Second MID Machine Learning Assign
ment

Name: Arslan Farooq

Reg: DS320192002

In [2]:
```
import numpy as np
import pandas as pd
import seaborn as sns
sns.set_palette('husl')
from sklearn import metrics
from sklearn.neighbors import KNeighborsClassifier
from sklearn.linear_model import LogisticRegression
from sklearn.preprocessing import StandardScaler
from sklearn.neural_network import MLPClassifier
from sklearn.model_selection import cross_val_score
import matplotlib.pyplot as plt
%pylab inline

from subprocess import check_output
```

```
Populating the interactive namespace from numpy and matplotlib
```

In [3]:
```
datairis = pd.read_csv("irisdata.csv")
```

In [5]:
```
datairis.head(9)
```

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 |
| **5** | 6 | 5.4 | 3.9 | 1.7 | 0.4 | Iris-setosa |
| **6** | 7 | 4.6 | 3.4 | 1.4 | 0.3 | Iris-setosa |
| **7** | 8 | 5.0 | 3.4 | 1.5 | 0.2 | Iris-setosa |
| **8** | 9 | 4.4 | 2.9 | 1.4 | 0.2 | Iris-setosa |

In [6]:
```
datairis.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 [7]:
```
datairis.describe()
```

Out[7]:

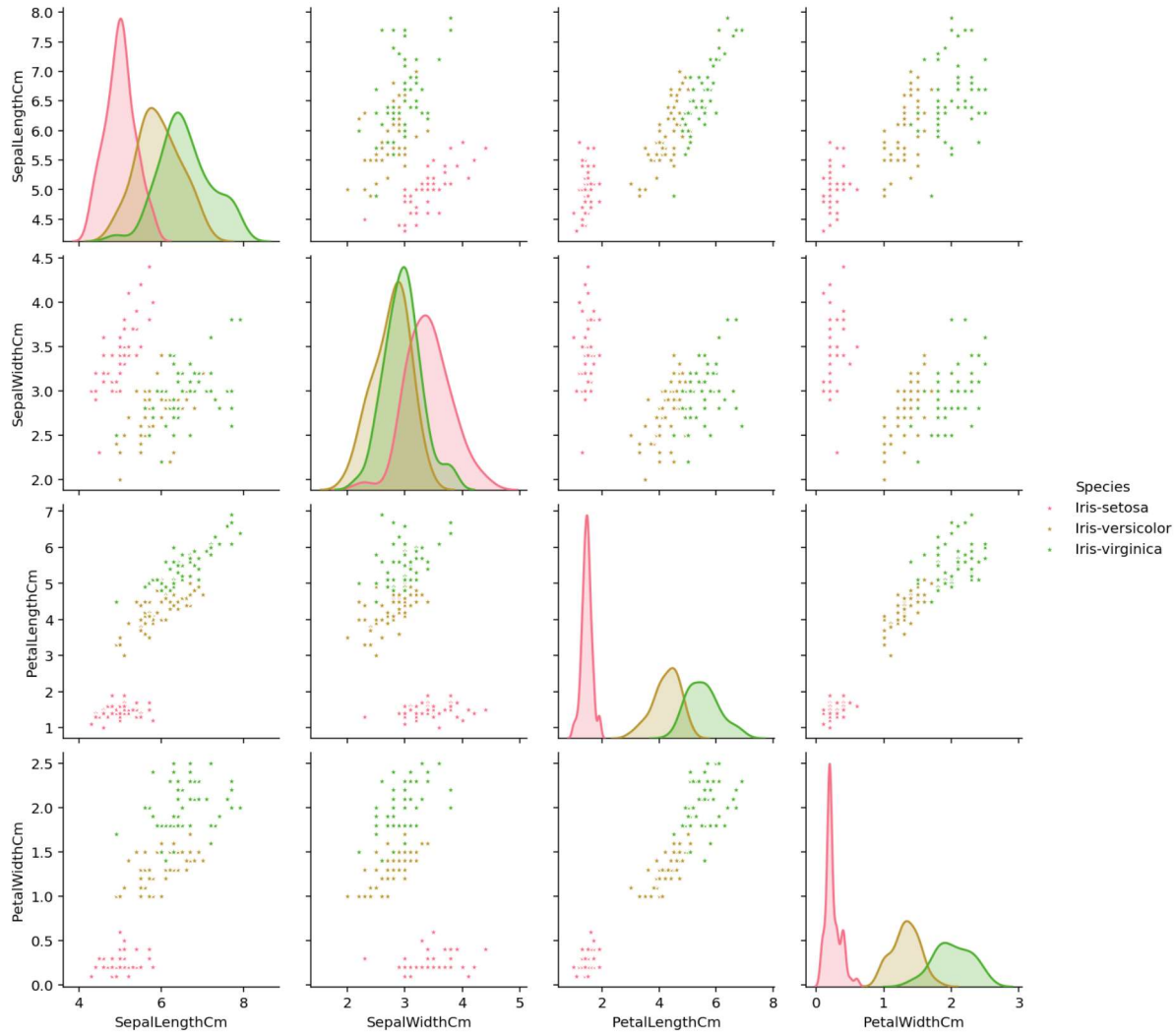
| | Id | SepalLengthCm | SepalWidthCm | PetalLengthCm | PetalWidthCm |
|---|---|---|---|---|---|
| **count** | 150.000000 | 150.000000 | 150.000000 | 150.000000 | 150.000000 |
| **mean** | 75.500000 | 5.843333 | 3.054000 | 3.758667 | 1.198667 |
| **std** | 43.445368 | 0.828066 | 0.433594 | 1.764420 | 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 [8]:
```
datairis['Species'].value_counts()
```

Out[8]:
```
Iris-setosa        50
Iris-versicolor    50
Iris-virginica     50
Name: Species, dtype: int64
```

In [11]:
```
tmp = datairis.drop('Id', axis=1)
g = sns.pairplot(tmp, hue='Species', markers='*')
plt.show()
```

Out[11]:




In [13]:
```
X = datairis.iloc[:, 1:5]
y = datairis.iloc[:, 5]
```

1) Artificial Neural Network

In [15]:
```
from sklearn.preprocessing import normalize
normalized_X=normalize(X,axis=0)
print("Normalised\n",normalized_X[:3])
```

```
Normalised
 [[0.07056264 0.09265065 0.02754646 0.01150299]
 [0.06779548 0.07941484 0.02754646 0.01150299]
 [0.06502832 0.08470916 0.02557886 0.01150299]]
```

In [17]:
```
total_length=len(datairis)
train_length=int(0.8*total_length)
test_length=int(0.2*total_length)

X_train=normalized_X[:train_length]
X_test=normalized_X[train_length:]
y_train=y[:train_length]
y_test=y[train_length:]

print("Length of train set x:",X_train.shape[0],"y:",y_train.shape[0])
print("Length of test set x:",X_test.shape[0],"y:",y_test.shape[0])
```

```
Length of train set x: 120 y: 120
Length of test set x: 30 y: 30
```

In [13]:
```
from sklearn.model_selection import train_test_split
train, test = train_test_split(datairis, test_size = 0.2, stratify = datairis[
'Species'], random_state = 42)
```

In [0]:
```
X_train = train[['SepalLengthCm',       'SepalWidthCm', 'PetalLengthCm','Petal
WidthCm']]
y_train = train.Species
X_test = test[['SepalLengthCm', 'SepalWidthCm', 'PetalLengthCm','PetalWidthCm'
]]
y_test = test.Species
```

In [50]:
```
anmodel =MLPClassifier(solver='lbfgs', alpha=1e-5, hidden_layer_sizes=(15,), r
andom_state=1)
anmodel.fit(X_train, y_train)
MLPClassifier(alpha=1e-05, hidden_layer_sizes=(15,), random_state=1,
              solver='lbfgs')
```

Out[50]:
```
MLPClassifier(alpha=1e-05, hidden_layer_sizes=(15,), random_state=1,
              solver='lbfgs')
```

In [52]:
```
print('Accuracy of ANN on training set: {:.2f}'.format(anmodel.score(X_train,
y_train) * 100))
print('Accuracy of ANN on test set: {:.2f}'.format(anmodel.score(X_test, y_tes
t) * 100))
```

```
Accuracy of ANN on training set: 99.17
Accuracy of ANN on test set: 96.67
```

2) Support Vector Machine (SVM)

In [23]:
```
X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.3, rando
m_state=0)
print('There are {} samples in the training set and {} samples in the test se
t'.format(X_train.shape[0], X_test.shape[0]))
```

```
There are 105 samples in the training set and 45 samples in the test set
```

In [26]:
```
stan_scale = StandardScaler()
stan_scale.fit(X_train)
X_train_std = stan_scale.transform(X_train)
X_test_std = stan_scale.transform(X_test)
```

In [27]:
```
from sklearn.svm import SVC

svm = SVC(kernel='rbf', random_state=0, gamma=.10, C=1.0)
svm.fit(X_train_std, y_train)
print('The accuracy of the SVM classifier on training data is {:.2f}'.format(s
vm.score(X_train_std, y_train)))
print('The accuracy of the SVM classifier on test data is {:.2f}'.format(svm.s
core(X_test_std, y_test)))
```

```
The accuracy of the SVM classifier on training data is 0.97
The accuracy of the SVM classifier on test data is 0.98
```

3) Random Forest

In [30]:
```
from sklearn.ensemble import RandomForestClassifier


ran_forest = RandomForestClassifier()
ran_forest.fit(X_train_std, y_train)


print('The accuracy of the Random Forest classifier on training data is {:.2f}
'.format(random_forest.score(X_train_std, y_train)))
print('The accuracy of the Random Forest classifier on test data is {:.2f}'.fo
rmat(random_forest.score(X_test_std, y_test)))
```

```
The accuracy of the Random Forest classifier on training data is 1.00
The accuracy of the Random Forest classifier on test data is 0.98
```

4) Desicion Tree

In [29]:
```
from sklearn import tree

d_tree = tree.DecisionTreeClassifier(criterion='gini')
d_tree.fit(X_train_std, y_train)


print('The accuracy of the Decision Tree classifier on training data is {:.2f}
'.format(decision_tree.score(X_train_std, y_train)))
print('The accuracy of the Decision Tree classifier on test data is {:.2f}'.fo
rmat(decision_tree.score(X_test_std, y_test)))
```

```
The accuracy of the Decision Tree classifier on training data is 1.00
The accuracy of the Decision Tree classifier on test data is 0.98
```

5) K Nearest Neighbor (KNN)

In [28]:
```
from sklearn.neighbors import KNeighborsClassifier

k_neasrest_neighbour = KNeighborsClassifier(n_neighbors = 7, p = 2, metric='mi
nkowski')
k_nearest_neighbour.fit(X_train_std, y_train)

print('The accuracy of the Knn classifier on training data is {:.2f}'.format(k
nn.score(X_train_std, y_train)))
print('The accuracy of the Knn classifier on test data is {:.2f}'.format(knn.s
core(X_test_std, y_test)))
```

```
The accuracy of the Knn classifier on training data is 0.97
The accuracy of the Knn classifier on test data is 0.98
```