In [1]:

```
import pandas as pd
import numpy as np
from sklearn.feature_extraction.text import TfidfVectorizer
```

In [2]:

```
df = pd.read_csv('news.csv')
df
```

Out[2]:

	Unnamed: 0	title	text	label
0	8476	You Can Smell Hillary’s Fear	Daniel Greenfield, a Shillman Journalism Fello...	FAKE
1	10294	Watch The Exact Moment Paul Ryan Committed Pol...	Google Pinterest Digg Linkedin Reddit Stumbleu...	FAKE
2	3608	Kerry to go to Paris in gesture of sympathy	U.S. Secretary of State John F. Kerry said Mon...	REAL
3	10142	Bernie supporters on Twitter erupt in anger ag...	— Kaydee King (@KaydeeKing) November 9, 2016 T...	FAKE
4	875	The Battle of New York: Why This Primary Matters	It's primary day in New York and front-runners...	REAL
...	...	...	...	...
6330	4490	State Department says it can't find emails fro...	The State Department told the Republican Natio...	REAL
6331	8062	The ‘P’ in PBS Should Stand for ‘Plutocratic’ ...	The ‘P’ in PBS Should Stand for ‘Plutocratic’ ...	FAKE
6332	8622	Anti-Trump Protesters Are Tools of the Oligarc...	Anti-Trump Protesters Are Tools of the Oligar...	FAKE
6333	4021	In Ethiopia, Obama seeks progress on peace, se...	ADDIS ABABA, Ethiopia —President Obama convene...	REAL
6334	4330	Jeb Bush Is Suddenly Attacking Trump. Here's W...	Jeb Bush Is Suddenly Attacking Trump. Here's W...	REAL

6335 rows × 4 columns

In [3]:

```
tfidf = TfidfVectorizer()
X = tfidf.fit_transform(df['text'])
```

In [4]:

```
df2 = pd.DataFrame(X.toarray())
df2.columns = [tfidf.get_feature_names_out()]
df2
```

Out[4]:

	00	000	0000	000000031	00000031	000035	00006	0001	0001pt	0002	...	حلب	عربي	عن	لم	ما	محاولات	من	هذا	مرضى
0	0.0	0.000000	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	(
1	0.0	0.000000	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	(
2	0.0	0.000000	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	(
3	0.0	0.028139	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	(
4	0.0	0.000000	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	(
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
6330	0.0	0.029299	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	(
6331	0.0	0.000000	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	(
6332	0.0	0.007522	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	(
6333	0.0	0.011331	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	(
6334	0.0	0.000000	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	(

6335 rows × 67659 columns

In [5]:

```
y = df.iloc[:,3]
y
```

Out[5]:

```
0       FAKE
1       FAKE
2       REAL
3       FAKE
4       REAL
        ...
6330    REAL
6331    FAKE
6332    FAKE
6333    REAL
6334    REAL
Name: label, Length: 6335, dtype: object
```

In [6]:

```
from sklearn.preprocessing import LabelEncoder

le = LabelEncoder()
y = le.fit_transform(y)
y
```

Out[6]:

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

In [37]:

```
X_axis = df2.iloc[:,0]
```

In [38]:

```
X_axis
```

Out[38]:

```
0       0.0
1       0.0
2       0.0
3       0.0
4       0.0
       ...
6330    0.0
6331    0.0
6332    0.0
6333    0.0
6334    0.0
Name: (00,), Length: 6335, dtype: float64
```

In [27]:

```
X_axis = X_axis.to_numpy()
```

In [39]:

```
len(y)
```

Out[39]:

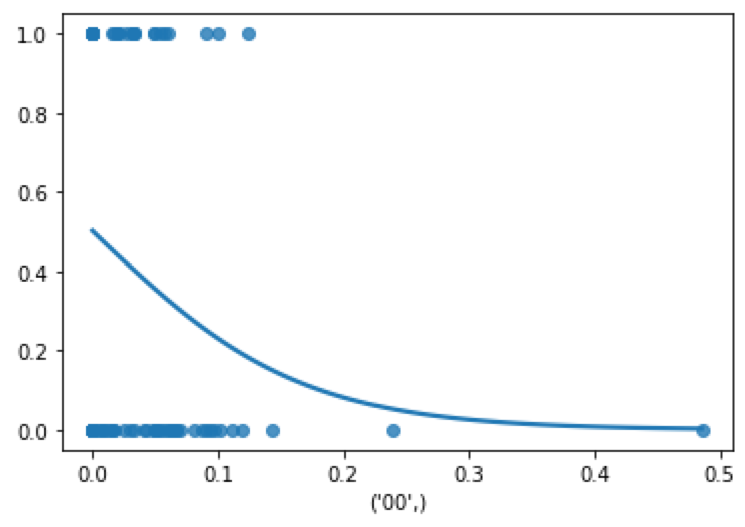
```
6335
```

In [41]:

```
sns.regplot(x=X_axis, y=y, data=df2, logistic=True, ci=None)
```

Out[41]:

```
<AxesSubplot:xlabel="('00',)">
```



In [7]:

```
x = df2.values
from sklearn.model_selection import train_test_split

x_train,x_test,y_train,y_test = train_test_split(x,y,test_size=0.20,random_state=0)
```

In [8]:

```
from sklearn.linear_model import LogisticRegression
classifier = LogisticRegression()
classifier.fit(x_train,y_train)
```

Out[8]:

```
LogisticRegression()
```

In [9]:

```
y_pred = classifier.predict(x_test)
```

In [10]:

```
y_pred
```

Out[10]:

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

In [11]:

```
from sklearn.metrics import confusion_matrix,ConfusionMatrixDisplay
cm = confusion_matrix(y_test,y_pred, labels=[1,0])
disp = ConfusionMatrixDisplay(confusion_matrix=cm , display_labels=['True','Spam'])
```

In [12]:

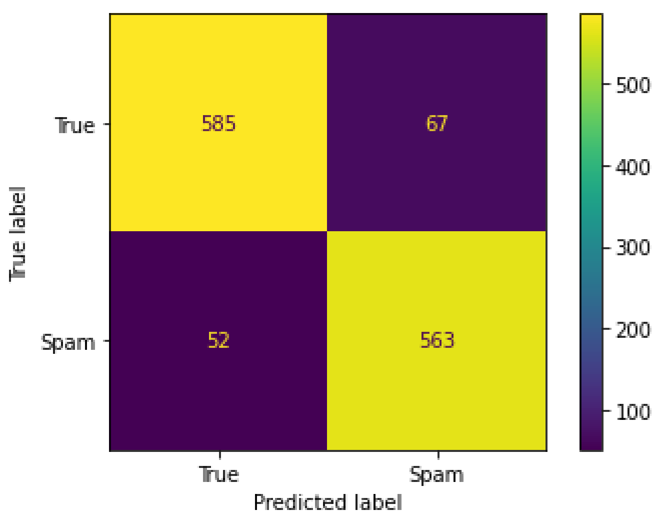
```
import seaborn as sns
```

In [13]:

```
disp.plot()
```

Out[13]:

```
<sklearn.metrics._plot.confusion_matrix.ConfusionMatrixDisplay at 0x1e4e49d0160>
```



In [14]:

```
from sklearn.metrics import classification_report

cr = classification_report(y_test, y_pred)
print(cr)
```

```
              precision    recall  f1-score   support

           0       0.89      0.92      0.90       615
           1       0.92      0.90      0.91       652

    accuracy                           0.91      1267
   macro avg       0.91      0.91      0.91      1267
weighted avg       0.91      0.91      0.91      1267
```

In [17]:

```
from sklearn.metrics import accuracy_score

score = accuracy_score(y_test, y_pred)
score
```

Out[17]:

```
0.9060773480662984
```

In [ ]: