

```
In [1]: import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
import plotly.express as px
from sklearn.datasets import load_iris
import warnings
warnings.filterwarnings("ignore")
```

```
In [2]: data=pd.read_csv('Iris.csv')
```

```
In [3]: data
```

```
Out[3]:
```

|  | 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

```
In [4]: data.head()
```

```
Out[4]:
```

|  | 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 [5]: data.head(10)
```

```
Out[5]:
```

|          | <b>Id</b> | <b>SepalLengthCm</b> | <b>SepalWidthCm</b> | <b>PetalLengthCm</b> | <b>PetalWidthCm</b> | <b>Species</b> |
|----------|-----------|----------------------|---------------------|----------------------|---------------------|----------------|
| <b>0</b> | 1         | 5.1                  | 3.5                 | 1.4                  | 0.2                 | Iris-setosa    |
| <b>1</b> | 2         | 4.9                  | 3.0                 | 1.4                  | 0.2                 | Iris-setosa    |
| <b>2</b> | 3         | 4.7                  | 3.2                 | 1.3                  | 0.2                 | Iris-setosa    |
| <b>3</b> | 4         | 4.6                  | 3.1                 | 1.5                  | 0.2                 | Iris-setosa    |
| <b>4</b> | 5         | 5.0                  | 3.6                 | 1.4                  | 0.2                 | Iris-setosa    |
| <b>5</b> | 6         | 5.4                  | 3.9                 | 1.7                  | 0.4                 | Iris-setosa    |
| <b>6</b> | 7         | 4.6                  | 3.4                 | 1.4                  | 0.3                 | Iris-setosa    |
| <b>7</b> | 8         | 5.0                  | 3.4                 | 1.5                  | 0.2                 | Iris-setosa    |
| <b>8</b> | 9         | 4.4                  | 2.9                 | 1.4                  | 0.2                 | Iris-setosa    |
| <b>9</b> | 10        | 4.9                  | 3.1                 | 1.5                  | 0.1                 | Iris-setosa    |

```
In [6]: data.tail()
```

```
Out[6]:
```

|            | <b>Id</b> | <b>SepalLengthCm</b> | <b>SepalWidthCm</b> | <b>PetalLengthCm</b> | <b>PetalWidthCm</b> | <b>Species</b> |
|------------|-----------|----------------------|---------------------|----------------------|---------------------|----------------|
| <b>145</b> | 146       | 6.7                  | 3.0                 | 5.2                  | 2.3                 | Iris-virginica |
| <b>146</b> | 147       | 6.3                  | 2.5                 | 5.0                  | 1.9                 | Iris-virginica |
| <b>147</b> | 148       | 6.5                  | 3.0                 | 5.2                  | 2.0                 | Iris-virginica |
| <b>148</b> | 149       | 6.2                  | 3.4                 | 5.4                  | 2.3                 | Iris-virginica |
| <b>149</b> | 150       | 5.9                  | 3.0                 | 5.1                  | 1.8                 | Iris-virginica |

```
In [7]: data.tail(10)
```

```
Out[7]:
```

|            | <b>Id</b> | <b>SepalLengthCm</b> | <b>SepalWidthCm</b> | <b>PetalLengthCm</b> | <b>PetalWidthCm</b> | <b>Species</b> |
|------------|-----------|----------------------|---------------------|----------------------|---------------------|----------------|
| <b>140</b> | 141       | 6.7                  | 3.1                 | 5.6                  | 2.4                 | Iris-virginica |
| <b>141</b> | 142       | 6.9                  | 3.1                 | 5.1                  | 2.3                 | Iris-virginica |
| <b>142</b> | 143       | 5.8                  | 2.7                 | 5.1                  | 1.9                 | Iris-virginica |
| <b>143</b> | 144       | 6.8                  | 3.2                 | 5.9                  | 2.3                 | Iris-virginica |
| <b>144</b> | 145       | 6.7                  | 3.3                 | 5.7                  | 2.5                 | Iris-virginica |
| <b>145</b> | 146       | 6.7                  | 3.0                 | 5.2                  | 2.3                 | Iris-virginica |
| <b>146</b> | 147       | 6.3                  | 2.5                 | 5.0                  | 1.9                 | Iris-virginica |
| <b>147</b> | 148       | 6.5                  | 3.0                 | 5.2                  | 2.0                 | Iris-virginica |
| <b>148</b> | 149       | 6.2                  | 3.4                 | 5.4                  | 2.3                 | Iris-virginica |
| <b>149</b> | 150       | 5.9                  | 3.0                 | 5.1                  | 1.8                 | Iris-virginica |

In [8]: *# Data Preprocessing*

```
#display information about data set  
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 [9]: data.columns

```
Out[9]: Index(['Id', 'SepalLengthCm', 'SepalWidthCm', 'PetalLengthCm', 'PetalWidthC  
m',  
              'Species'],  
            dtype='object')
```

