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

In [2]:
```
# Reading dataset
ds=pd.read_csv(r"news.csv")
ds.head()
```

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

In [3]:
```
# Checking for null values
ds.isnull().sum()
```

Out[3]:
```
Unnamed: 0    0
title         0
text          0
label         0
dtype: int64
```

In [4]:
```
# Label Encoding
from sklearn.preprocessing import LabelEncoder
x=ds["text"]
le=LabelEncoder()
y=le.fit_transform(ds["label"])
```

In [5]:
```
# Splitting the data
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)
```

In [6]:
```
x_train.shape
```

Out[6]:
```
(5068,)
```

In [7]:
```
# Initializing TF-IDF Vectorizer
# with document frequency 0.5
from sklearn.feature_extraction.text import TfidfVectorizer
tfidf=TfidfVectorizer(stop_words="english",max_df=0.5)

x_train_tfidf= tfidf.fit_transform(x_train)
x_test_tfidf=tfidf.transform(x_test)
```

In [8]:
```
x_train_tfidf.shape
```

Out[8]:
```
(5068, 61710)
```

In [9]:
```
# Initializing PassiveAggressive Classifier
# with 50 iterations
from sklearn.linear_model import PassiveAggressiveClassifier
pac=PassiveAggressiveClassifier(max_iter=50)

pac.fit(x_train_tfidf,y_train)
```

Out[9]:
```
PassiveAggressiveClassifier(C=1.0, average=False, class_weight=None,
                            early_stopping=False, fit_intercept=True,
                            loss='hinge', max_iter=50, n_iter_no_change=5,
                            n_jobs=None, random_state=None, shuffle=True,
                            tol=0.001, validation_fraction=0.1, verbose=0,
                            warm_start=False)
```

In [10]:
```
# Prediction
y_pred=pac.predict(x_test_tfidf)
```

In [11]:
```
# Getting Accuracy Score
from sklearn.metrics import accuracy_score
accuracy_score(y_test,y_pred)
```

Out[11]:
```
0.9344909234411997
```

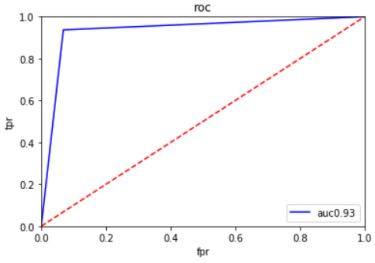
In [12]:
```
# Getting Confusion Matrix
from sklearn.metrics import confusion_matrix
confusion_matrix(y_test,y_pred)
```

Out[12]:
```
array([[573,  42],
       [ 41, 611]], dtype=int64)
```

In [13]:
```
# Getting roc
import sklearn.metrics as metrics
fpr,tpr,threshold=metrics.roc_curve(y_test,y_pred)
roc_auc=metrics.auc(fpr,tpr)
```

In [14]:
```
# Plotting roc
import matplotlib.pyplot as plt
plt.title("roc")
plt.plot(fpr,tpr,'b',label="auc%0.2f"%roc_auc)
plt.legend(loc="lower right")
plt.plot([0,1],[0,1],"r--")
plt.xlim([0,1])
plt.ylim([0,1])
plt.xlabel("fpr")
plt.ylabel("tpr")
```

Out[14]:
```
Text(0, 0.5, 'tpr')
```



Done