PROBLEM STATEMENT

The Iris flower dataset consists of three species: setosa, versicolor, and virginica. These species can be distinguished based on their measurements. Now, imagine that you have the measurements of Iris flowers categorized by their respective species. Your objective is to train a machine learning model that can learn from these measurements and accurately classify the Iris flowers into their respective species. Use the Iris dataset to develop a model that can classify iris flowers into different species based on their sepal and petal measurements. This dataset is widely used for introductory classification tasks.

Import Packages and Dataset

In [1]:
```
import numpy as np
import pandas as pd

import seaborn as sns
import matplotlib.pyplot as plt
```

In [2]:
```
df = pd.read_csv(r"C:\Users\LENOVO\Desktop\IRIS.csv")
df
```

Out[2]:

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

150 rows × 5 columns

Preprocessing

In [3]:
```
iris = df.copy()
iris.head()
```

Out[3]:

	sepal_length	sepal_width	petal_length	petal_width	species
0	5.1	3.5	1.4	0.2	Iris-setosa
1	4.9	3.0	1.4	0.2	Iris-setosa
2	4.7	3.2	1.3	0.2	Iris-setosa
3	4.6	3.1	1.5	0.2	Iris-setosa
4	5.0	3.6	1.4	0.2	Iris-setosa

In [4]:
```
iris.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 150 entries, 0 to 149
Data columns (total 5 columns):
 #   Column        Non-Null Count  Dtype  
---  ------        --------------  -----  
 0   sepal_length  150 non-null    float64
 1   sepal_width   150 non-null    float64
 2   petal_length  150 non-null    float64
 3   petal_width   150 non-null    float64
 4   species       150 non-null    object 
dtypes: float64(4), object(1)
memory usage: 6.0+ KB
```

In [5]:
```
iris.species.value_counts()
```

Out[5]:
```
species
Iris-setosa        50
Iris-versicolor    50
Iris-virginica     50
Name: count, dtype: int64
```

In [6]:
```
iris.describe()
```

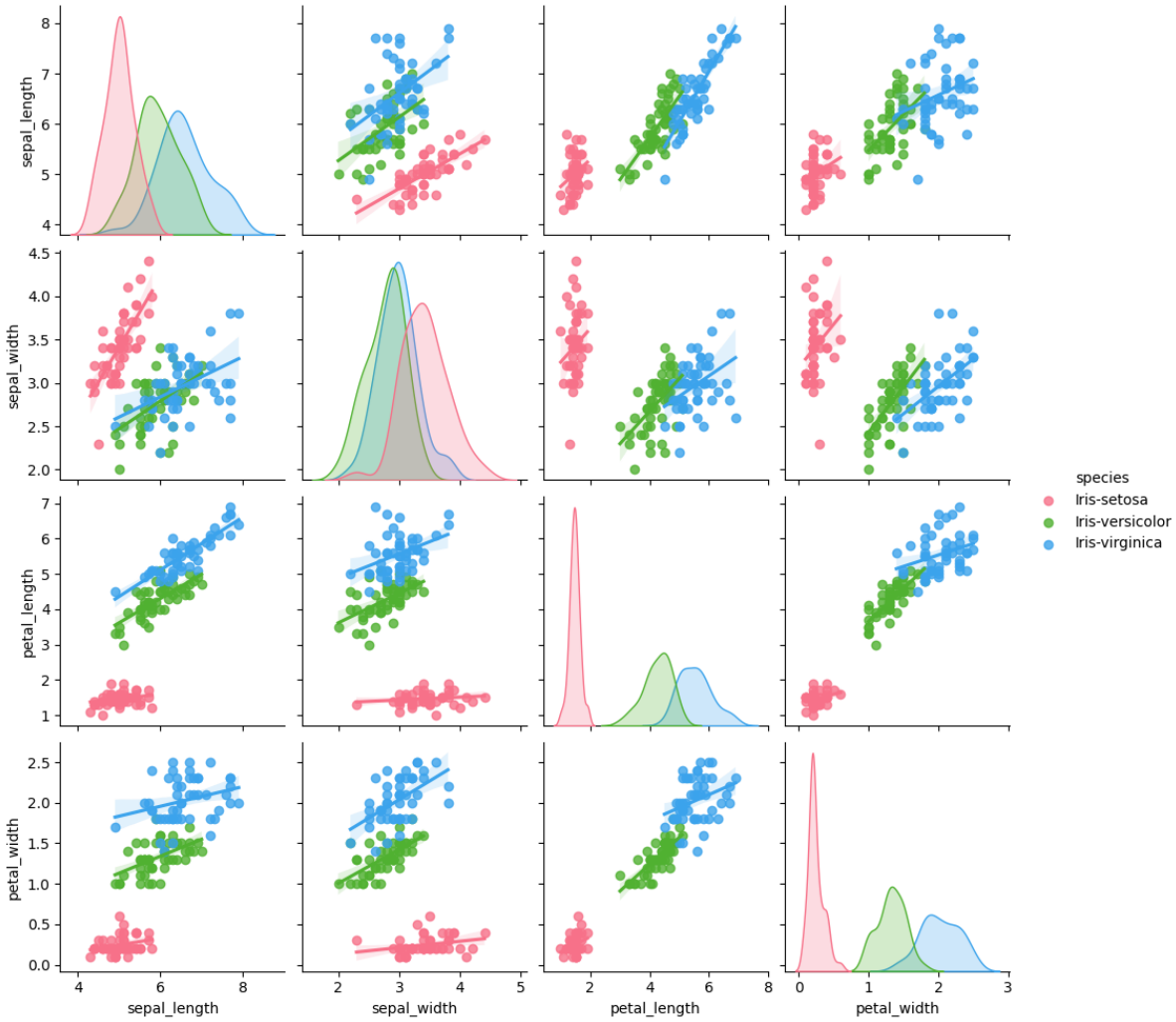
Out[6]:

