

A PYTHON PROGRAM TO IMPLEMENT SVM CLASSIFIER MODEL

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Code:

```
import numpy as np
```

```
import pandas as pd
```

```
from sklearn import svm
```

```
import matplotlib.pyplot as plt
```

```
import seaborn as sns
```

```
# Load dataset
```

```
recipes = pd.read_csv("C:\\Users\\Shyam  
Ganesh\\Documents\\kaggle\\recipes_muffins_cupcakes.csv")
```

```
# Check data
```

```
print(recipes.head())
```

```
print(recipes.shape)
```

```
# Scatter plot of sugar vs flour
```

```
sns.set(font_scale=1.2)
```

```
sns.lmplot(x='Sugar', y='Flour', data=recipes, hue='Type', palette='Set1',  
fit_reg=False, scatter_kws={"s": 70})
```

```
# Prepare features and labels
sugar_flour = recipes[['Sugar', 'Flour']].values
type_label = np.where(recipes['Type'] == 'Muffin', 0, 1)

# Train SVM model
model = svm.SVC(kernel='linear')
model.fit(sugar_flour, type_label)

# Plot decision boundary
w = model.coef_[0]
a = -w[0] / w[1]

xx = np.linspace(5, 30)
yy = a * xx - (model.intercept_[0] / w[1])

# Margins
b_down = model.support_vectors_[0]
yy_down = a * xx + (b_down[1] - a * b_down[0])

b_up = model.support_vectors_[-1]
yy_up = a * xx + (b_up[1] - a * b_up[0])

# Plot all
plt.figure(figsize=(8, 6))
```

```
sns.scatterplot(x='Sugar', y='Flour', data=recipes, hue='Type', palette='Set1', s=70)
plt.plot(xx, yy, color='black', linewidth=2)
plt.plot(xx, yy_down, 'k--')
plt.plot(xx, yy_up, 'k--')
plt.scatter(model.support_vectors_[0], model.support_vectors_[1], s=80,
facecolors='none', edgecolors='k')
plt.title("SVM Decision Boundary: Muffins vs Cupcakes")
plt.show()
```

```
# Train-test evaluation
```

```
from sklearn.model_selection import train_test_split
```

```
from sklearn.metrics import confusion_matrix, classification_report
```

```
x_train, x_test, y_train, y_test = train_test_split(sugar_flour, type_label,
test_size=0.2, random_state=42)
```

```
model1 = svm.SVC(kernel='linear')
```

```
model1.fit(x_train, y_train)
```

```
pred = model1.predict(x_test)
```

```
print("Predictions:", pred)
```

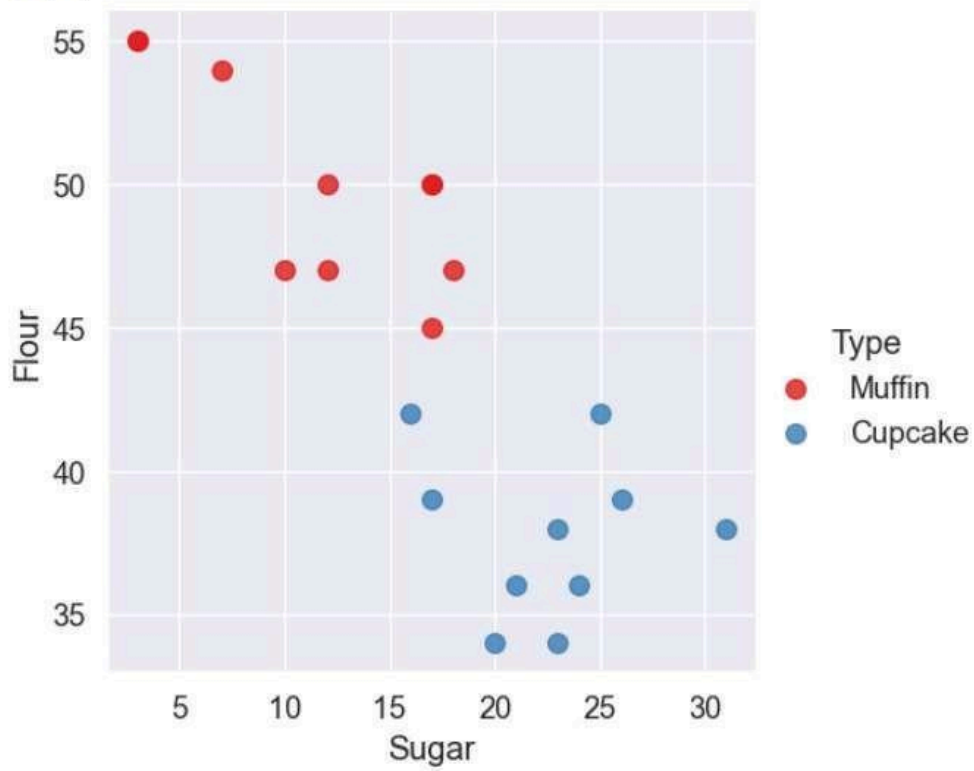
```
print("\nConfusion Matrix:\n", confusion_matrix(y_test, pred))
```

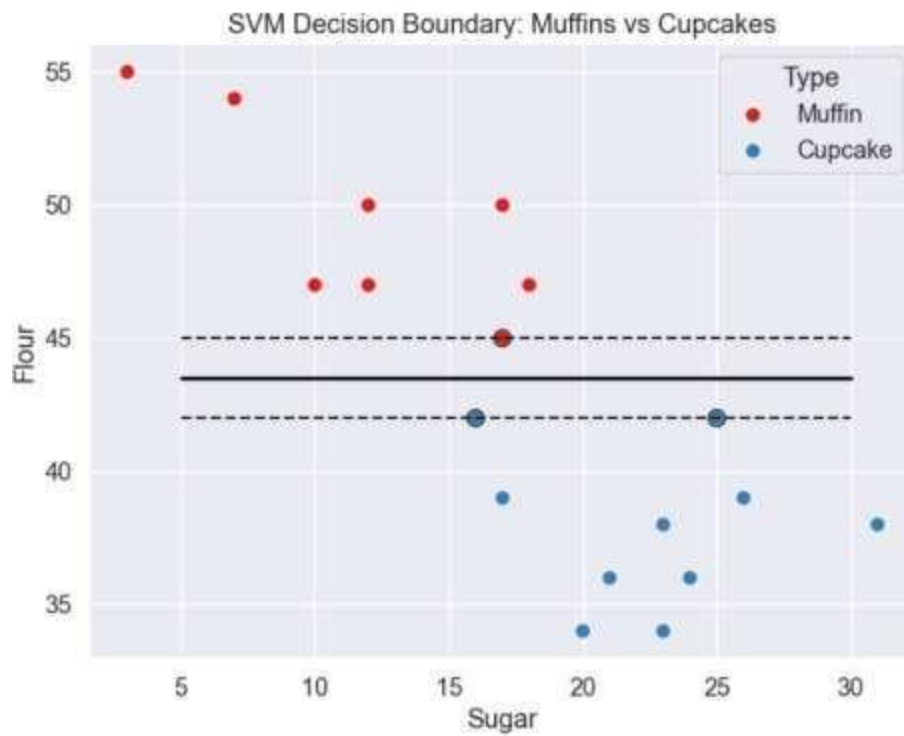
```
print("\nClassification Report:\n", classification_report(y_test, pred))
```

```
output:
```

	Type	Flour	Milk	Sugar	Butter	Egg	Baking Powder	Vanilla	Salt
0	Muffin	55	28	3	7	5	2	0	0
1	Muffin	47	24	12	6	9	1	0	0
2	Muffin	47	23	18	6	4	1	0	0
3	Muffin	45	11	17	17	8	1	0	0
4	Muffin	50	25	12	6	5	2	1	0

(20, 9)





Predictions: [0 1 0 0]

Confusion Matrix:

```
[[2 0]
 [1 1]]
```

Classification Report:

	precision	recall	f1-score	support
0	0.67	1.00	0.80	2
1	1.00	0.50	0.67	2
accuracy			0.75	4
macro avg	0.83	0.75	0.73	4
weighted avg	0.83	0.75	0.73	4