

```
In [1]: import pandas as pd
import numpy as np
from sklearn import svm

#package for visuals
import matplotlib.pyplot as plt
import seaborn as sns;
sns.set(font_scale=1.2)
#allows charts to appear in notebook
%matplotlib inline
import pickle
```

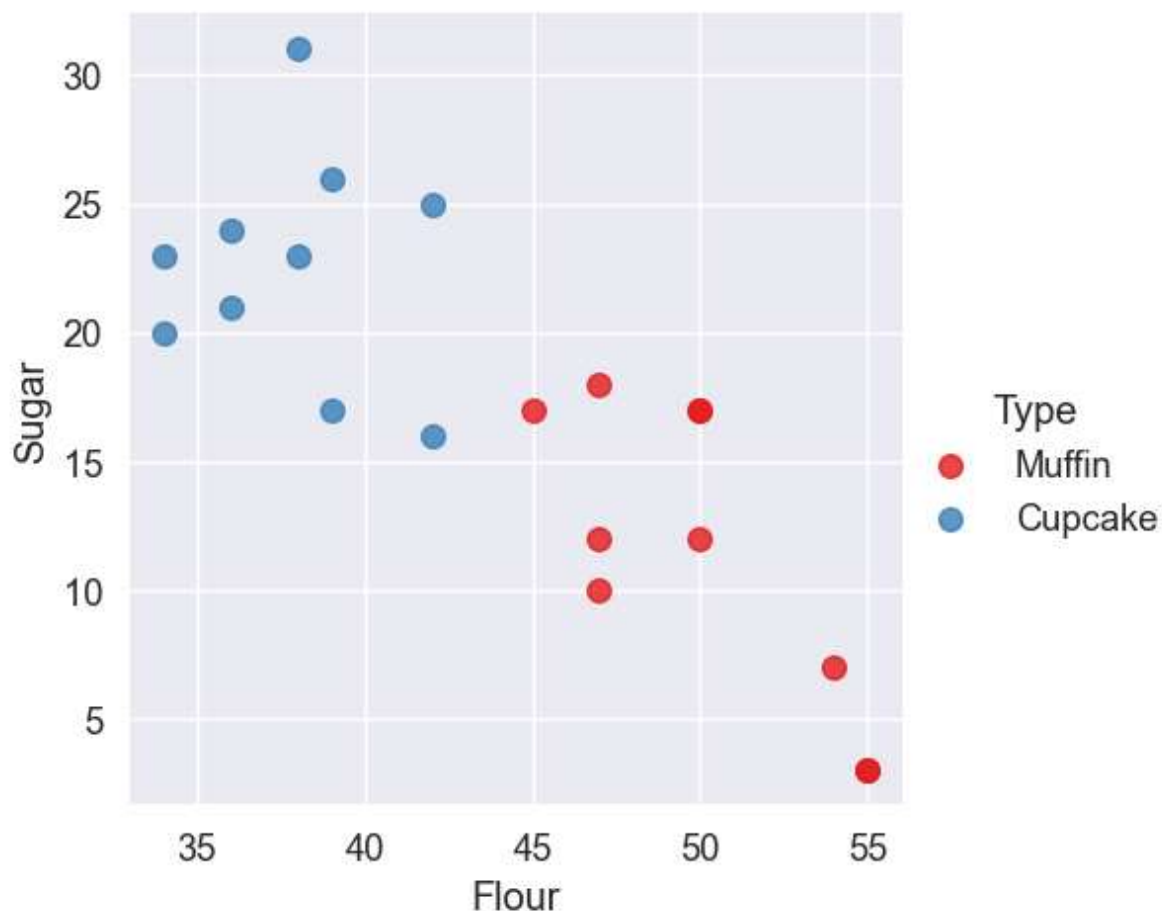
```
In [4]: df=pd.read_csv('recipes_muffins_cupcakes.csv')
df
```

Out[4]:

	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
5	Muffin	55	27	3	7	5	2	1	0
6	Muffin	54	27	7	5	5	2	0	0
7	Muffin	47	26	10	10	4	1	0	0
8	Muffin	50	17	17	8	6	1	0	0
9	Muffin	50	17	17	11	4	1	0	0
10	Cupcake	39	0	26	19	14	1	1	0
11	Cupcake	42	21	16	10	8	3	0	0
12	Cupcake	34	17	20	20	5	2	1	0
13	Cupcake	39	13	17	19	10	1	1	0
14	Cupcake	38	15	23	15	8	0	1	0
15	Cupcake	42	18	25	9	5	1	0	0
16	Cupcake	36	14	21	14	11	2	1	0
17	Cupcake	38	15	31	8	6	1	1	0
18	Cupcake	36	16	24	12	9	1	1	0
19	Cupcake	34	17	23	11	13	0	1	0

```
In [19]: #plot two ingredients
sns.lmplot(x='Flour',y='Sugar',data=df,hue='Type',palette='Set1',
           fit_reg=False,scatter_kws={"s":70})
```

