```
#Importing necessary library
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt

data = pd.read_csv("emails.csv")
data.head()
```

	text	spam
0	Subject: naturally irresistible your corporate...	1
1	Subject: the stock trading gunslinger fanny i...	1
2	Subject: unbelievable new homes made easy im ...	1
3	Subject: 4 color printing special request add...	1
4	Subject: do not have money , get software cds ...	1

```
data.shape
```

```
(5728, 2)
```

```
data['text'][0]
```

```
"Subject: naturally irresistible your corporate identity  lt is really
hard to recollect a company : the  market is full of suqgestions and
the information isoverwhelminq ; but a good  catchy logo , stylish
statlonery and outstanding website  will make the task much easier .
we do not promise that havinq ordered a iogo your  company will
automaticaily become a world ieader : it isguite ciear that  without
good products , effective business organization and practicable aim it
will be hotat nowadays market ; but we do promise that your marketing
efforts  will become much more effective . here is the list of clear
benefits : creativeness : hand - made , original logos , specially
done  to reflect your distinctive company image . convenience : logo
and stationery  are provided in all formats ; easy - to - use content
management system letsyou  change your website content and even its
structure . promptness : you  will see logo drafts within three
business days . affordability : your  marketing break - through
shouldn ' t make gaps in your budget . 100 % satisfaction
guaranteed : we provide unlimited amount of changes with no extra fees
for you to  be surethat you will love the result of this collaboration
. have a look at our  portfolio _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _
_ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ not
interested . . . _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _
_ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _"
```

```
data['spam'].value_counts()
```

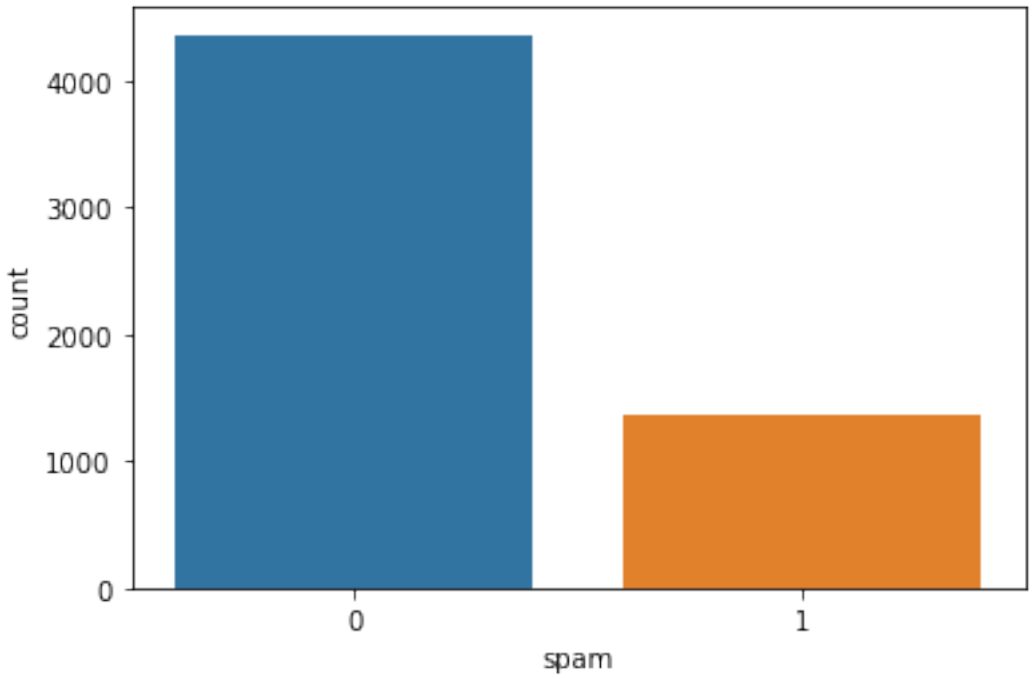
```
0    4360
1    1368
Name: spam, dtype: int64
```

```
import seaborn as sns
```

```
sns.countplot(data['spam'])
```

```
c:\python 3.7\lib\site-packages\seaborn\_decorators.py:43:
FutureWarning: Pass the following variable as a keyword arg: x. From
version 0.12, the only valid positional argument will be `data`, and
passing other arguments without an explicit keyword will result in an
error or misinterpretation.
  FutureWarning
```

```
<AxesSubplot:xlabel='spam', ylabel='count'>
```




```
data.duplicated().sum()
```

```
33
```

```
data.drop_duplicates(inplace=True)
```

```
data.duplicated().sum()
```

```
0
```

```
data.isnull().sum()
```

```
text    0
spam    0
dtype: int64
```

```
data.shape
```

```
(5695, 2)
```

```
5728 - 33
```

```
5695
```

```
sns.countplot(data['spam'])
```

```
c:\python 3.7\lib\site-packages\seaborn\_decorators.py:43:
FutureWarning: Pass the following variable as a keyword arg: x. From
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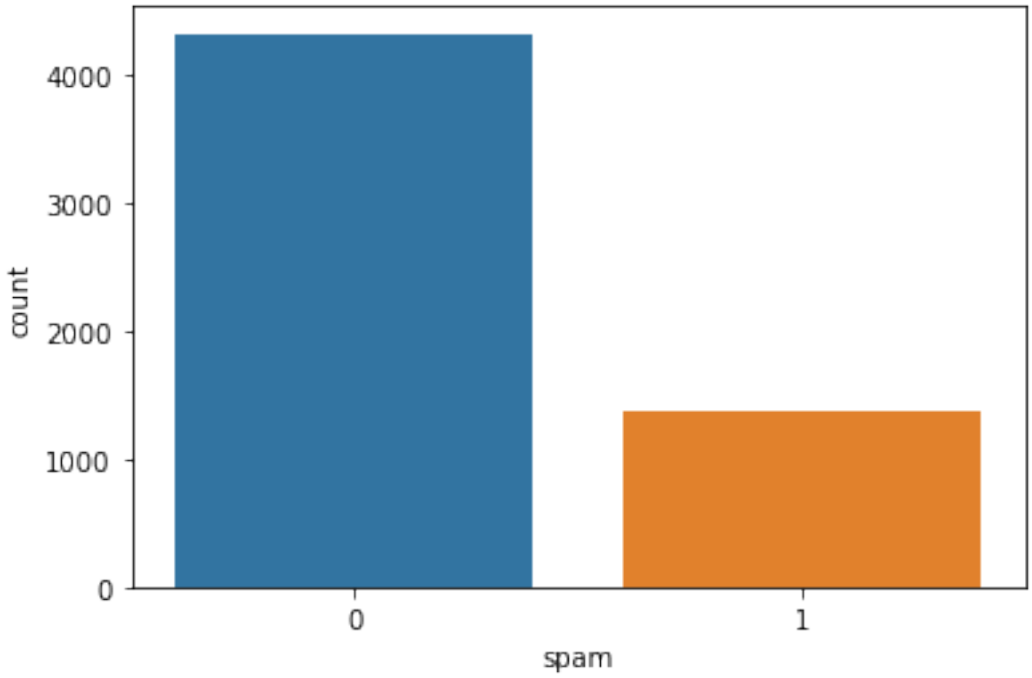
```
<AxesSubplot:xlabel='spam', ylabel='count'>
```




```
data['spam'].value_counts()
```

```
0    4327
1    1368
Name: spam, dtype: int64
```

Separate in X and Y

```
X = data['text'].values
y = data['spam'].values

y
```

```
array([1, 1, 1, ..., 0, 0, 0], dtype=int64)
```

Train - Test split

```
from sklearn.model_selection import train_test_split
X_train, X_test, y_train, y_test = train_test_split(X,y, test_size =
0.2 , random_state= 0)

X_train.shape
```

```
(4556,)
```

```
X_test.shape
```

```
(1139,)
```

```
y_train.shape
```

```
(4556,)
```

```
y_test.shape
```

```
(1139,)
```

Preprocessing

```
from sklearn.feature_extraction.text import CountVectorizer

cv = CountVectorizer()
x_train = cv.fit_transform(X_train)

x_train.toarray()
```

```
array([[1, 0, 0, ..., 0, 0, 0],
       [0, 0, 0, ..., 0, 0, 0],
       [0, 0, 0, ..., 0, 0, 0],
       ...,
       [0, 0, 0, ..., 0, 0, 0],
       [0, 0, 0, ..., 0, 0, 0],
       [0, 0, 0, ..., 0, 0, 0]], dtype=int64)
```

```
len(x_train.toarray())
```

```
4556
```

```
len(x_train.toarray()[0])
```

```
33126
```

Training by ML Algorithm

```
from sklearn.naive_bayes import MultinomialNB
nb = MultinomialNB()

nb.fit(x_train, y_train)
```

```
MultinomialNB()
```

```
x_test = cv.transform(X_test)

len(x_test.toarray())
```

```
1139
```

```
len(x_test.toarray()[0])
```

```
33126
```

```
y_pred = nb.predict(x_test)

from sklearn.metrics import accuracy_score

print("Testing Accuracy:")
accuracy_score(y_pred, y_test)
```

```
Testing Accuracy:
```

```
0.990342405618964
```

```
print("Training Accuracy:")
nb.score(x_train,y_train)
```

```
Training Accuracy:
```

```
0.995171202809482
```

Lets test using some emails

```
email = ['Hey, Jack whats up dude? Tomorrow please meet with me at my
home.']

clean_email = cv.transform(email)

len(clean_email.toarray()[0])
```

```
33126
```

```
check = nb.predict(clean_email)[0]

check
```

```
0
```

Evaluation Function

```
email = ['Hey i am Elon Musk. Get a brand new car from Tesla']

clean_email = cv.transform(email)
check = nb.predict(clean_email)[0]

if check == 0:
    print("This is a Ham Email!")
else:
    print("This is a Spam Email!")
```

```
This is a Spam Email!
```