Text Classification

Importing Libraries:

In [1]:

```
import numpy as np
import pandas as pd
from tqdm import tqdm

import re
import string

import nltk
from nltk.corpus import stopwords
from nltk.stem import WordNetLemmatizer
stop_words = stopwords.words('english')

from sklearn.model_selection import train_test_split
from sklearn.metrics import confusion_matrix,classification_report
from sklearn.feature_extraction.text import CountVectorizer, TfidfVectorizer
from sklearn.ensemble import RandomForestClassifier
from sklearn.metrics import confusion_matrix,classification_report

import matplotlib.pyplot as plt
import seaborn as sns
```

Data Loading:

In [2]:

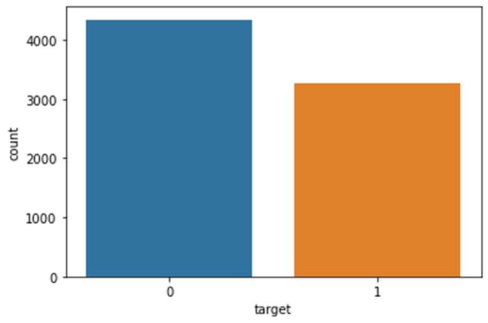
```
df = pd.read_csv('/kaggle/input/nlp-getting-started/train.csv')
df.head()
```

Out[2]:

	id	keyword	location	text	target
0	1	NaN	NaN	Our Deeds are the Reason of this #earthquake M...	1
1	4	NaN	NaN	Forest fire near La Ronge Sask. Canada	1
2	5	NaN	NaN	All residents asked to 'shelter in place' are ...	1
3	6	NaN	NaN	13,000 people receive #wildfires evacuation or...	1
4	7	NaN	NaN	Just got sent this photo from Ruby #Alaska as ...	1

In [3]:

```
ax = sns.countplot(x="target", data=df)
```



Data Preprocessing:

In [4]:

```
sw = stopwords.words('english') lemmatizer =
WordNetLemmatizer()

def clean_text(text):

    text = text.lower()

    text = re.sub(r"[^a-zA-Z?.!,¿]+", " ", text) # replacing everything with space except (a-z, A-Z,".", "?", "!", ",")

    text = re.sub(r"http\S+", "",text) #Removing URLs#text = re.sub(r"http",
    "",text)

    html=re.compile(r'<.*?>')

    text = html.sub(r'',text) #Removing html tags

    punctuations = '@#!?+&*[]-%.:/();$=><|{}^' + "'`" + '_'for p in punctuations:
        text = text.replace(p,'') #Removing punctuations

    text = [word.lower() for word in text.split() if word.lower() not in sw]text =

    [lemmatizer.lemmatize(word) for word in text]

    text = " ".join(text) #removing stopwords

    emoji_pattern = re.compile("["
                               u"\U0001F600-\U0001F64F"   # emoticons
                               u"\U0001F300-\U0001F5FF" # symbols & pictographs
                               u"\U0001F680-\U0001F6FF" # transport & map symbols
                               u"\U0001F1E0-\U0001F1FF" # flags (iOS)
                               u"\U00002702-\U000027B0"
                               u"\U000024C2-\U0001F251"
                               "]+", flags=re.UNICODE)
    text = emoji_pattern.sub(r'', text) #Removing emojis

    return text
```

In [5]:

```
df['text'] = df['text'].apply(lambda x: clean_text(x))


df.head()
```

Out[5]:

	id	keyword	location	text	target
0	1	NaN	NaN	deed reason earthquake may allah forgive u	1
1	4	NaN	NaN	forest fire near la ronge sask canada	1
2	5	NaN	NaN	resident asked shelter place notified officer ...	1
3	6	NaN	NaN	, people receive wildfire evacuation order cal...	1

Words to vectors:

We need to convert the words to numeric representations, to use them as input to our machine learning model. One way to dothis is:

Count Vectorizer:

The most basic and naive method of transforming words into vectors by counting occurrence of each word in each document.The output is a document-term matrix with each row representing a document and each column addressing a token (weight assigned to each token based on counting the occurence).

In [6]:

```
sample_corpora = df['text'].iloc[:2].values
sample_corpora
```

Out[6]:

```
array(['deed reason earthquake may allah forgive u',
       'forest fire near la ronge sask canada'], dtype=object)
```

In [7]:

```
count_vectorizer = CountVectorizer()
wm = count_vectorizer.fit_transform(sample_corpora)


doc_names = ['Doc{:d}'.format(idx) for idx, _ in enumerate(wm)]
feat_names = count_vectorizer.get_feature_names()



sample_df = pd.DataFrame(data=wm.toarray(), index=doc_names,columns=feat_names)
sample_df
```

Out[7]:

	allah	canada	deed	earthquake	fire	forest	forgive	la	may	near	reason	ronge	sask
Doc0	1	0	1	1	0	0	1	0	1	0	1	0	0
Doc1	0	1	0	0	1	1	0	1	0	1	0	1	1

TF-IDF Vectorization:

In [8]:

```
X_train, X_test , y_train, y_test = train_test_split(df['text'].values,df['target'].values,test_size=
0.2,random_state=123,stratify=df['target'].values)
```

In [9]:

```
tfidf_vectorizer = TfidfVectorizer()

tfidf_train_vectors = tfidf_vectorizer.fit_transform(X_train)

tfidf_test_vectors = tfidf_vectorizer.transform(X_test)
```

Model Building:

In [10]:

```
classifier = RandomForestClassifier()

classifier.fit(tfidf_train_vectors,y_train)
```

Out[10]:

```
RandomForestClassifier()
```

In[11]:

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

in[12]:

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

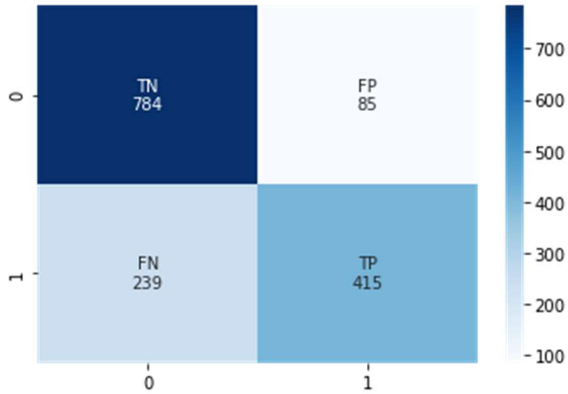
```
              precision    recall  f1-score   support

           0       0.77      0.90      0.83       869
           1       0.83      0.63      0.72       654

    accuracy                           0.79      1523
   macro avg       0.80      0.77      0.77      1523
weighted avg       0.79      0.79      0.78      1523
```

In [13]:

```
cnf_matrix = confusion_matrix(y_test,y_pred)
group_names = ['TN','FP','FN','TP']
group_counts = ["{0:0.0f}".format(value) for value in cnf_matrix.flatten()]
labels = [f"{v1}\n{v2}" for v1, v2 in zip(group_names,group_counts)]
labels = np.asarray(labels).reshape(2,2)
sns.heatmap(cnf_matrix, annot=labels, fmt='', cmap='Blues');
```


TN
FP
FN
TP