SVM_Classification

February 20, 2024

1 Import required libraries and load dataset

[ ]:
```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
import warnings
warnings.filterwarnings('ignore')
```

[ ]:
```
df = pd.read_csv("datasets/iris/Iris.csv")
```

2 Explore the dataset

[ ]:
```
df= df.drop(columns=["SepalLengthCm","SepalWidthCm"])
```

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

[ ]:

	Id	PetalLengthCm	PetalWidthCm	Species
0	1	1.4	0.2	Iris-setosa
1	2	1.4	0.2	Iris-setosa
2	3	1.3	0.2	Iris-setosa
3	4	1.5	0.2	Iris-setosa
4	5	1.4	0.2	Iris-setosa

[ ]:
```
df = df[df["Species"] != "Iris-setosa"]
```

[ ]:
```
df.shape
```

[ ]:
```
(100, 4)
```

[ ]:
```
df.Species.unique()
```

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

[ ]:
```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Index: 100 entries, 50 to 149
```

```
Data columns (total 4 columns):
 #   Column         Non-Null Count  Dtype
---  ------         --------------  -----
 0   Id             100 non-null    int64
 1   PetalLengthCm  100 non-null    float64
 2   PetalWidthCm   100 non-null    float64
 3   Species        100 non-null    object
dtypes: float64(2), int64(1), object(1)
memory usage: 3.9+ KB
```

[ ]:
```
df.describe()
```

[ ]:

	Id	PetalLengthCm	PetalWidthCm
count	100.000000	100.000000	100.000000
mean	100.500000	4.906000	1.676000
std	29.011492	0.825578	0.424769
min	51.000000	3.000000	1.000000
25%	75.750000	4.375000	1.300000
50%	100.500000	4.900000	1.600000
75%	125.250000	5.525000	2.000000
max	150.000000	6.900000	2.500000

3 Null value check

[ ]:
```
df.isnull().sum()
```

[ ]:
```
Id              0
PetalLengthCm   0
PetalWidthCm    0
Species         0
dtype: int64
```

4 Some plot to visualize the data

[ ]:
```
sns.scatterplot(x = 'PetalLengthCm', y = 'PetalWidthCm', data = df ,hue␣
↪='Species')
plt.title('Petal Length vs Petal Width')
plt.show()
```

5 lets label encode all the categorical problems

[ ]:
```
from sklearn.preprocessing import LabelEncoder
le = LabelEncoder()
df["Species"] = le.fit_transform(df["Species"])
df.head()
```

[ ]:

	Id	PetalLengthCm	PetalWidthCm	Species
50	51	4.7	1.4	0
51	52	4.5	1.5	0
52	53	4.9	1.5	0
53	54	4.0	1.3	0
54	55	4.6	1.5	0

[ ]:
```
X = df.drop(columns=["Species","Id"])
y = df.Species
```

6 Do the test train split

[ ]:
```
from sklearn.model_selection import train_test_split
X_train, X_test, y_train, y_test = train_test_split(X,y,train_size=0.
↪80,random_state=0)
```

7 Train the model

[ ]:
```
from sklearn.svm import SVC
svc = SVC(kernel="linear")
svc.fit(X_train,y_train)
```

[ ]:
```
SVC(kernel='linear')
```

8 Make some predictions

[ ]:
```
y_pred = svc.predict(X_test)
y_pred
```

[ ]:
```
array([0, 1, 0, 1, 1, 1, 0, 1, 1, 1, 1, 1, 1, 0, 0, 0, 0, 0, 1, 0])
```

9 Evaluate the model

[ ]:
```
from sklearn.metrics import accuracy_score
accuracy_score(y_test,y_pred)
```

[ ]:
```
0.95
```

[ ]:
```
from sklearn.metrics import classification_report
print(classification_report(y_test, y_pred))
```

```
              precision    recall  f1-score   support

           0       1.00      0.90      0.95        10
           1       0.91      1.00      0.95        10

    accuracy                           0.95        20
   macro avg       0.95      0.95      0.95        20
weighted avg       0.95      0.95      0.95        20
```

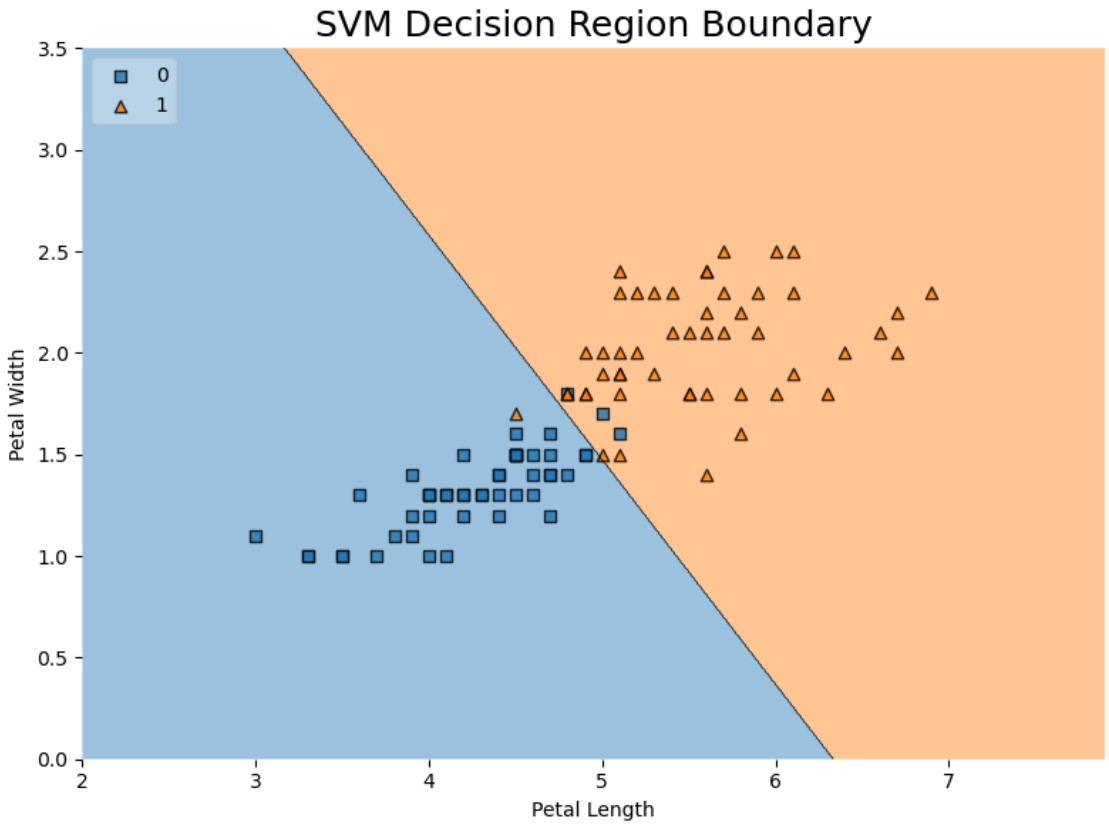
10 Let's try plotting the SVM

[ ]:
```
import matplotlib.pyplot as plt
from mlxtend.plotting import plot_decision_regions

fig, ax = plt.subplots(nrows=1, ncols=1, figsize=(8, 6))

plot_decision_regions(X=X.values,
                      y=y.values,
                      clf=svc,
                      legend=2)

plt.title('SVM Decision Region Boundary', size=18)
plt.xlabel('Petal Length')
plt.ylabel('Petal Width')
plt.tight_layout()
plt.show()
```



[ ]: