A PYTHON PROGRAM TO IMPLEMENT SVM CLASSIFIER MODEL

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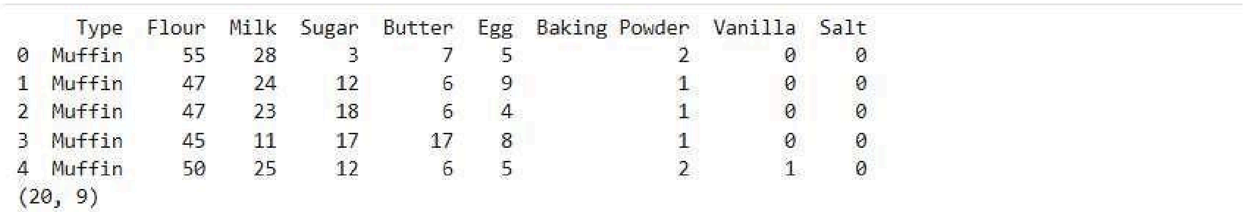
Code:

```
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})
```

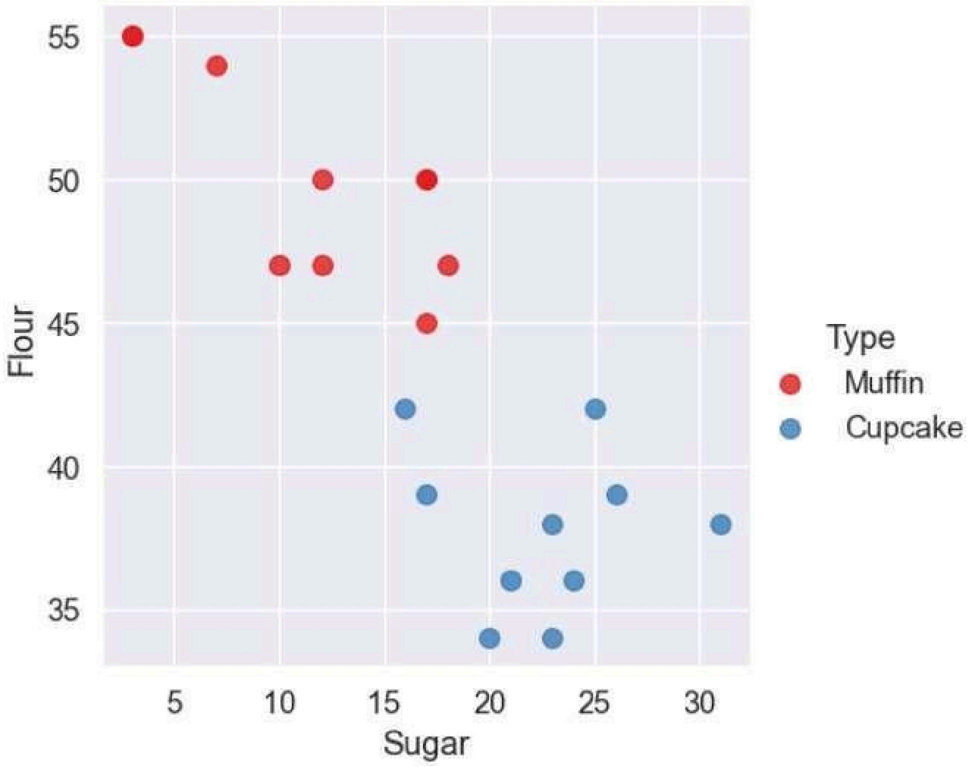
```
# Prepare features and labels
sugar_flour = recipes[['Sugar', 'Flour']].values
type_label = np.where(recipes['Type'] == 'Muffin', 0, 1)

# 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))
```

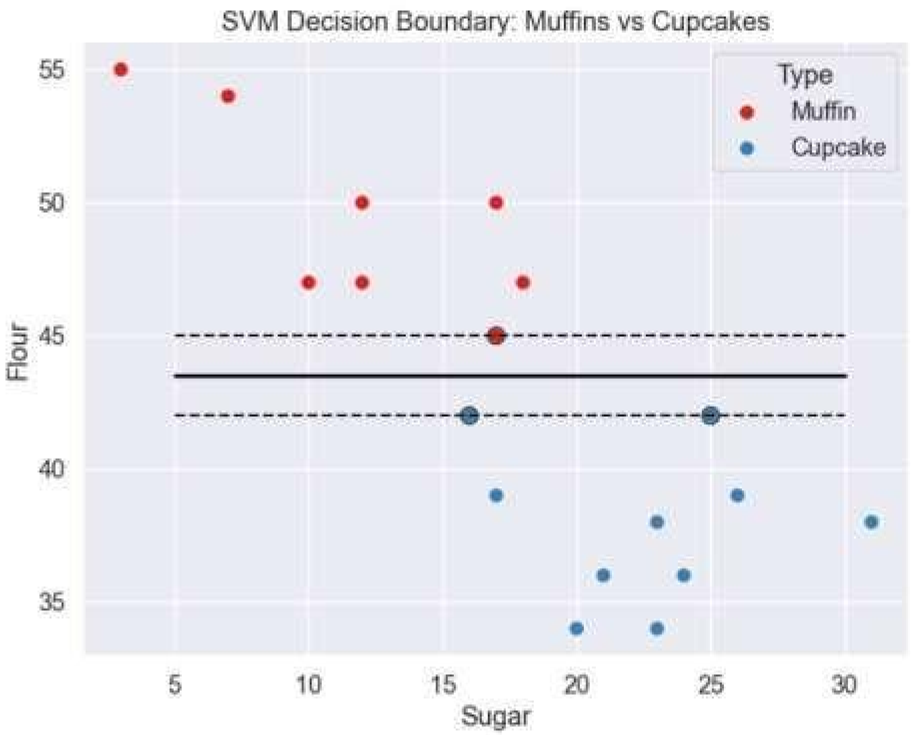
```
sns.scatterplot(x='Sugar', y='Flour', data=recipes, hue='Type', palette='Set1', s=70)
plt.plot(xx, yy, color='black', linewidth=2)
plt.plot(xx, yy_down, 'k--')
plt.plot(xx, yy_up, 'k--')
plt.scatter(model.support_vectors_[:, 0], model.support_vectors_[:, 1], s=80,
facecolors='none', edgecolors='k')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