In [1]:
```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
from sklearn.model_selection import train_test_split, cross_val_score
from sklearn.svm import SVC
from sklearn.metrics import accuracy_score
from sklearn.neighbors import KNeighborsClassifier
%matplotlib inline
```

In [2]:
```
df=pd.read_csv('D:/OASIS/1.IRSI FLOWER TASK/archive/Iris.csv')
```

In [3]:
```
df.head(5)
```

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 [4]:
```
df=df.drop(columns=['Id']) #Delete Columns "Id''
df.head()
```

Out[4]:

	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

```
       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 [6]:
```
#Checking for null values
print(df.isna().sum())
```

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

In [7]:
```
df.head(150)
```

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

In [8]:
```
df.tail(150)
```

Out[8]:

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

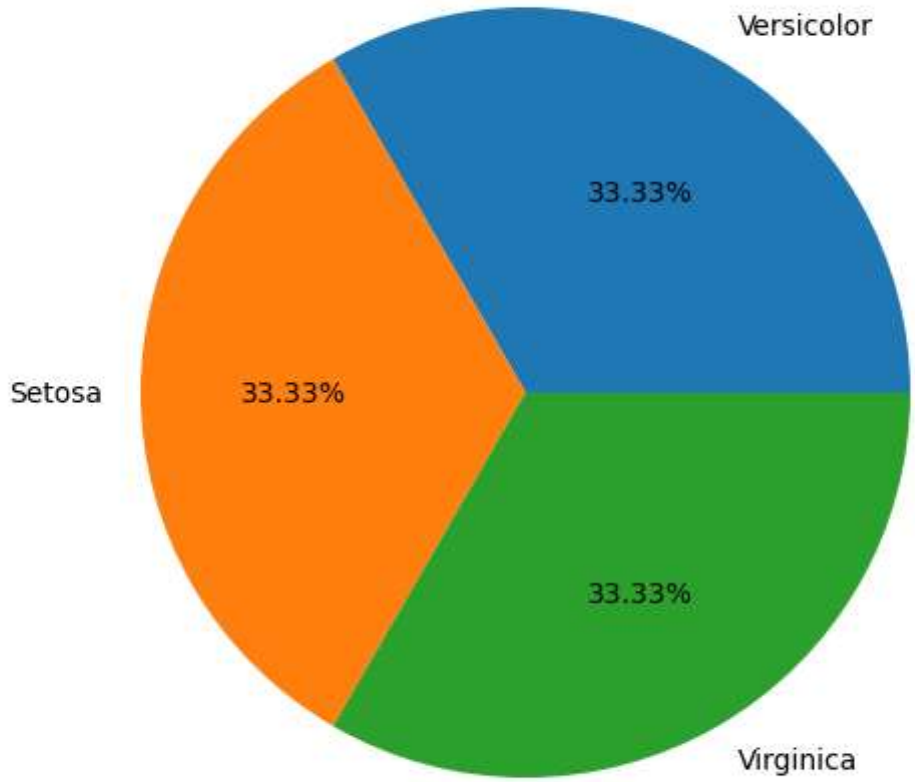
150 rows × 5 columns

In [9]:
```
n = len(df[df['Species'] == 'versicolor'])
n1 = len(df[df['Species'] == 'virginica'])
n2 = len(df[df['Species'] == 'setosa'])
print("No of Versicolor in Dataset:",n)
print("No of Virginica in Dataset:",n1)
print("No of Setosa in Dataset:",n2)
```

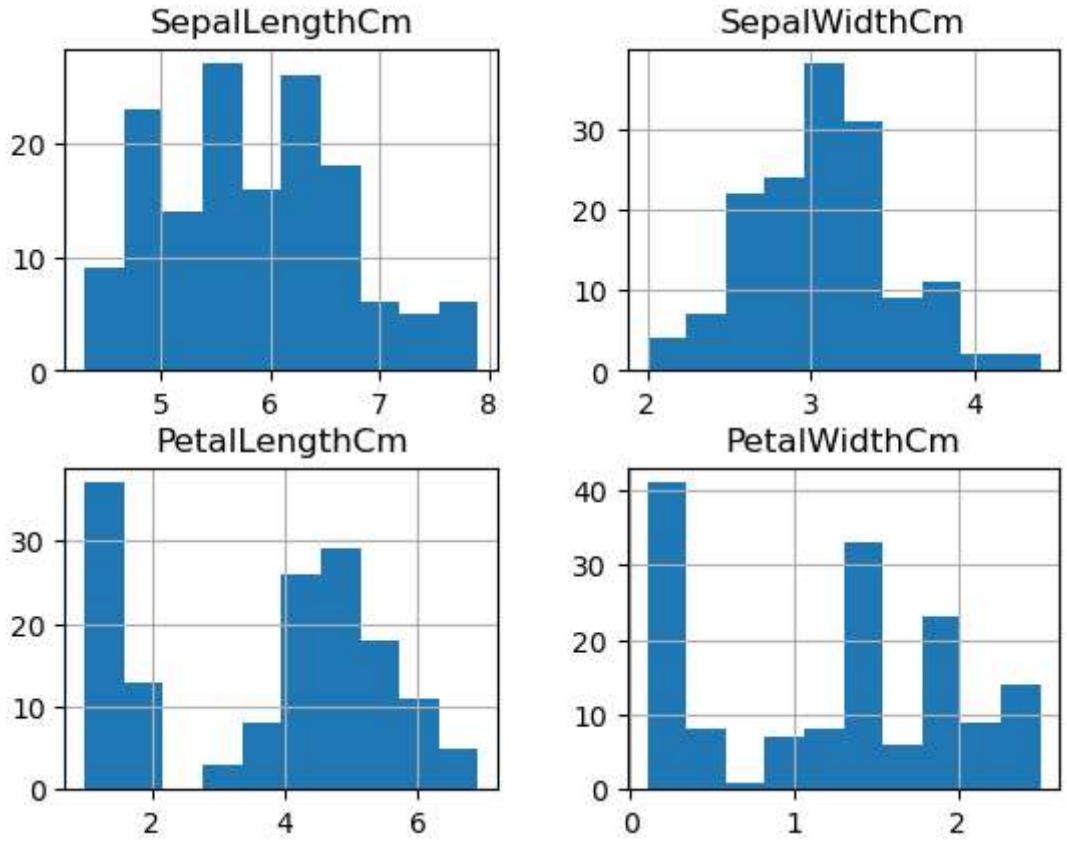
```
No of Versicolor in Dataset: 0
No of Virginica in Dataset: 0
No of Setosa in Dataset: 0
```

In [10]:
```
#pai chart
fig = plt.figure()
ax = fig.add_axes([0,0,1,1])
ax.axis('equal')
l = ['Versicolor', 'Setosa', 'Virginica']
s = [50,50,50]
```

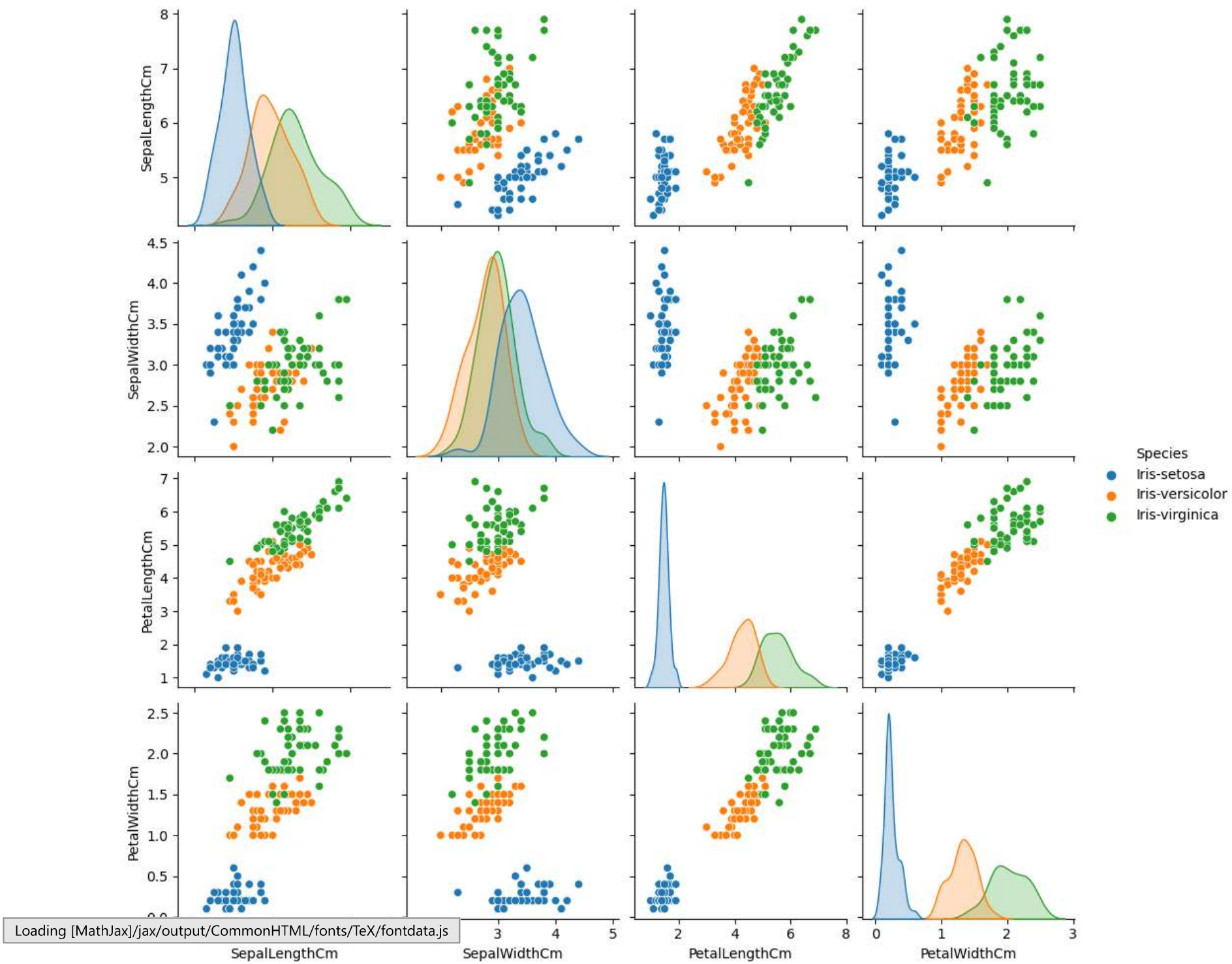
```
ax.pie(s, labels = l,autopct='%1.2f%%')
plt.show()
```



In [11]:
```
df.hist()
plt.show()
```



In [12]:
```
#Pairplot
sns.pairplot(df,hue='Species');
```



In [13]:
```
df.head()
```

Out[13]:

	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 [14]:
```
##Target Variable and feture variable
```

In [15]:
```
X = df[['SepalLengthCm','SepalWidthCm','PetalLengthCm','PetalWidthCm']]
y= df['Species']
```

In [16]:
```
from sklearn.model_selection import train_test_split
X_train,X_test, y_train, y_test= train_test_split(X,y,test_size=0.2,random_state=4)
```

In [17]:
```
print('Train set:', X_train.shape, y_train.shape)
```

```
Train set: (120, 4) (120,)
```

In [18]:
```
print('Train set:', X_test.shape, y_test.shape)
```

```
Train set: (30, 4) (30,)
```

SVM

In [19]:
```
svm_model = SVC()
svm_model.fit(X_train, y_train)
y_pred = svm_model.predict(X_test)
accuracy = accuracy_score(y_test, y_pred)
print("Accuracy:", accuracy)
```

```
Accuracy: 0.9666666666666667
```

SVM Cross Validation

In [20]:
```
scores = cross_val_score(svm_model, X_train, y_train, cv=5)  # 5-fold cross-validation

# Print the average score and its variance
print("Mean Accuracy: {:.2f}".format(scores.mean()))
print("Score Variance: {:.2f}".format(scores.std()))
```

```
Mean Accuracy: 0.97
Score Variance: 0.05
```

K Nearest Neighbor (KNN) Classification

In [21]:
```
KNN_model = KNeighborsClassifier()
KNN_model.fit(X_train, y_train)
y_pred_knn = KNN_model.predict(X_test)
knn_accuracy = accuracy_score(y_test, y_pred_knn)
print(knn_accuracy)
```

```
0.9666666666666667
```

```
C:\Users\Hp\anaconda3\lib\site-packages\sklearn\neighbors\_classification.py:228: FutureWarning: Unlike other reduction functions (e.g. `skew`, `kurtosis`), the default behavior of `mode` typically preserves the axis it acts along. In SciPy 1.11.0, this behavior will change: the default value of `keepdims` will become False, the `axis` over which the statistic is taken will be eliminated, and the value None will no longer be accepted. Set `keepdims` to True or False to avoid this warning.
  mode, _ = stats.mode(_y[neigh_ind, k], axis=1)
```

KNN Cross Validation

In [22]:
```
knn_scores = cross_val_score(KNN_model, X_train, y_train, cv=5)
print("Mean Accuracy: {:.2f}".format(scores.mean()))
print("Score Variance: {:.2f}".format(scores.std()))
```

```
Mean Accuracy: 0.97
Score Variance: 0.05
```

```
C:\Users\Hp\anaconda3\lib\site-packages\sklearn\neighbors\_classification.py:228: FutureWarning: Unlike other reduction functions (e.g. `skew`, `kurtosis`), the default behavior of `mode` typically preserves the axis it acts along. In SciPy 1.11.0, this behavior will change: the default value of `keepdims` will become False, the `axis` over which the statistic is taken will be eliminated, and the value None will no longer be accepted. Set `keepdims` to True or False to avoid this warning.
  mode, _ = stats.mode(_y[neigh_ind, k], axis=1)
C:\Users\Hp\anaconda3\lib\site-packages\sklearn\neighbors\_classification.py:228: FutureWarning: Unlike other reduction functions (e.g. `skew`, `kurtosis`), the default behavior of `mode` typically preserves the axis it acts along. In SciPy 1.11.0, this behavior will change: the default value of `keepdims` will become False, the `axis` over which the statistic is taken will be eliminated, and the value None will no longer be accepted. Set `keepdims` to True or False to avoid this warning.
  mode, _ = stats.mode(_y[neigh_ind, k], axis=1)
C:\Users\Hp\anaconda3\lib\site-packages\sklearn\neighbors\_classification.py:228: FutureWarning: Unlike other reduction functions (e.g. `skew`, `kurtosis`), the default behavior of `mode` typically preserves the axis it acts along. In SciPy 1.11.0, this behavior will change: the default value of `keepdims` will become False, the `axis` over which the statistic is taken will be eliminated, and the value None will no longer be accepted. Set `keepdims` to True or False to avoid this warning.
  mode, _ = stats.mode(_y[neigh_ind, k], axis=1)
C:\Users\Hp\anaconda3\lib\site-packages\sklearn\neighbors\_classification.py:228: FutureWarning: Unlike other reduction functions (e.g. `skew`, `kurtosis`), the default behavior of `mode` typically preserves the axis it acts along. In SciPy 1.11.0, this behavior will change: the default value of `keepdims` will become False, the `axis` over which the statistic is taken will be eliminated, and the value None will no longer be accepted. Set `keepdims` to True or False to avoid this warning.
  mode, _ = stats.mode(_y[neigh_ind, k], axis=1)
C:\Users\Hp\anaconda3\lib\site-packages\sklearn\neighbors\_classification.py:228: FutureWarning: Unlike other reduction functions (e.g. `skew`, `kurtosis`), the default behavior of `mode` typically preserves the axis it acts along. In SciPy 1.11.0, this behavior will change: the default value of `keepdims` will become False, the `axis` over which the statistic is taken will be eliminated, and the value None will no longer be accepted. Set `keepdims` to True or False to avoid this warning.
  mode, _ = stats.mode(_y[neigh_ind, k], axis=1)
```

Decision Tree Classifier

In [23]:

```
from sklearn.tree import DecisionTreeClassifier
d_t = DecisionTreeClassifier()
d_t.fit(X_train,y_train)
y_pred = d_t.predict(X_test)
accuracy = accuracy_score(y_test,y_pred)
print("Accuracy:", accuracy)
```

```
Accuracy: 0.9666666666666667
```

Decision Tree Cross Validation

In [24]:
```
d_t_scores = cross_val_score(d_t, X_train, y_train, cv=5)
print("Mean Accuracy: {:.2f}".format(scores.mean()))
print("Score Variance: {:.2f}".format(scores.std()))
```

```
Mean Accuracy: 0.97
Score Variance: 0.05
```

Thank you

Md Sadiul Haque

In [ ]:
```

```