In [1]:

```
import pandas as pd
import numpy as np
from pandas.plotting import scatter_matrix
import matplotlib.pyplot as plt
import seaborn as sns
from sklearn.linear_model import LogisticRegression
from sklearn.model_selection import train_test_split
from sklearn.model_selection import KFold
from sklearn.model_selection import cross_val_score
from sklearn.metrics import classification_report
```

In [2]:

```
df = pd.read_csv("iris.csv")
```

In [3]:

```
df.head()
```

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

In [9]:

```
df[[ 'SepalLengthCm' , 'SepalWidthCm' , 'PetalLengthCm' ,'PetalWidthCm' ]] = df[['SepalLeng
print (df.isnull().sum())
```

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

In [10]:

```
print("Shape of the dataset(rows, columns):",df.shape)
```

```
Shape of the dataset(rows, columns): (150, 6)
```

In [11]:

```
print(df.dtypes)
```

```
Id                int64
SepalLengthCm    float64
SepalWidthCm     float64
PetalLengthCm    float64
PetalWidthCm     float64
Species           object
dtype: object
```

In [12]:

```
print(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
```

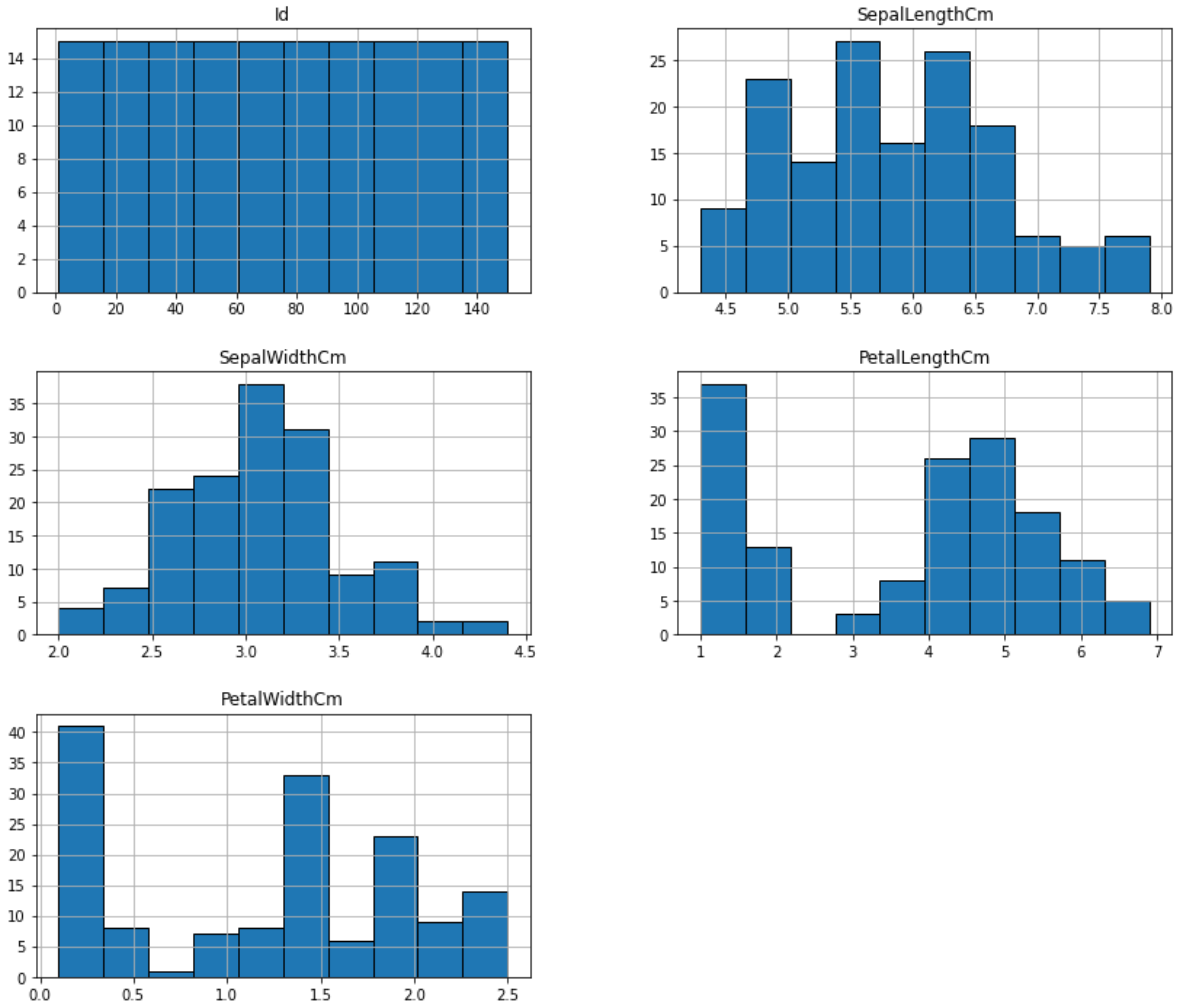
In [13]:

```
print(df.groupby('Species').size())
```

```
Species
Iris-setosa        50
Iris-versicolor    50
Iris-virginica     50
dtype: int64
```