Out[19]: <seaborn.axisgrid.FacetGrid at 0x206da41ace0>



```
In [12]: x_test = df[['Flour', 'Sugar']].to_numpy()
          #print(x_test)
          y_test = np.where(df['Type']=='Muffin',0,1)
          receipe_features=df.columns.values[1:].tolist()
          receipe_features
```

Out[12]: ['Flour', 'Milk', 'Sugar', 'Butter', 'Egg', 'Baking Powder', 'Vanilla', 'Salt']

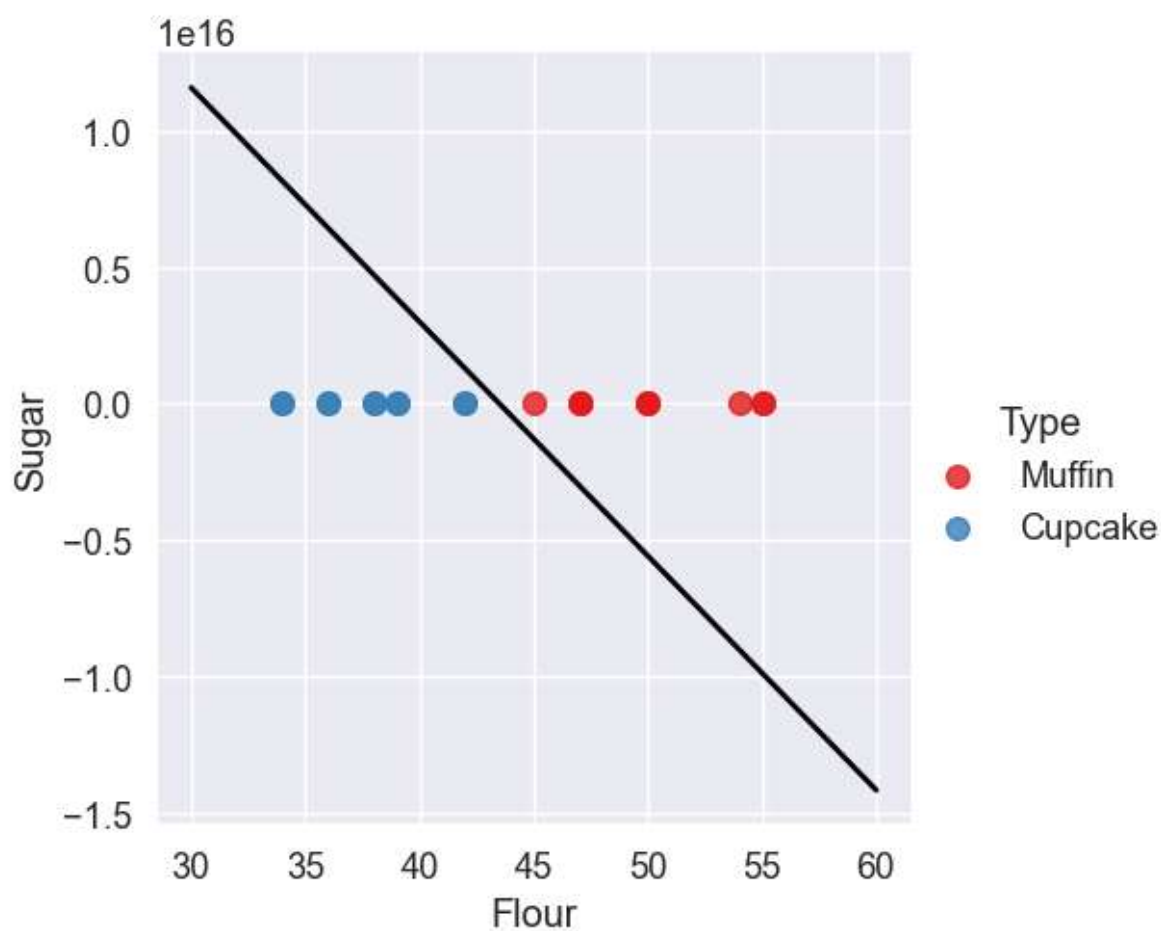
```
In [13]: #fit the svm model
          model = svm.SVC(kernel='linear')
          model.fit(x_test,y_test)
```

Out[13]:

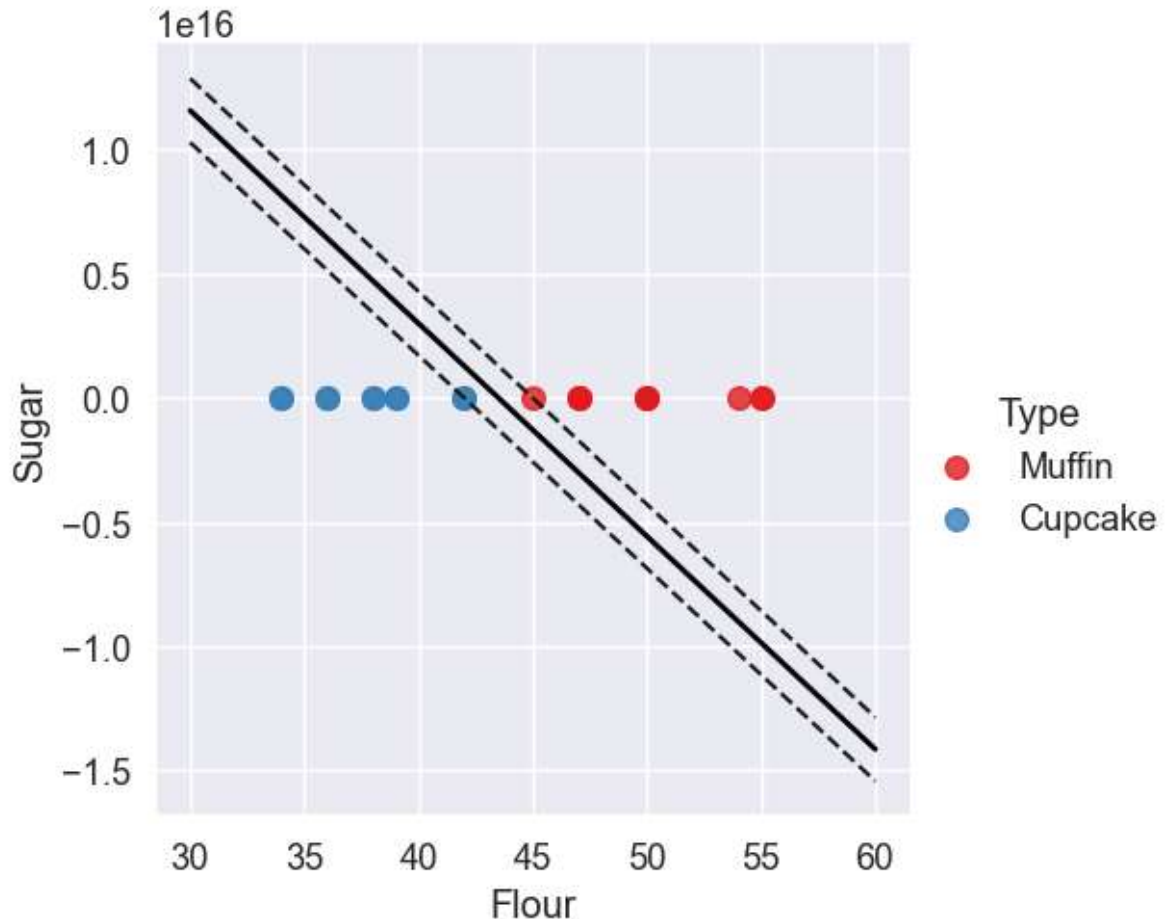
```
SVC
SVC(kernel='linear')
```

```
In [14]: #get the separating hyperplane
w= model.coef_[0]
a= -w[0]/w[1]
xx = np.linspace(30,60)
yy= a*xx - (model.intercept_[0])/ w[1]
#plot the parallels to the separating hyperplane that
b= model.support_vectors_[0]
yy_down= a*xx + (b[1] - a*b[0])
b= model.support_vectors_[ -1]
yy_up= a*xx + (b[1] - a*b[0])
```

```
In [20]: #plot the hyperplane
sns.lmplot(x='Flour',y='Sugar',data=df,hue='Type',palette='Set1',
           fit_reg=False,scatter_kws={"s":70})
plt.plot(xx,yy,linewidth=2,color='black');
```



```
In [22]: #Look at the margins and support vectors
sns.lmplot(x='Flour',y='Sugar',data=df,hue='Type',palette='Set1',
           fit_reg=False,scatter_kws={"s":70})
plt.plot(xx,yy,linewidth=2,color='black');
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');
```



```
In [28]: #Creation a function to guess when a receipe is muffin or cupcake
def muffin_or_cupcake(flour,sugar):
    if(model.predict([[flour,sugar]]))==0:
        print('You\'re looking at a muffin receipe!')
    else:
        print('You\'re looking at a cupcake receipe!')
```

```
In [30]: #predict if 50 parts flour and 20 parts sugar
muffin_or_cupcake(50,20)
```

You're looking at a muffin receipe!

In [ ]:

