Import Libraries

In [1]:

```
import pandas as pd
import numpy as np
```

In [3]:

```
import matplotlib.pyplot as plt
import seaborn as sns
import warnings
warnings.filterwarnings('ignore')
```

Import Dataset

In [5]:

```
data = pd.read_csv('Iris.csv')
data.head()
```

Out[5]:

	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

In [6]:

```
data.drop(['Id'] , axis = 1 , inplace = True)
```

In [7]:

```
data.head()
```

Out[7]:

	SepalLengthCm	SepalWidthCm	PetalLengthCm	PetalWidthCm	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 [8]:

```
data['Species'] = data['Species'].str.replace('Iris-' , '')
```

In [9]:

```
data.head()
```

Out[9]:

	SepalLengthCm	SepalWidthCm	PetalLengthCm	PetalWidthCm	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

In [13]:

```
data.Species.unique()
```

Out[13]:

```
array(['setosa', 'versicolor', 'virginica'], dtype=object)
```

In [10]:

```
data.info()
```

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

In [11]:

```
data.describe()
```

Out[11]:

	SepalLengthCm	SepalWidthCm	PetalLengthCm	PetalWidthCm
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

In [12]:

```
data.isnull().sum()
```

Out[12]:

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

In [14]:

```
data['Species'] = data['Species'].str.replace('setosa' , '1')
data['Species'] = data['Species'].str.replace('versicolor' , '2')
data['Species'] = data['Species'].str.replace('virginica' , '3')
```

In [18]:

```
data["Species"] = pd.to_numeric(data["Species"], downcast = "integer")
```

In [19]:

```
data.head()
```

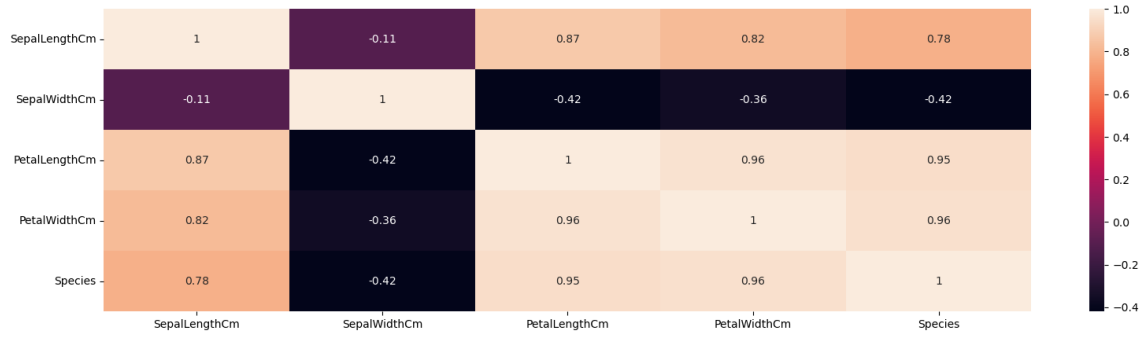
Out[19]:

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

Heat map

In [20]:

```
plt.figure(figsize = (19,5))
sns.heatmap(data.corr() , annot = True)
plt.show()
```



In [21]:

```
data.drop(['SepalWidthCm'] , axis = 1 , inplace = True)
```

In [22]:

```
data.head()
```

Out[22]:

	SepalLengthCm	PetalLengthCm	PetalWidthCm	Species
0	5.1	1.4	0.2	1
1	4.9	1.4	0.2	1
2	4.7	1.3	0.2	1
3	4.6	1.5	0.2	1
4	5.0	1.4	0.2	1

Modelling

In [23]:

```
X = data.drop(['Species'] , axis = 1)
y = data['Species']
```

In [24]:

```
from sklearn.model_selection import train_test_split
```

In [25]:

```
X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.25, random_state=4
```

In [26]:

```
from sklearn.tree import DecisionTreeClassifier
```

In [27]:

```
dt_model = DecisionTreeClassifier()
```

In [28]:

```
dt_model.fit(X_train, y_train)
```

Out[28]:

DecisionTreeClassifier

DecisionTreeClassifier()

In [29]:

```
y_pred = dt_model.predict(X_test)
```

In [30]:

```
from sklearn.metrics import classification_report,confusion_matrix, accuracy_score
```

In [31]:

```
print("Accuracy Score:", accuracy_score(y_test, y_pred))
```

```
Accuracy Score: 1.0
```

In [32]:

```
from sklearn.model_selection import cross_val_score
```

In [33]:

```
cv_scores = cross_val_score(estimator=dt_model, X = X_train, y = y_train, cv=10)
cv_scores.mean()
```

Out[33]:

```
0.918181818181818
```

In [34]:

```
cv_scores
```

Out[34]:

```
array([1.        , 1.        , 1.        , 1.        , 0.63636364,
       0.81818182, 1.        , 0.90909091, 0.90909091, 0.90909091])
```

In [35]:

```
print(confusion_matrix(y_test, y_pred))
```

```
[[15  0  0]
 [ 0 11  0]
 [ 0  0 12]]
```

Decision Tree

In [36]:

```
from sklearn import tree
```

In [38]:

```
list(data.columns[:-1])
```

Out[38]:

```
['SepalLengthCm', 'PetalLengthCm', 'PetalWidthCm']
```

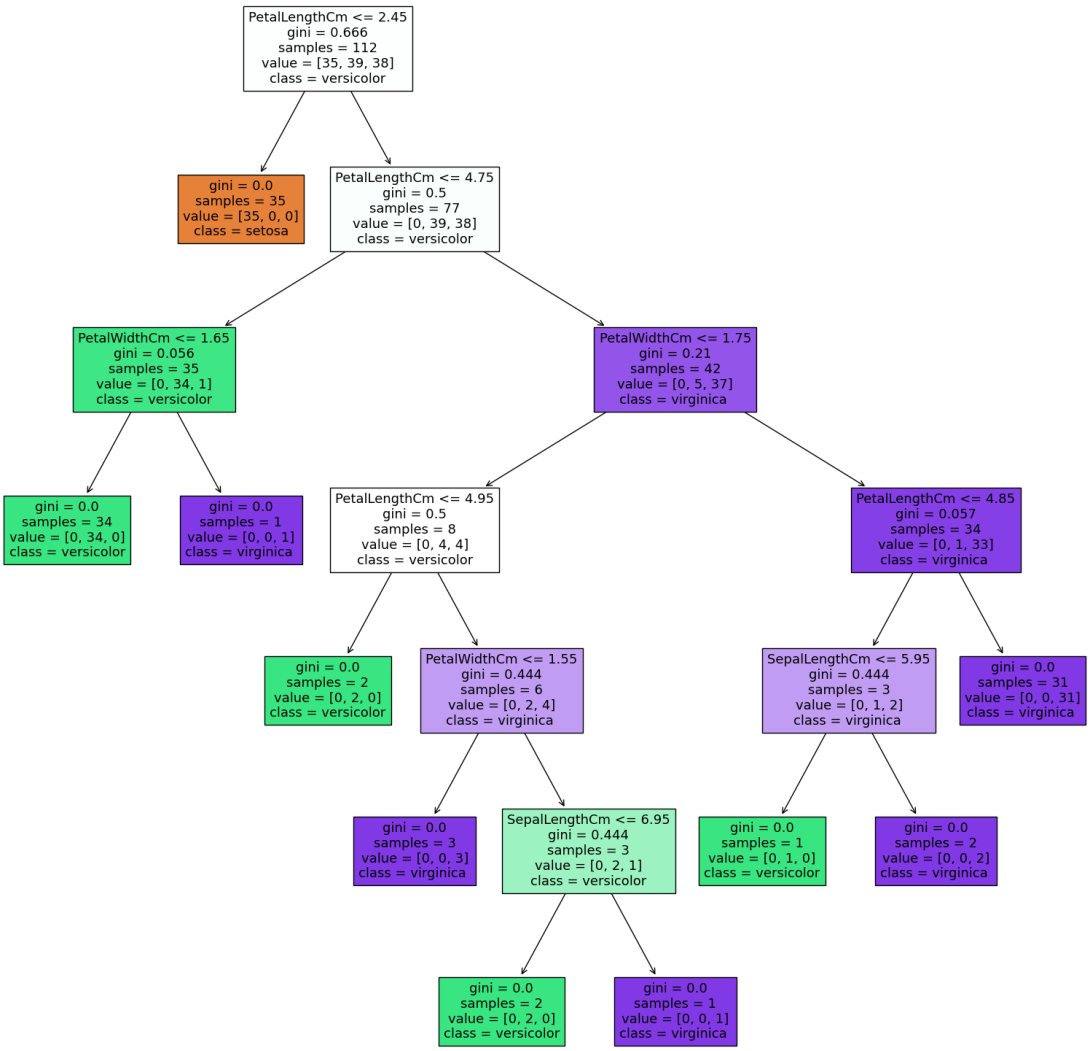
In [39]:

```
features = list(data.columns[:-1])
targets = ["setosa", "versicolor", "virginica "]
print(features)
print(targets)
```

```
['SepalLengthCm', 'PetalLengthCm', 'PetalWidthCm']
['setosa', 'versicolor', 'virginica ']
```

In [43]:

```
plt.figure(figsize=(20,20))
tree2 = tree.plot_tree(dt_model, filled = True ,   feature_names=features , class_names
```



In [ ]:

```

```