In [10]: data.describe()

```
Out[10]:
```

|              | Id         | SepalLengthCm | SepalWidthCm | PetalLengthCm | PetalWidthCm |
|--------------|------------|---------------|--------------|---------------|--------------|
| <b>count</b> | 150.000000 | 150.000000    | 150.000000   | 150.000000    | 150.000000   |
| <b>mean</b>  | 75.500000  | 5.843333      | 3.054000     | 3.758667      | 1.198667     |
| <b>std</b>   | 43.445368  | 0.828066      | 0.433594     | 1.764420      | 0.763161     |
| <b>min</b>   | 1.000000   | 4.300000      | 2.000000     | 1.000000      | 0.100000     |
| <b>25%</b>   | 38.250000  | 5.100000      | 2.800000     | 1.600000      | 0.300000     |
| <b>50%</b>   | 75.500000  | 5.800000      | 3.000000     | 4.350000      | 1.300000     |
| <b>75%</b>   | 112.750000 | 6.400000      | 3.300000     | 5.100000      | 1.800000     |
| <b>max</b>   | 150.000000 | 7.900000      | 4.400000     | 6.900000      | 2.500000     |

```
In [11]: data.describe(include='all')
```

```
Out[11]:
```

|               | <b>Id</b>  | <b>SepalLengthCm</b> | <b>SepalWidthCm</b> | <b>PetalLengthCm</b> | <b>PetalWidthCm</b> | <b>Species</b> |
|---------------|------------|----------------------|---------------------|----------------------|---------------------|----------------|
| <b>count</b>  | 150.000000 | 150.000000           | 150.000000          | 150.000000           | 150.000000          | 150            |
| <b>unique</b> | NaN        | NaN                  | NaN                 | NaN                  | NaN                 | 3              |
| <b>top</b>    | NaN        | NaN                  | NaN                 | NaN                  | NaN                 | Iris-setosa    |
| <b>freq</b>   | NaN        | NaN                  | NaN                 | NaN                  | NaN                 | 50             |
| <b>mean</b>   | 75.500000  | 5.843333             | 3.054000            | 3.758667             | 1.198667            | NaN            |
| <b>std</b>    | 43.445368  | 0.828066             | 0.433594            | 1.764420             | 0.763161            | NaN            |
| <b>min</b>    | 1.000000   | 4.300000             | 2.000000            | 1.000000             | 0.100000            | NaN            |
| <b>25%</b>    | 38.250000  | 5.100000             | 2.800000            | 1.600000             | 0.300000            | NaN            |
| <b>50%</b>    | 75.500000  | 5.800000             | 3.000000            | 4.350000             | 1.300000            | NaN            |
| <b>75%</b>    | 112.750000 | 6.400000             | 3.300000            | 5.100000             | 1.800000            | NaN            |
| <b>max</b>    | 150.000000 | 7.900000             | 4.400000            | 6.900000             | 2.500000            | NaN            |

```
In [12]: data.shape
```

```
Out[12]: (150, 6)
```

```
In [13]: data.dtypes
```

```
Out[13]: Id                int64
SepalLengthCm            float64
SepalWidthCm             float64
PetalLengthCm            float64
PetalWidthCm             float64
Species                  object
dtype: object
```

```
In [14]: data.index
```

```
Out[14]: RangeIndex(start=0, stop=150, step=1)
```

```
In [15]: # Check The Missing Value in data using pandas isnull()
data.isnull()
```

```
Out[15]:
```

|     | <b>Id</b> | <b>SepalLengthCm</b> | <b>SepalWidthCm</b> | <b>PetalLengthCm</b> | <b>PetalWidthCm</b> | <b>Species</b> |
|-----|-----------|----------------------|---------------------|----------------------|---------------------|----------------|
| 0   | False     | False                | False               | False                | False               | False          |
| 1   | False     | False                | False               | False                | False               | False          |
| 2   | False     | False                | False               | False                | False               | False          |
| 3   | False     | False                | False               | False                | False               | False          |
| 4   | False     | False                | False               | False                | False               | False          |
| ... | ...       | ...                  | ...                 | ...                  | ...                 | ...            |
| 145 | False     | False                | False               | False                | False               | False          |
| 146 | False     | False                | False               | False                | False               | False          |
| 147 | False     | False                | False               | False                | False               | False          |
| 148 | False     | False                | False               | False                | False               | False          |
| 149 | False     | False                | False               | False                | False               | False          |

150 rows × 6 columns

```
In [16]: data.isnull().any()
```

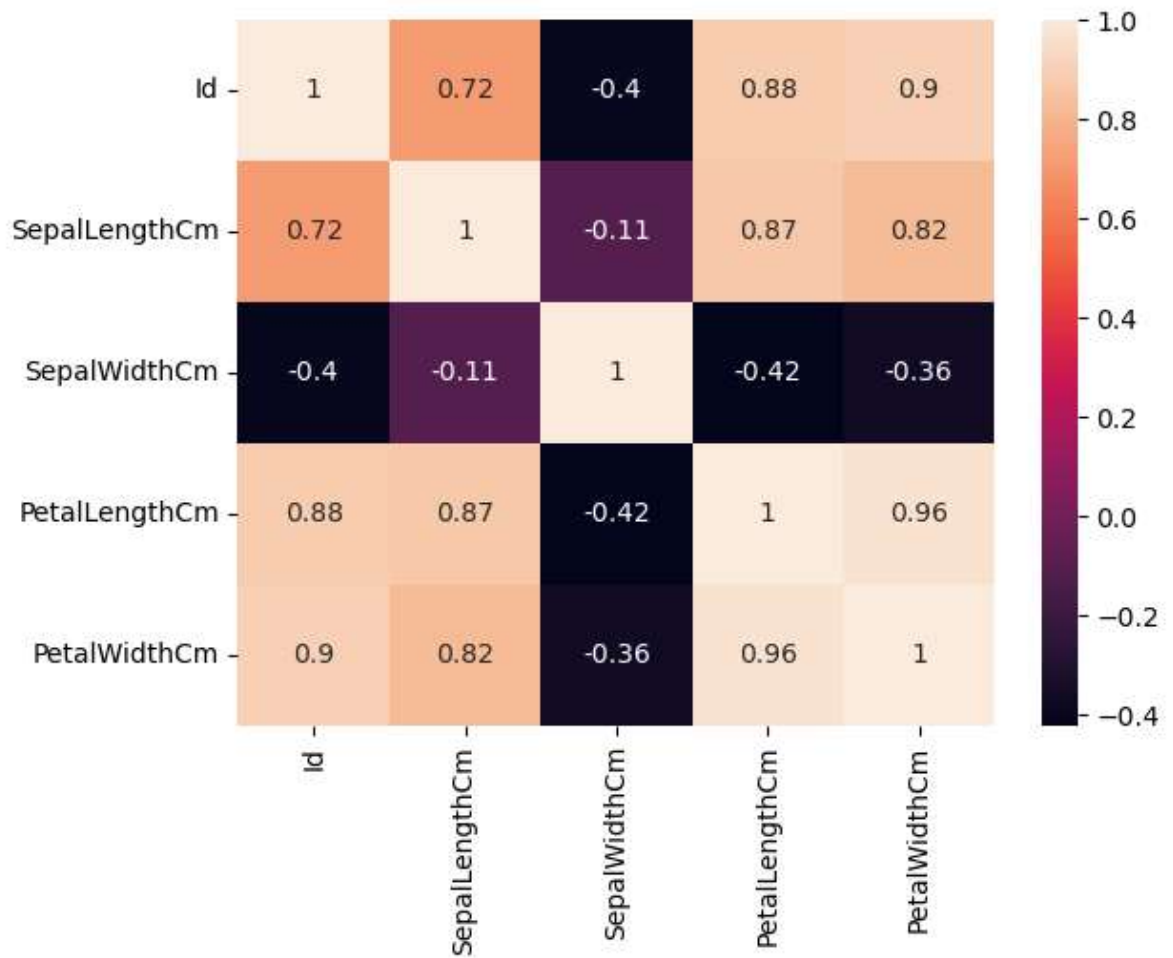
```
Out[16]: Id                False
SepalLengthCm            False
SepalWidthCm             False
PetalLengthCm            False
PetalWidthCm             False
Species                  False
dtype: bool
```

```
In [17]: data.isnull().sum()
```