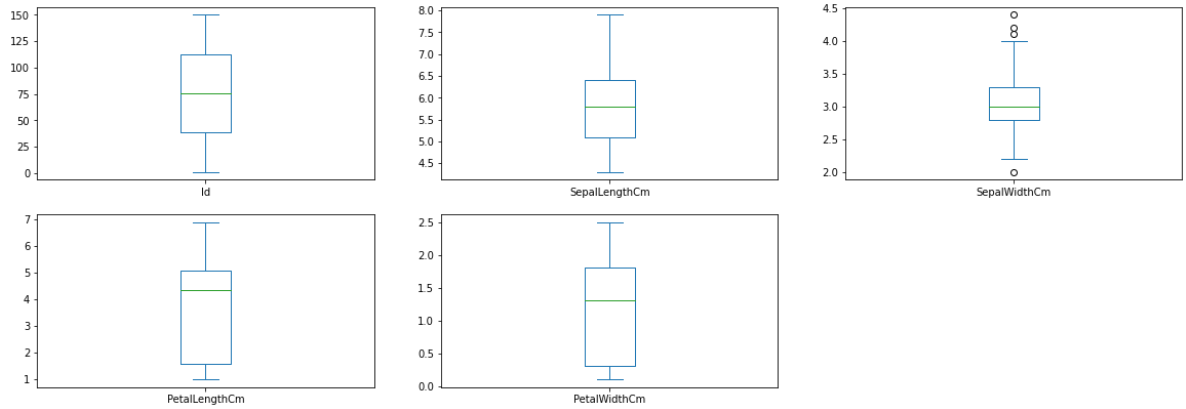
In [14]:

```
df.hist(edgecolor= 'black',figsize=(14,12))
plt.show()
```



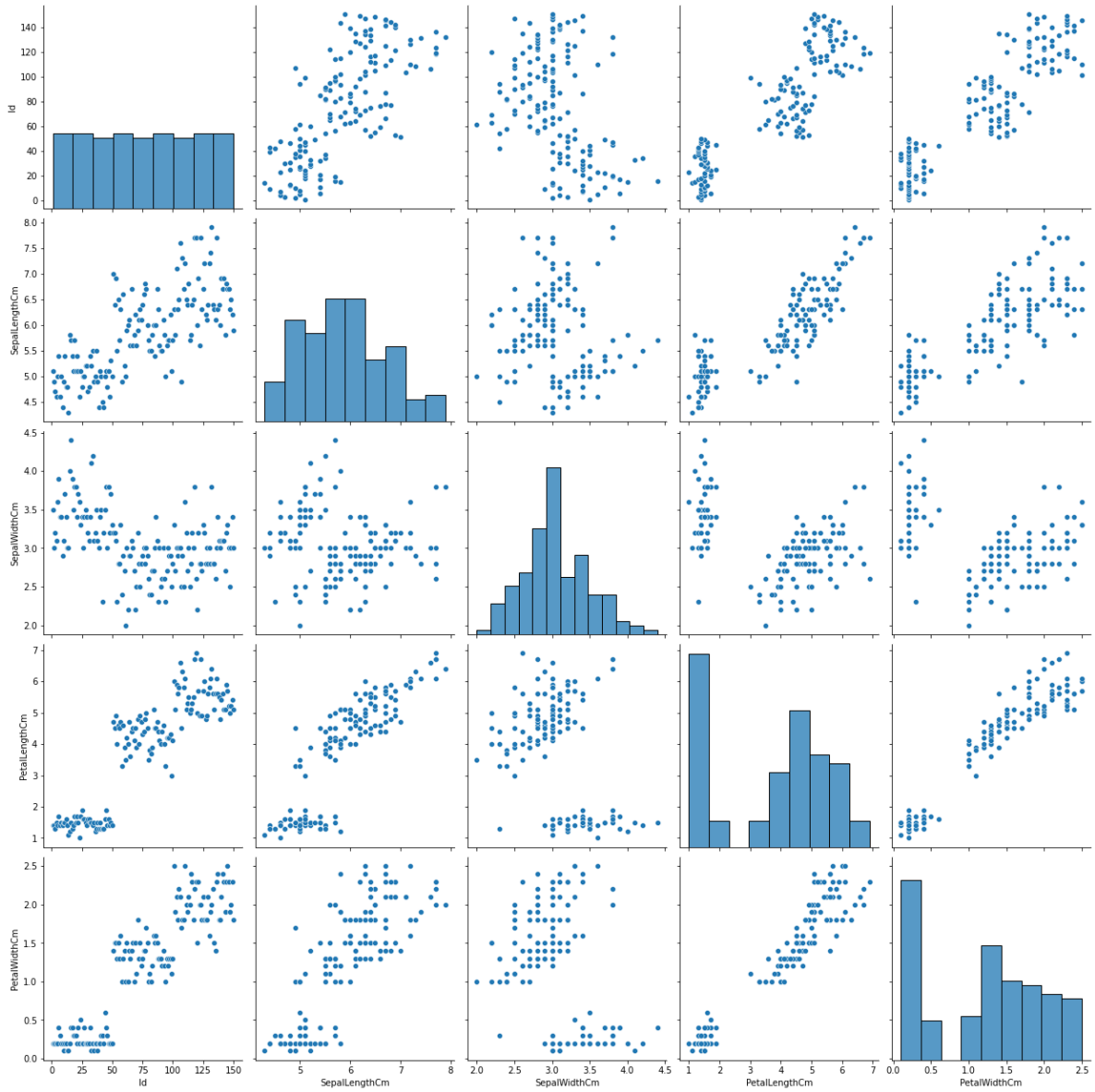
In [15]:

```
df.plot(kind="box", subplots=True, layout=(5,3), sharex=False,
figsize=(20,18))
plt.show()
```



