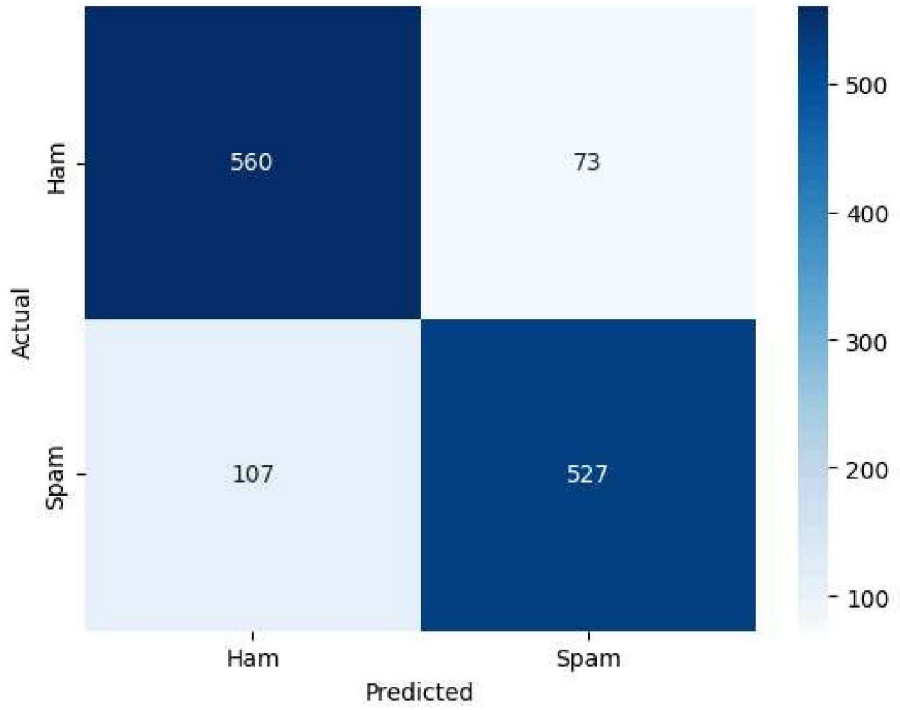
```
import pandas as pd
import numpy as np

import re import string from nltk.corpus
import stopwords from nltk. stem import
PorterStemmer
from sklearn.feature_extraction . text import TfidfVectorizer
CountVectorizer,
from sklearn.model_selection import train_test_split from
sklearn.naive_bayes import MultinomialNB
from sklearn.metrics import accuracy_ score, precision_ recall score, fl score, confusion
score, import seaborn as sns import matplotlib. pyplot as Pl ma
t

# Load dataset pd . read_csv( " /content/news . csv" ,
    encoding= " latin-l" )

# Display the actual column names print ("Actual column
names: " , df. columns . tolist ( ) )
```

```
  label message e FAKE Daniel Greenfield, a Shillman
Journalism Fello 1 FAKE Google Pinterest Digg Linkedin
Reddit Stumbleu
2  REAL U.S. Secretary of State John F . Kerry said Mon
3  FAKE ä212 Kaydee King (@KaydeeKing) November 9, 2016
4  REAL It ' s primary day in New York and front-runners
Dataset size: (6335,
2) Class distribution:
label
REAL    3171
FAKE    3164

Name : count, dtype: int64

import nltk nltk. download( '
stopwords ' )
stop_words = 'english ' ) ) stemmer = PorterStemmer()

def preprocess _text (text) : text = text. lower() text text) text = text.
        '          string. punctuation)) words = text . split ( ) words =
    [stemmer.stem(w) for w in words if w not in stop_words] return
        . join (words)
    ' clean_message' ] = df[ 'message' ] . apply(preprocess_text)
[nltk_data] Downloading package stopwords to /root/nltk_data. . .
[nltk_data]    Unzipping corpora/ stopwords.zip.

vectorizer =
X = vectorizer.fit_transform(df[ ' clean_message' ] )
  -                    'ham' : 0, 'spam' : 1})

print ("Feature matrix shape: " X. shape) print ("Sample feature names : "
vectorizer. ( ) [ : 20] )
```

```
Feature matrix shape: (6335, 3000)

Sample feature names:              abandon ' 'abc ' ' abedin' ' abil ' ' abl ' ' abort ' ' abroad '          ' absenc ' ' absolut '
 'abus ' academ' accept ' access' accompani ' accomplish ' accord '
  account' 'accur' accus' ' achiev' ]

                                                    ' REAL' : 1})
X_train, X_test, y_train, y_test = train_test_split(
    X, y, test_size=Ø.2, random_state=42, stratify=y


model = MultinomialNB() model.
fit(X_train, y_train)


print ("Model parameters: " model .                    ) )

Model parameters: { ' alpha ' : 1 0    ' class _prior '      None, 'fit_ prior' : True, ' force_alpha '      True}

y_pred = model. predict (X_test)

print ("Accuracy: , accuracy_score(y_test, y_pred))
print( "Precision : " precision_score(y_test, y_pred))
print( "Recall: " , recall_score(y_test, y_pred)) print(
"F I-score: " fl_score(y_test, y_pred))

# Confusion Matrix cm = confusion_matrix(y_test, y_pred) sns.heatmap(cm, annot=True,
fmt='d' cmap= 'Blues ' , xticklabels=[ 'Ham' , 'Spam' ] ' yticklabels=[ 'Ham PI t . xlabel( "
Predicted " )
PI t . ylabel( "Actual )
PI t . show()
```

print("\nC1assification , classification_report(y_test, y_pred))


```
Accuracy: 0.8579321231254933
Precision: 0.8783333333333333
Recall: 0.831230283911672
F1-score: 0.8541329011345219
```




```
Classification Report:
              precision    recall  f1-score   support

           0       0.84      0.88      0.86       633
           1       0.88      0.83      0.85       634

    accuracy                           0.86      1267
   macro avg       0.86      0.86      0.86      1267
weighted avg       0.86      0.86      0.86      1267
```

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