Email Spam Detection

In [16]:

```
import pandas as pd
from sklearn.model_selection import train_test_split
from sklearn.svm import SVC
from sklearn.metrics import accuracy_score
from sklearn.neighbors import KNeighborsClassifier
import matplotlib.pyplot as plt
```

In [2]:

```
df = pd.read_csv("emails.csv")
```

In [3]:

```
df.head()
```

Out[3]:

	Email No.	the	to	ect	and	for	of	a	you	hou	...	connevey	jay	valued	lay	infrastructure	militar
0	Email 1	0	0	1	0	0	0	2	0	0	...	0	0	0	0	0	
1	Email 2	8	13	24	6	6	2	102	1	27	...	0	0	0	0	0	
2	Email 3	0	0	1	0	0	0	8	0	0	...	0	0	0	0	0	
3	Email 4	0	5	22	0	5	1	51	2	10	...	0	0	0	0	0	
4	Email 5	7	6	17	1	5	2	57	0	9	...	0	0	0	0	0	

5 rows × 3002 columns

In [4]:

```
df.isnull().sum()
```

Out[4]:

```
Email No.     0
the           0
to            0
ect           0
and           0
             ..
military      0
allowing      0
ff            0
dry           0
Prediction    0
Length: 3002, dtype: int64
```

In [5]:

```
X = df.iloc[:,1:3001]
X
```

Out[5]:

	the	to	ect	and	for	of	a	you	hou	in	...	enhancements	connevey	jay	valued	lay	infra
0	0	0	1	0	0	0	2	0	0	0	...	0	0	0	0	0	
1	8	13	24	6	6	2	102	1	27	18	...	0	0	0	0	0	
2	0	0	1	0	0	0	8	0	0	4	...	0	0	0	0	0	
3	0	5	22	0	5	1	51	2	10	1	...	0	0	0	0	0	
4	7	6	17	1	5	2	57	0	9	3	...	0	0	0	0	0	
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
5167	2	2	2	3	0	0	32	0	0	5	...	0	0	0	0	0	
5168	35	27	11	2	6	5	151	4	3	23	...	0	0	0	0	0	
5169	0	0	1	1	0	0	11	0	0	1	...	0	0	0	0	0	
5170	2	7	1	0	2	1	28	2	0	8	...	0	0	0	0	0	
5171	22	24	5	1	6	5	148	8	2	23	...	0	0	0	0	0	

5172 rows × 3000 columns

In [6]:

```
Y = df.iloc[:,-1].values
Y
```

Out[6]:

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

In [7]:

```
train_x, test_x, train_y, test_y = train_test_split(X,Y,test_size = 0.25)
```

In [8]:

```
svc = SVC(C=1.0,kernel='rbf',gamma='auto')
# C here is the regularization parameter. Here, L2 penalty is used(default). It is the inve
# As C increases, model overfits.
# Kernel here is the radial basis function kernel.
# gamma (only used for rbf kernel) : As gamma increases, model overfits.
svc.fit(train_x,train_y)
y_pred2 = svc.predict(test_x)
```

In [9]:

```
print("Accuracy Score for SVC : ", accuracy_score(y_pred2,test_y))
```

```
Accuracy Score for SVC :  0.9040989945862336
```

In [10]:

```
X_train, X_test, y_train, y_test = train_test_split(X, Y, test_size = 0.2, random_state=42
```

In [11]:

```
knn = KNeighborsClassifier(n_neighbors=7)
```

In [12]:

```
knn.fit(X_train, y_train)
```

Out[12]:

```
KNeighborsClassifier(n_neighbors=7)
```

In [13]:

```
print(knn.predict(X_test))
```

```
[0 0 1 ... 0 1 0]
```

In [14]:

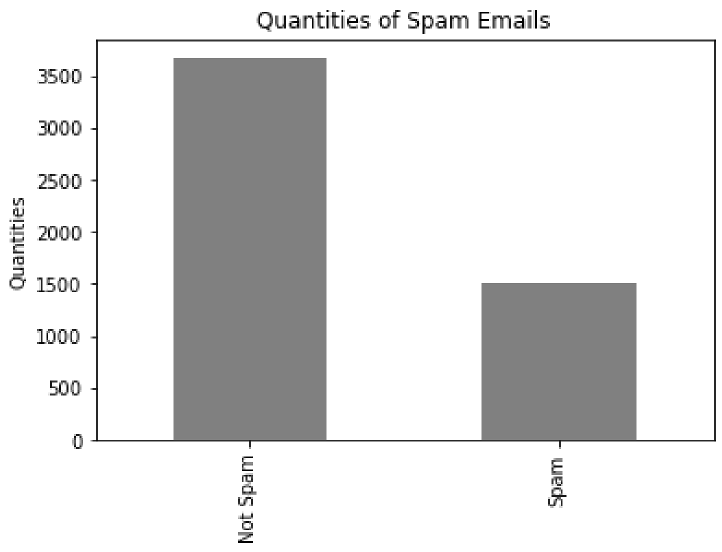
```
print(knn.score(X_test, y_test))
```

```
0.8685990338164251
```

In [17]:

```
val = df['Prediction'].value_counts()
val.plot(kind='bar', color='gray')
plt.xlabel('')
plt.ylabel('Quantities')
plt.title('Quantities of Spam Emails')

plt.xticks([0,1],['Not Spam','Spam'])
plt.show()
```


Quantities of Spam Emails
Quantities
Not Spam
Spam