	sepal_length	sepal_width	petal_length	petal_width
count	150.000000	150.000000	150.000000	150.000000
mean	5.843333	3.054000	3.758667	1.198667
std	0.828066	0.433594	1.764420	0.763161
min	4.300000	2.000000	1.000000	0.100000
25%	5.100000	2.800000	1.600000	0.300000
50%	5.800000	3.000000	4.350000	1.300000
75%	6.400000	3.300000	5.100000	1.800000
max	7.900000	4.400000	6.900000	2.500000

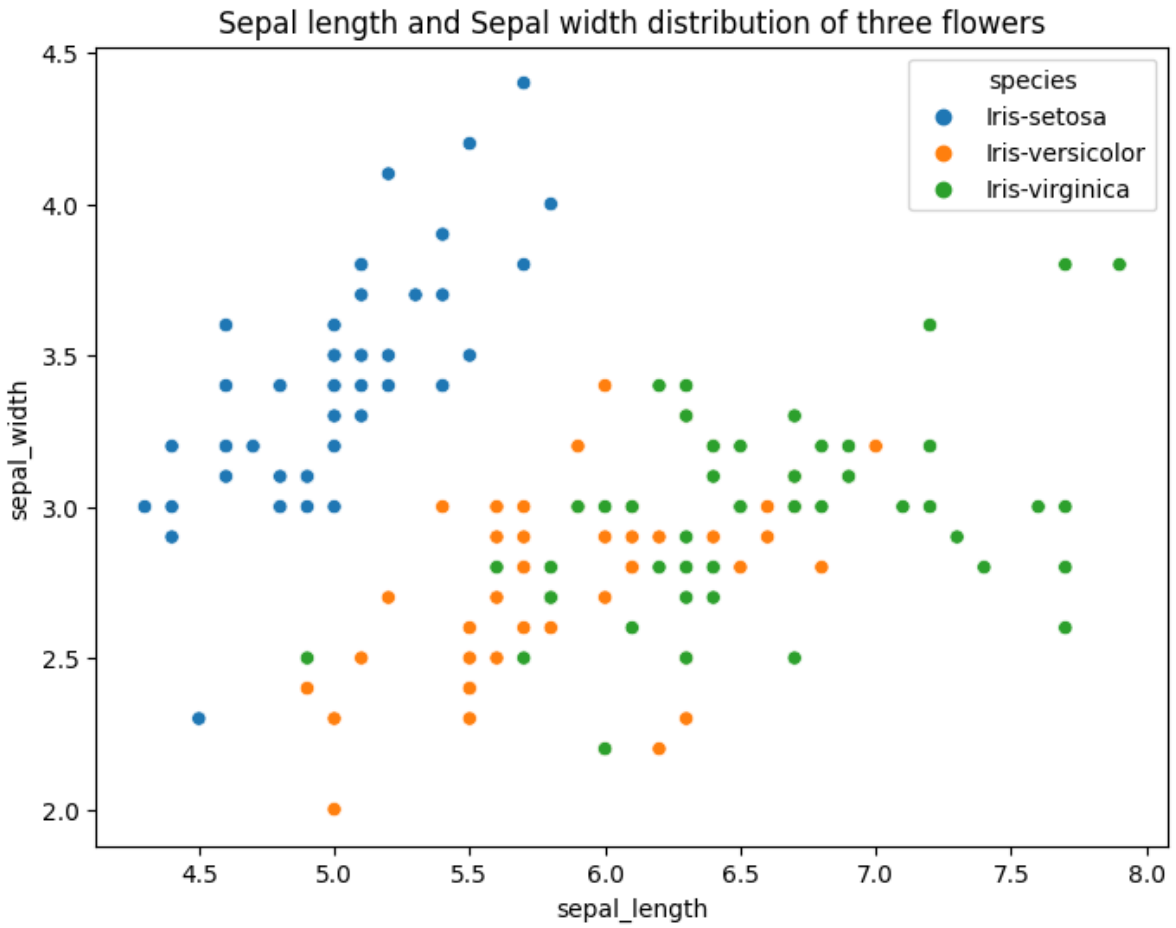
Data visualization

In [7]:
```
plt.figure(figsize=(6,8));
sns.pairplot(iris,kind='reg',hue ='species',palette="husl" );
```

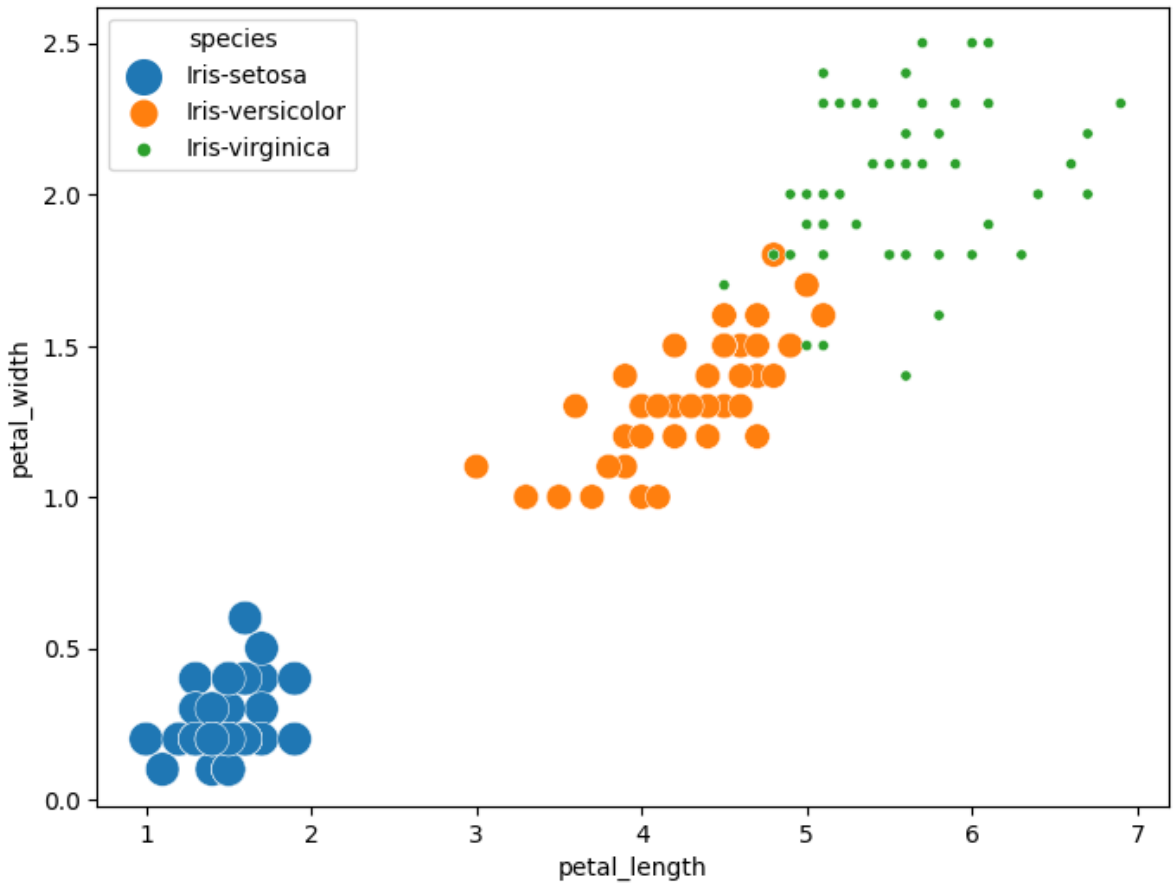
```
<Figure size 600x800 with 0 Axes>
```