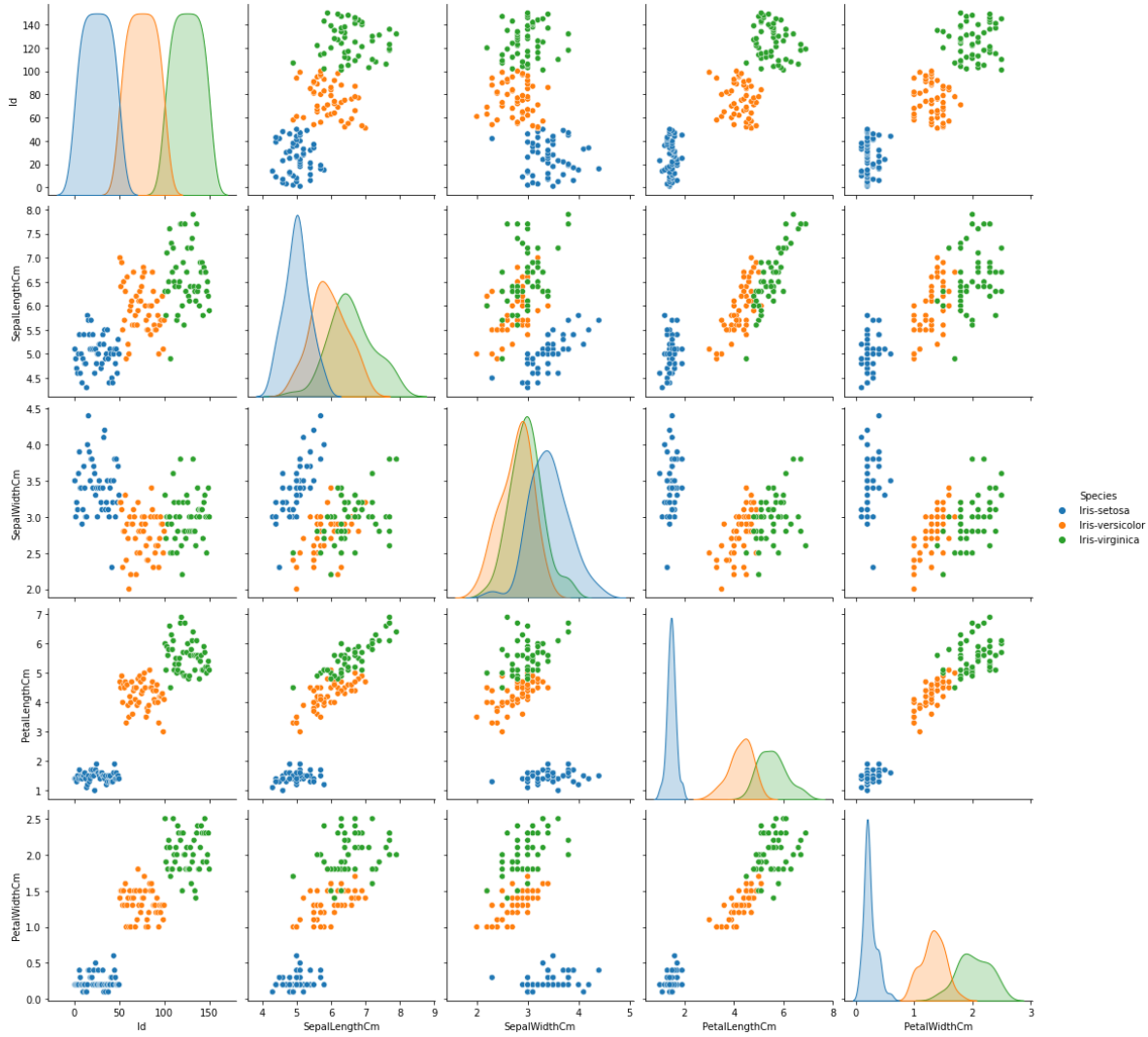
In [16]:

```
sns.pairplot(df, height=3.5);
plt.show()
```



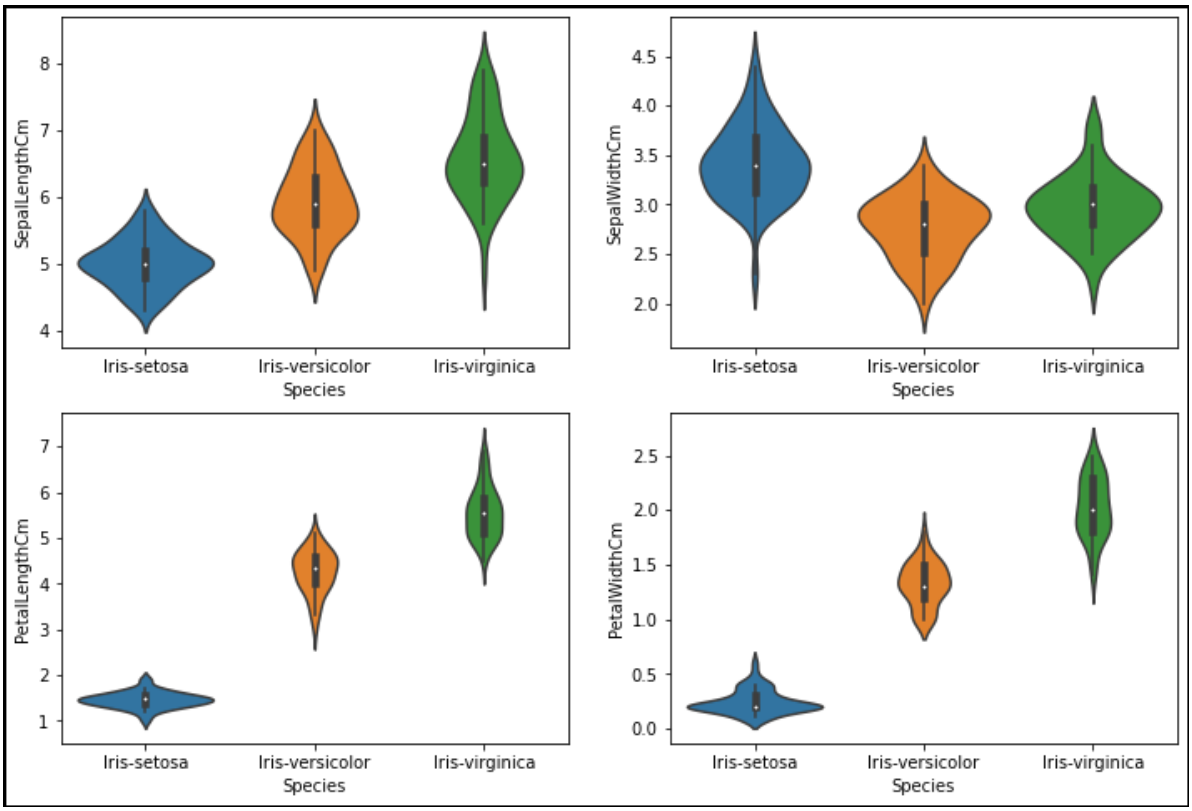
In [17]:

```
sns.pairplot(df, hue='Species', height=3, aspect= 1);
```



In [18]:

```
plt.figure(edgecolor="black", linewidth= 1.2,figsize=(12,8));
plt.subplot(2,2,1)
sns.violinplot(x='Species', y = 'SepalLengthCm', data=df)
plt.subplot(2,2,2)
sns.violinplot(x='Species', y = 'SepalWidthCm', data=df)
plt.subplot(2,2,3)
sns.violinplot(x='Species', y = 'PetalLengthCm', data=df)
plt.subplot(2,2,4)
sns.violinplot(x='Species', y = 'PetalWidthCm', data=df);
```



In [19]:

```
array = df.values
X = array[:,1:5]
Y = array[:,5]
```

In [20]:

```
X_train, X_test, Y_train, Y_test = train_test_split(X, Y, test_size=0.33, random_state=7)
```

In [21]:

```
model = LogisticRegression(random_state=7, max_iter=1000)
```

In [22]:

```
model.fit(X_train, Y_train)
predicted = model.predict(X_test)
report = classification_report(Y_test, predicted)
print("Classification Report: ", "\n", "\n",report)
```

```
Classification Report:

                 precision    recall  f1-score   support

    Iris-setosa       1.00      1.00      1.00        14
Iris-versicolor       0.89      0.89      0.89        18
 Iris-virginica       0.89      0.89      0.89        18

       accuracy                           0.92        50
      macro avg       0.93      0.93      0.93        50
   weighted avg       0.92      0.92      0.92        50
```

In [23]:

```
result = model.score(X_test, Y_test)
print(("Accuracy: %.3f%%") % (result*100.0))
```

```
Accuracy: 92.000%
```

In [24]:

```
model.predict([[5.3, 3.0, 4.5, 1.5]])
```

Out[24]:

```
array(['Iris-versicolor'], dtype=object)
```

In [25]:

```
model.predict([[5, 3.6, 1.4, 1.5]])
```

Out[25]:

```
array(['Iris-setosa'], dtype=object)
```

In [26]:

```
n_splits=10
kfold=KFold(n_splits, random_state=7, shuffle=True)
scoring="accuracy"
```

In [27]:

```
results=cross_val_score (model, X, Y, cv=kfold, scoring=scoring)
print("Accuracy: %.3f (%.3f)"% (results.mean(), results.std()))
```

```
Accuracy: 0.967 (0.054)
```