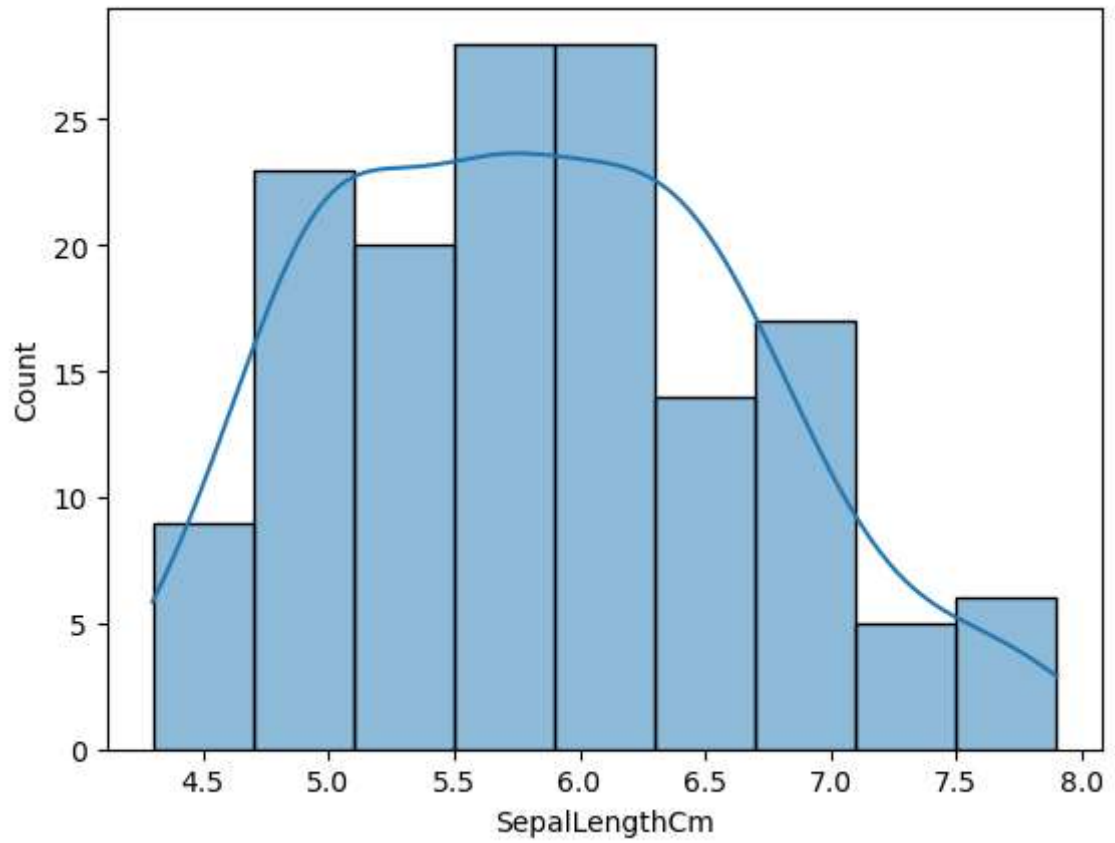
```
Out[17]: Id                0
SepalLengthCm            0
SepalWidthCm             0
PetalLengthCm            0
PetalWidthCm             0
Species                  0
dtype: int64
```

## Visualization

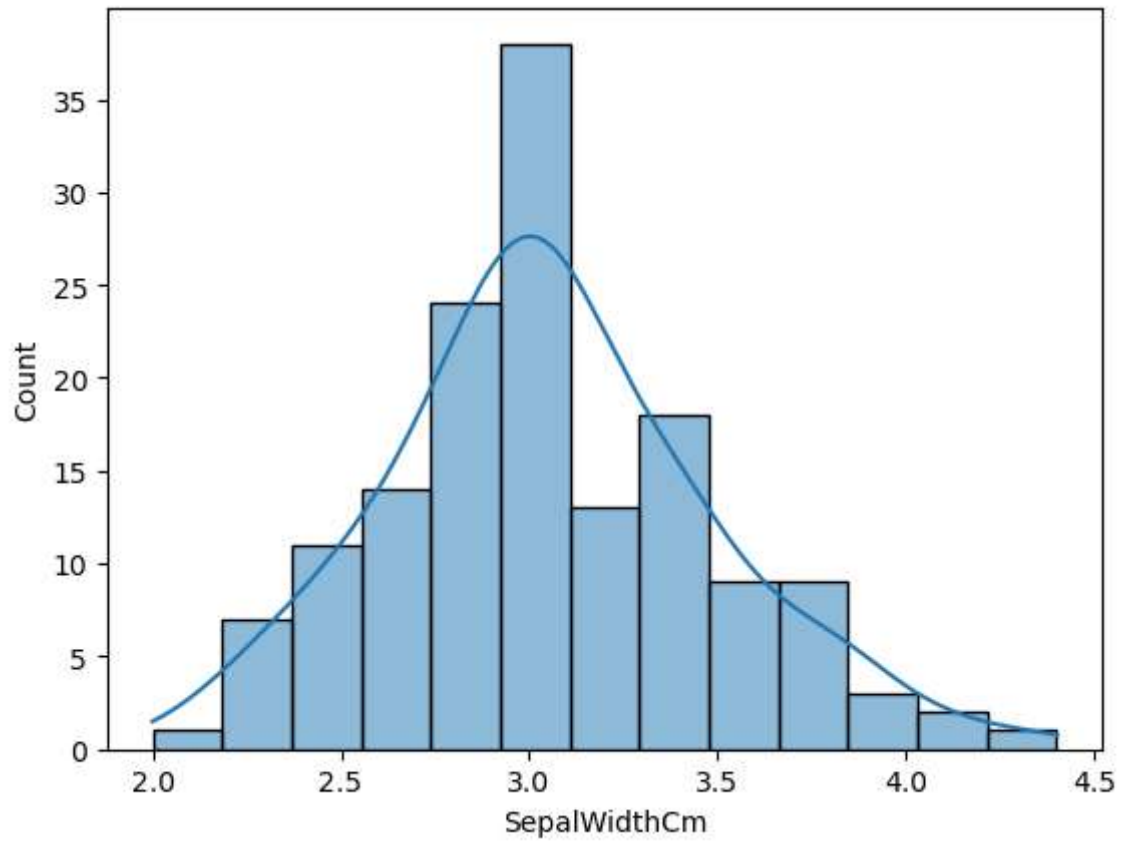
```
In [18]: sns.heatmap(data.corr(), annot=True)  
plt.show()
```



```
In [20]: sns.histplot(data["SepalLengthCm"], kde=True)  
plt.show()
```

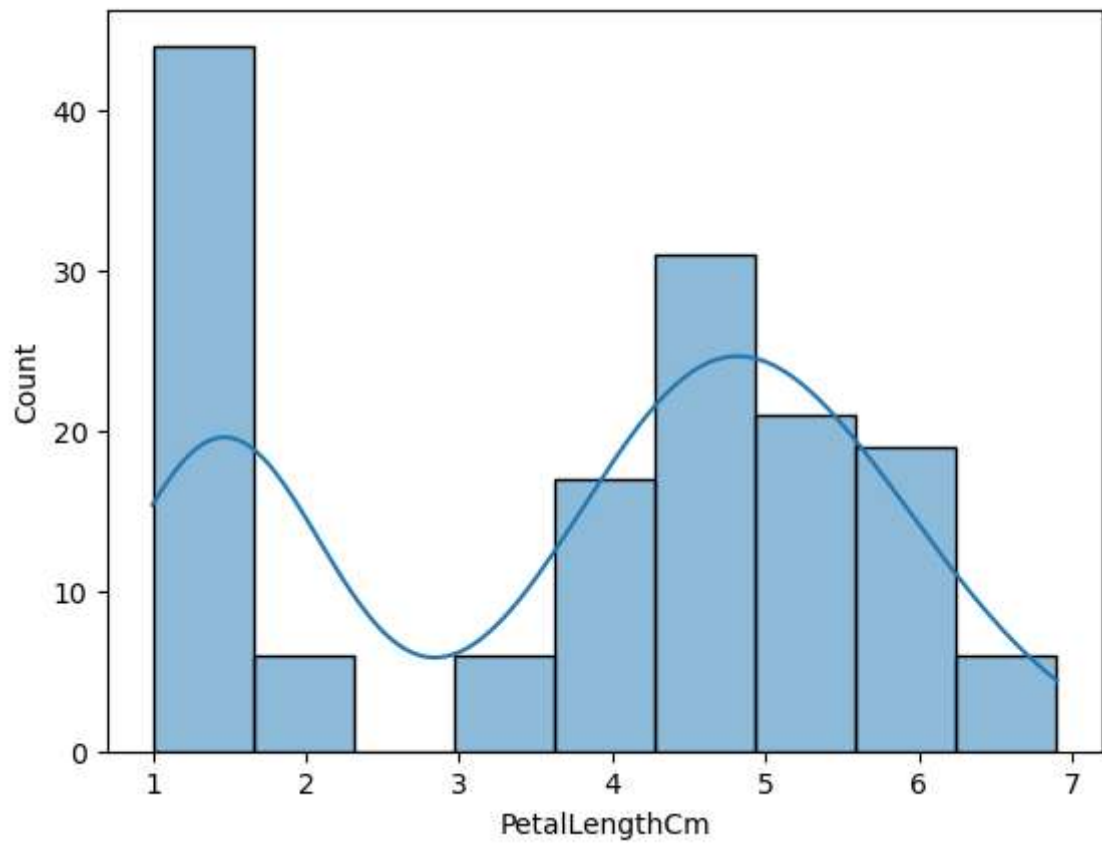


```
In [21]: sns.histplot(data["SepalWidthCm"], kde=True)  
plt.show()
```

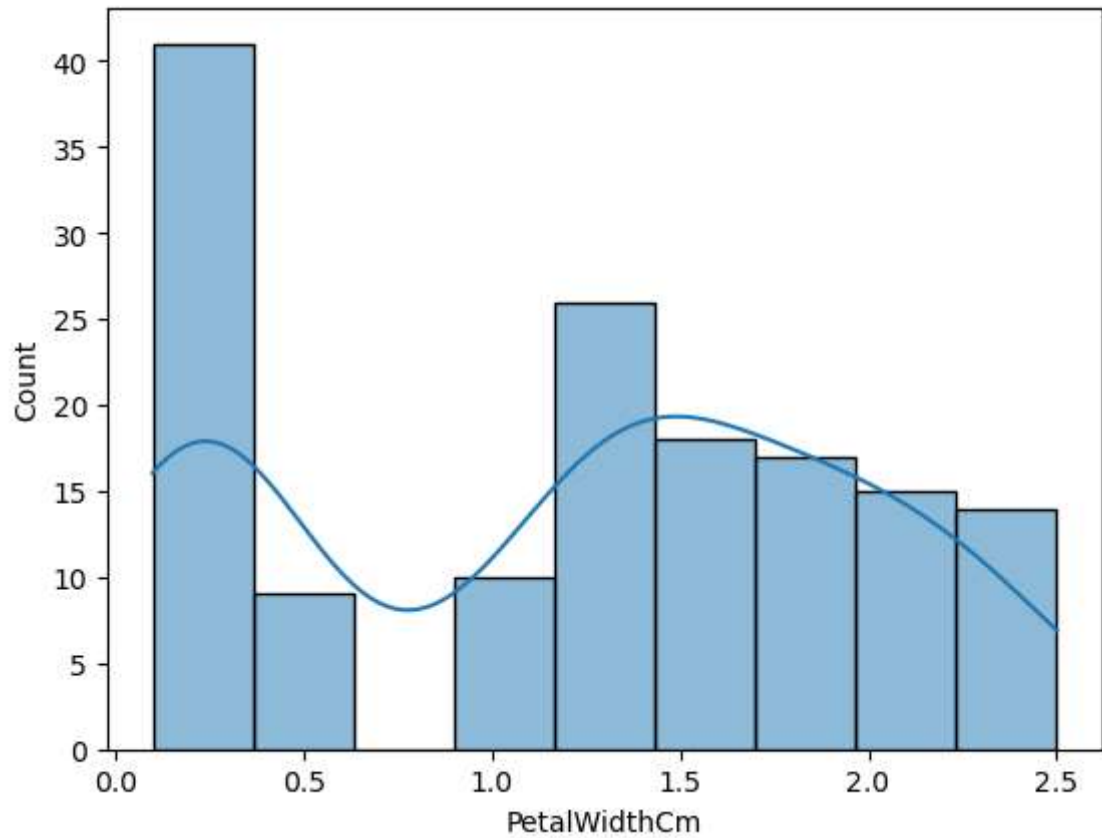




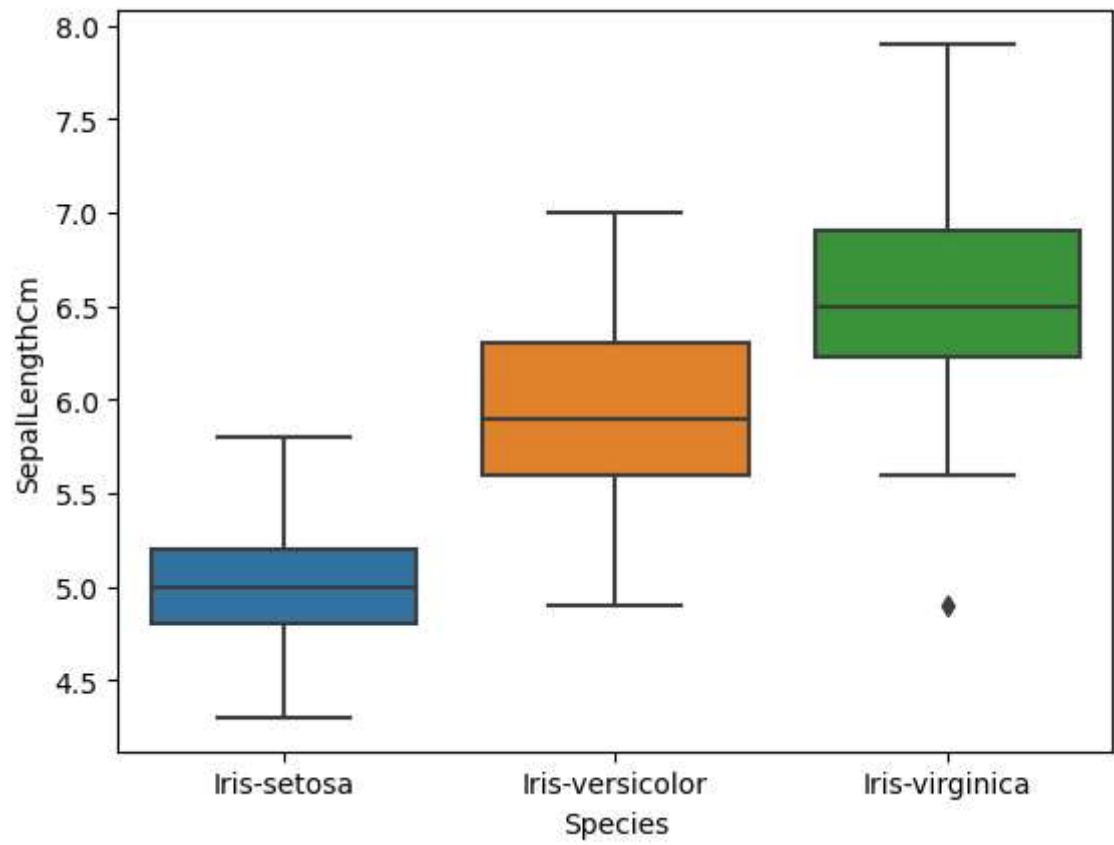
```
In [23]: sns.histplot(data["PetalLengthCm"], kde=True)  
plt.show()
```



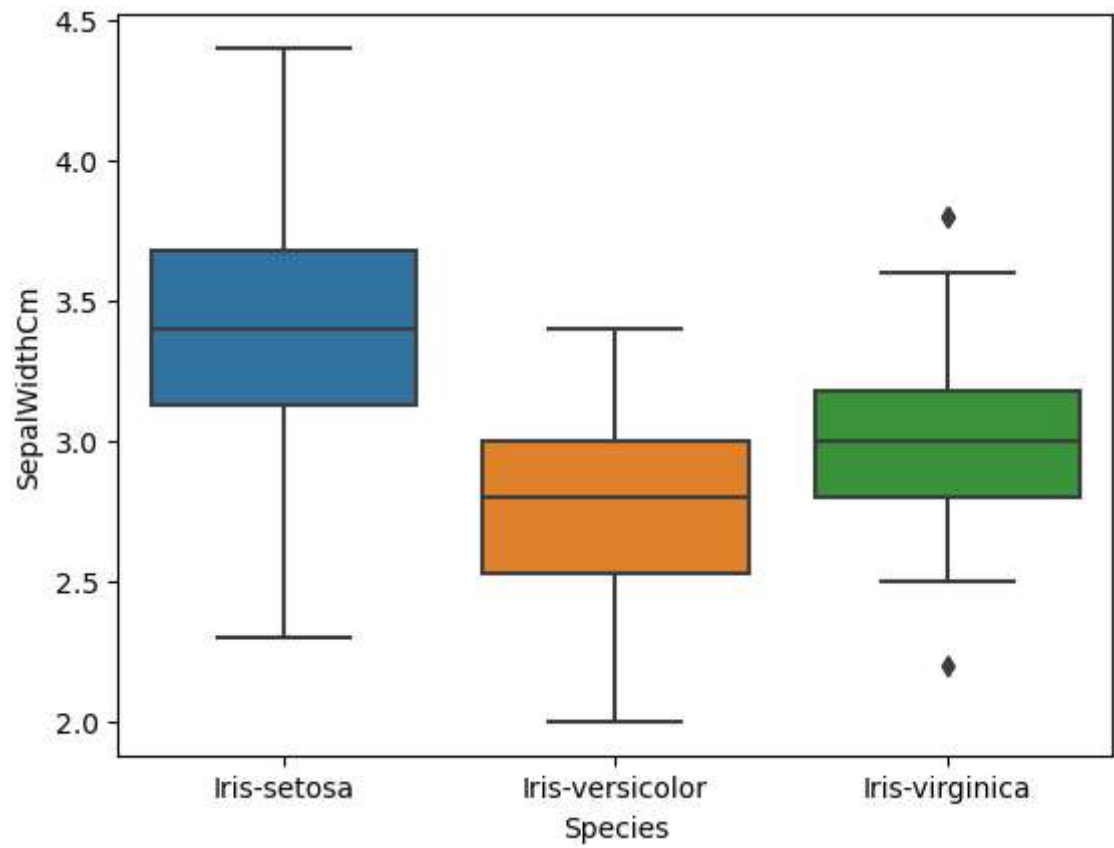
```
In [24]: sns.histplot(data["PetalWidthCm"], kde=True)  
plt.show()
```



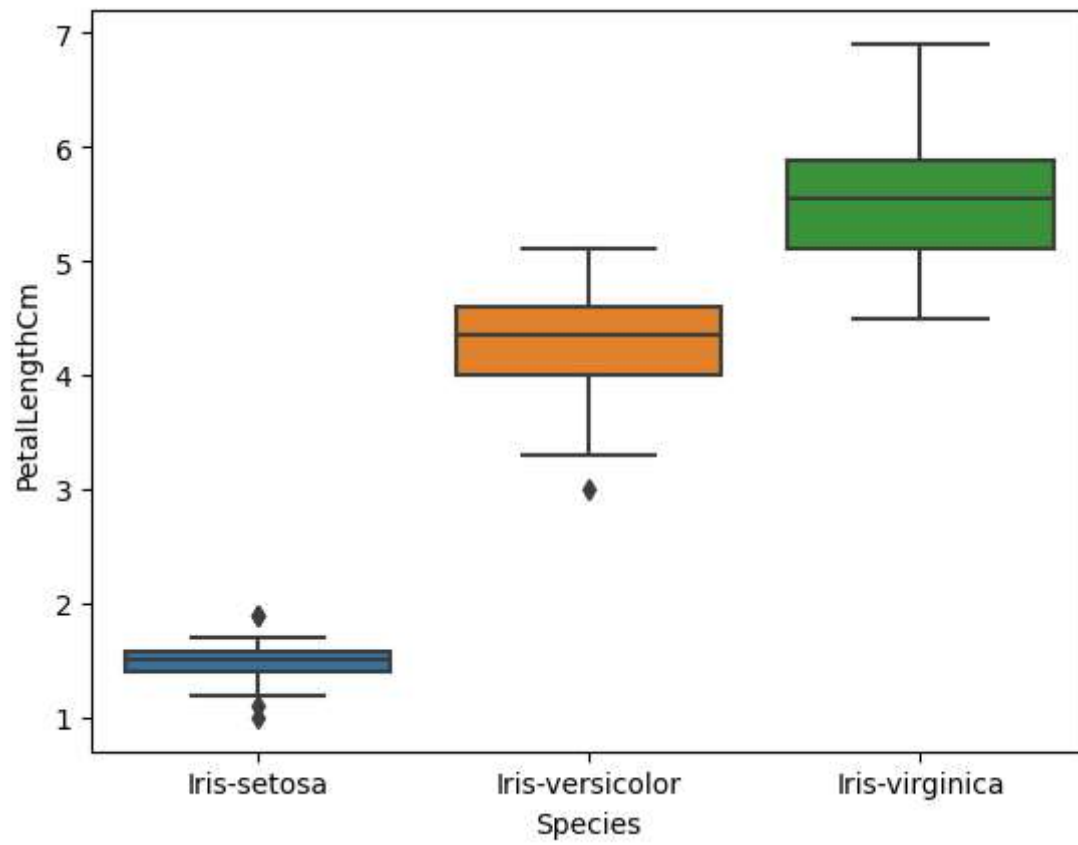
```
In [27]: sns.boxplot(x=data['Species'], y=data["SepalLengthCm"])  
plt.show()
```



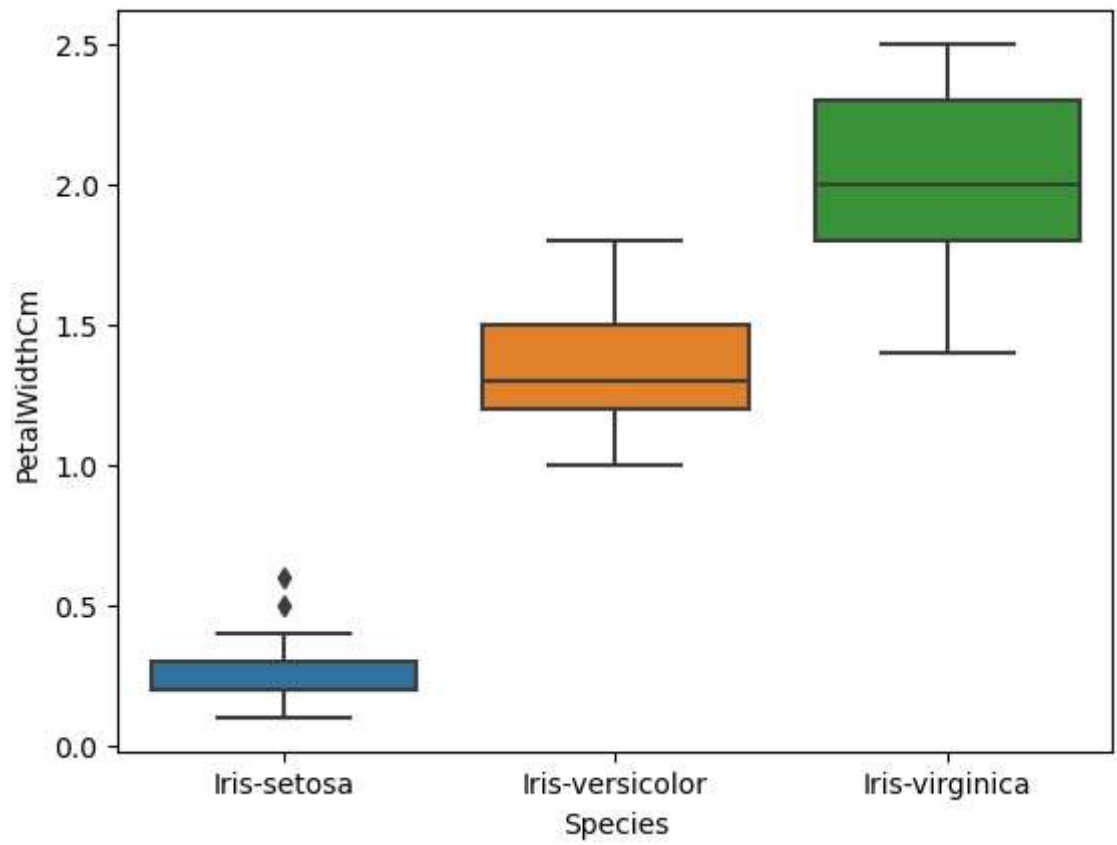
```
In [28]: sns.boxplot(x=data['Species'], y=data["SepalWidthCm"])  
plt.show()
```



```
In [29]: sns.boxplot(x=data['Species'], y=data["PetalLengthCm"])  
plt.show()
```



```
In [30]: sns.boxplot(x=data['Species'], y=data["PetalWidthCm"])  
plt.show()
```



In [ ]:

In [ ]: