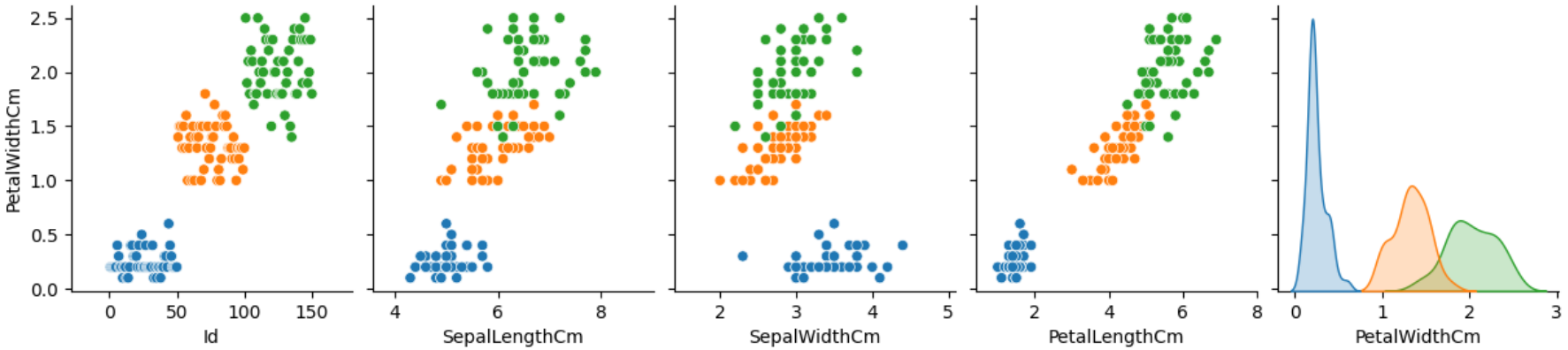
	Id	SepalLengthCm	SepalWidthCm	PetalLengthCm	PetalWidthCm
count	150.000000	150.000000	150.000000	150.000000	150.000000
mean	75.500000	5.843333	3.054000	3.758667	1.198667
std	43.445368	0.828066	0.433594	1.764420	0.763161
min	1.000000	4.300000	2.000000	1.000000	0.100000
25%	38.250000	5.100000	2.800000	1.600000	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

Pair Plot

In [ ]:

```
# Create Pair Plot to check correlation
sns.pairplot(data,hue='Species')
plt.show()
```

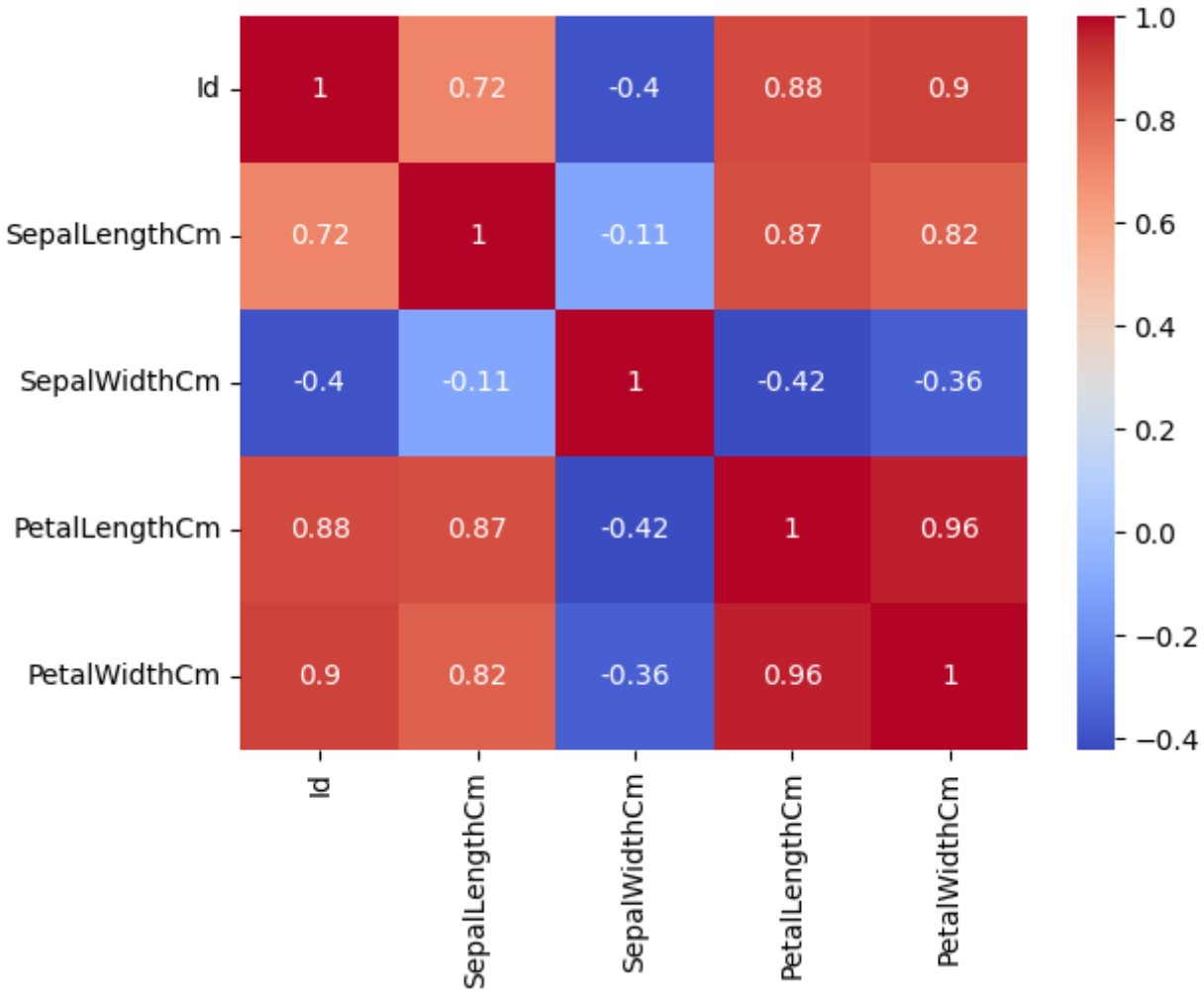

Id
SepalLengthCm
SepalWidthCm
PetalLengthCm
Species
Iris-setosa
Iris-versicolor
Iris-virginica



Correlation

In [ ]:
```
# Find Correlation between all the features
correlation_Matrix= data.corr()
sns.heatmap(data= correlation_Matrix,annot= True,cmap= 'coolwarm')
plt.show()
```

```
C:\Users\shory\AppData\Local\Temp\ipykernel_8872\1075848048.py:2: FutureWarning: The default value of numeric_only in DataFrame.corr is deprecated. In a future version, it will default to False. Select only valid columns or specify the value of numeric_only to silence this warning.
  correlation_Matrix= data.corr()
```



In [ ]:
```
# Data Split in Input (X) and Target (Y) Form
X= data.drop(['Species'], axis=1)
y= data['Species']
```

Apply Algorithms For Classification Task to check Performance Metrics

In [ ]:
```
# Assuming you have your features in X and labels in y
X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.30, random_state=10)
```

```python
# List of classifiers
classifiers = [
    LogisticRegression(max_iter=1000),
    DecisionTreeClassifier(),
    RandomForestClassifier(),
    SVC(),
    KNeighborsClassifier(),
    GaussianNB(),
    MLPClassifier(),
]

# Dictionary to store the results
results = {}

# Loop through each classifier and calculate metrics
for clf in classifiers:
    clf_name = clf.__class__.__name__
    clf.fit(X_train, y_train)
    y_pred = clf.predict(X_test)
    accuracy = accuracy_score(y_test, y_pred)
    precision = precision_score(y_test, y_pred, average='micro')
    recall = recall_score(y_test, y_pred, average='micro')
    f1 = f1_score(y_test, y_pred, average='micro')


    results[clf_name] = {
        'Accuracy': accuracy,
        'Precision': precision,
        'Recall': recall,
        'F1 Score': f1
    }

# Print the results
for clf_name, metrics in results.items():
    print(f"{clf_name} Metrics:")
    for metric_name, value in metrics.items():
        print(f"{metric_name}: {value:.4f}")
    print("\n")
```

```
LogisticRegression Metrics:
Accuracy: 1.0000
Precision: 1.0000
Recall: 1.0000
F1 Score: 1.0000


DecisionTreeClassifier Metrics:
Accuracy: 1.0000
Precision: 1.0000
Recall: 1.0000
F1 Score: 1.0000


RandomForestClassifier Metrics:
Accuracy: 1.0000
Precision: 1.0000
Recall: 1.0000
F1 Score: 1.0000


SVC Metrics:
Accuracy: 1.0000
Precision: 1.0000
Recall: 1.0000
F1 Score: 1.0000


KNeighborsClassifier Metrics:
Accuracy: 1.0000
Precision: 1.0000
Recall: 1.0000
F1 Score: 1.0000


GaussianNB Metrics:
Accuracy: 1.0000
Precision: 1.0000
Recall: 1.0000
F1 Score: 1.0000
```

```
MLPClassifier Metrics:
Accuracy: 0.9111
Precision: 0.9111
Recall: 0.9111
F1 Score: 0.9111
```

```
c:\Users\shory\AppData\Local\Programs\Python\Python311\Lib\site-packages\sklearn\neural_network\_multilayer_perceptron.py:691: ConvergenceWa
rning: Stochastic Optimizer: Maximum iterations (200) reached and the optimization hasn't converged yet.
  warnings.warn(
```