In [8]:
```
plt.figure(figsize=(8,6));
sns.scatterplot(x=iris.sepal_length,y=iris.sepal_width,hue=iris.species).set_t
```



In [9]:
```
plt.figure(figsize=(8,6));
cmap = sns.cubehelix_palette(dark=.5, light=.9, as_cmap=True)
ax = sns.scatterplot(x="petal_length", y="petal_width",hue="species",size="spe
```



Preparing Model

In [10]:
```
from sklearn.preprocessing import LabelEncoder
lb = LabelEncoder()
iris['species'] = lb.fit_transform(iris['species'])
iris.sample(3)
```

Out[10]:

	sepal_length	sepal_width	petal_length	petal_width	species
82	5.8	2.7	3.9	1.2	1
60	5.0	2.0	3.5	1.0	1
36	5.5	3.5	1.3	0.2	0

In [11]:
```
from sklearn.metrics import confusion_matrix
from sklearn.metrics import classification_report
```

In [12]:
```
y = iris.species
X = iris.drop('species',axis = 1)
```

In [13]:
```
from sklearn.model_selection import KFold,train_test_split,cross_val_score
X_train,X_test,y_train,y_test=train_test_split(X,y,test_size=0.3,random_state=
```

knn

In [14]:
```
from sklearn.neighbors import KNeighborsClassifier
```

In [15]:
```
knn = KNeighborsClassifier(n_neighbors = 3)
knn.fit(X_train,y_train)
```

Out[15]:
```
KNeighborsClassifier(n_neighbors=3)
```
In a Jupyter environment, please rerun this cell to show the HTML representation or trust the notebook.
On GitHub, the HTML representation is unable to render, please try loading this page with nbviewer.org.

In [16]:
```
y_pred = knn.predict(X_test)
```

Evaluation

In [17]:
```
print(classification_report(y_test, y_pred))
print(confusion_matrix(y_test, y_pred))
```

```
              precision    recall  f1-score   support

           0       1.00      1.00      1.00        16
           1       1.00      0.94      0.97        18
           2       0.92      1.00      0.96        11

    accuracy                           0.98        45
   macro avg       0.97      0.98      0.98        45
weighted avg       0.98      0.98      0.98        45

[[16  0  0]
 [ 0 17  1]
 [ 0  0 11]]
```

In [18]:
```
from sklearn.metrics import accuracy_score
print('accuracy is',accuracy_score(y_pred,y_test))
```

```
accuracy is 0.9777777777777777
```

In [ ]: