Data Preprocessing

In [1]:

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

In [2]:

```
true=pd.read_csv("True.csv")
```

In [3]:

```
true['label']="TRUE"
```

In [4]:

```
fake=pd.read_csv("Fake.csv")
```

In [5]:

```
fake['label']="FAKE"
```

In [6]:

```
news=pd.concat([true,fake])
```

In [7]:

```
news.shape
```

Out[7]:

```
(44898, 5)
```

In [8]:

```
news.columns
```

Out[8]:

```
Index(['title', 'text', 'subject', 'date', 'label'], dtype='object')
```

In [9]:

```
news.drop(['date'],axis=1,inplace=True)
```

In [10]:

```
news.isnull().sum()
```

Out[10]:

```
title      0
text       0
subject    0
label      0
dtype: int64
```

In [11]:

```
news['text_len']=[len(x.split()) for x in news['text']]
```

In [12]:

```
top_len=news.sort_values(['text_len'],ascending=False)
```

In [13]:

```
top_len.head()
```

Out[13]:

	title	text	subject	label	text_len
23086	MEDIA TRIPWIRE? Ping Pong Pizza Conspiracy Pro...	Funny how secrets travel. I d start to believ...	Middle-east	FAKE	8135
22303	MEDIA TRIPWIRE? Ping Pong Pizza Conspiracy Pro...	Funny how secrets travel. I d start to believ...	US_News	FAKE	8135
21978	The Las Vegas Mass Shooting – More to the Stor...	Shawn Helton 21st Century WireAlthough many ar...	US_News	FAKE	7928
22761	The Las Vegas Mass Shooting – More to the Stor...	Shawn Helton 21st Century WireAlthough many ar...	Middle-east	FAKE	7928
22506	CULT CRIMES, MASS SHOOTINGS & MEDIA MIND CONTR...	Shawn Helton 21st Century WireThe 1994 cult fi...	US_News	FAKE	7209

In [14]:

```
import nltk
nltk.download('stopwords')
from nltk.corpus import stopwords
```

```
[nltk_data] Downloading package stopwords to
[nltk_data]     C:\Users\saiak\AppData\Roaming\nltk_data...
[nltk_data]   Package stopwords is already up-to-date!
```

In [15]:

```
list_stops_words = stopwords.words("english")
news["text"] = news['text'].str.lower()
news["text"].replace('\n',' ', regex=True, inplace=True)
```

In [16]:

```
news.head()
```

Out[16]:

	title	text	subject	label	text_len
0	As U.S. budget fight looms, Republicans flip t...	washington (reuters) - the head of a conservat...	politicsNews	TRUE	749
1	U.S. military to accept transgender recruits o...	washington (reuters) - transgender people will...	politicsNews	TRUE	624
2	Senior U.S. Republican senator: 'Let Mr. Muell...	washington (reuters) - the special counsel inv...	politicsNews	TRUE	457
3	FBI Russia probe helped by Australian diplomat...	washington (reuters) - trump campaign adviser ...	politicsNews	TRUE	376
4	Trump wants Postal Service to charge 'much mor...	seattle/washington (reuters) - president donal...	politicsNews	TRUE	852

In [17]:

```
import nltk
nltk.download('vader_lexicon')
nltk.download('punkt')
from nltk.sentiment.vader import SentimentIntensityAnalyzer
```

```
[nltk_data] Downloading package vader_lexicon to
[nltk_data]     C:\Users\saiak\AppData\Roaming\nltk_data...
[nltk_data]   Package vader_lexicon is already up-to-date!
[nltk_data] Downloading package punkt to
[nltk_data]     C:\Users\saiak\AppData\Roaming\nltk_data...
```

```
[nltk_data]    Package punkt is already up-to-date!
```

In [18]:

```
sid = SentimentIntensityAnalyzer()
polarity=[]
for readme in news.text:
    overall=0
    sentences = nltk.tokenize.sent_tokenize(readme)
    for sentence in sentences:
        sentiment_score = sid.polarity_scores(sentence)
        if sentiment_score["compound"] == 0.0:
            overall+=0
        elif sentiment_score["compound"] > 0.0:
            overall+=1
        else:
            overall-=1
    if overall==0:
        polarity.append('Neutral')
    elif overall>0:
        polarity.append('Positive')
    else:
        polarity.append('Negative')
```

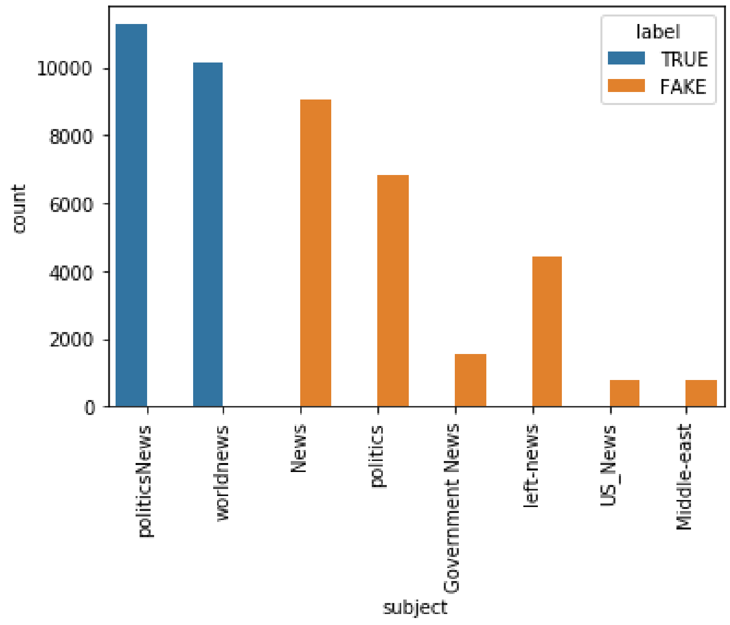
In [20]:

```
news['polarity']=polarity
```

Visualisations

In [43]:

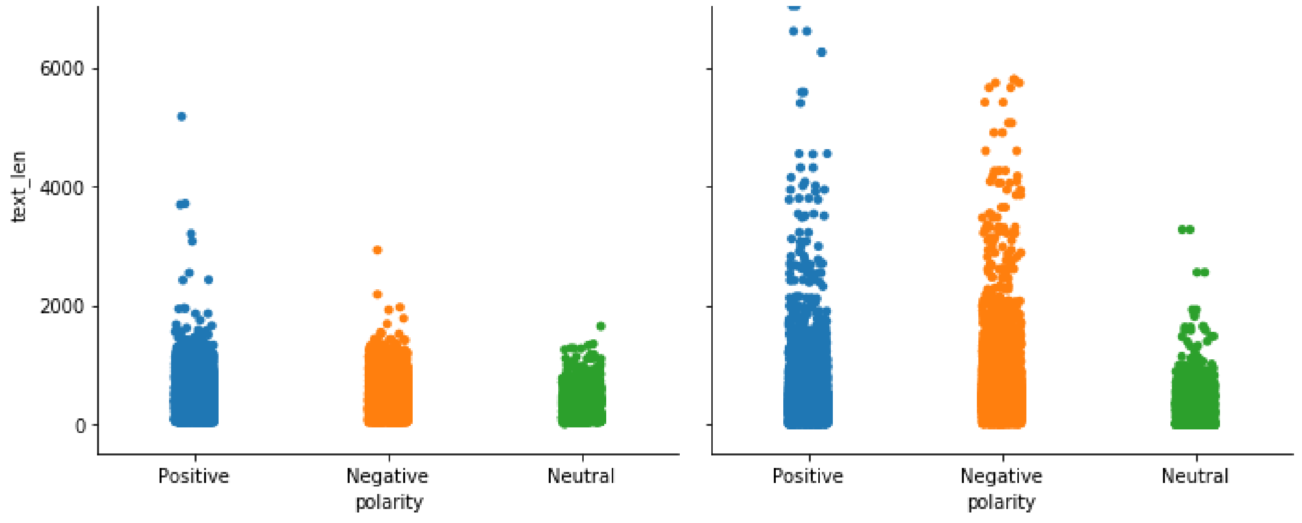
```
sns.countplot(news.subject,hue=news['label'])
plt.xticks(rotation =90)
plt.show()
```



Here we can see the news subjects distribution for fake and real news

In [38]:

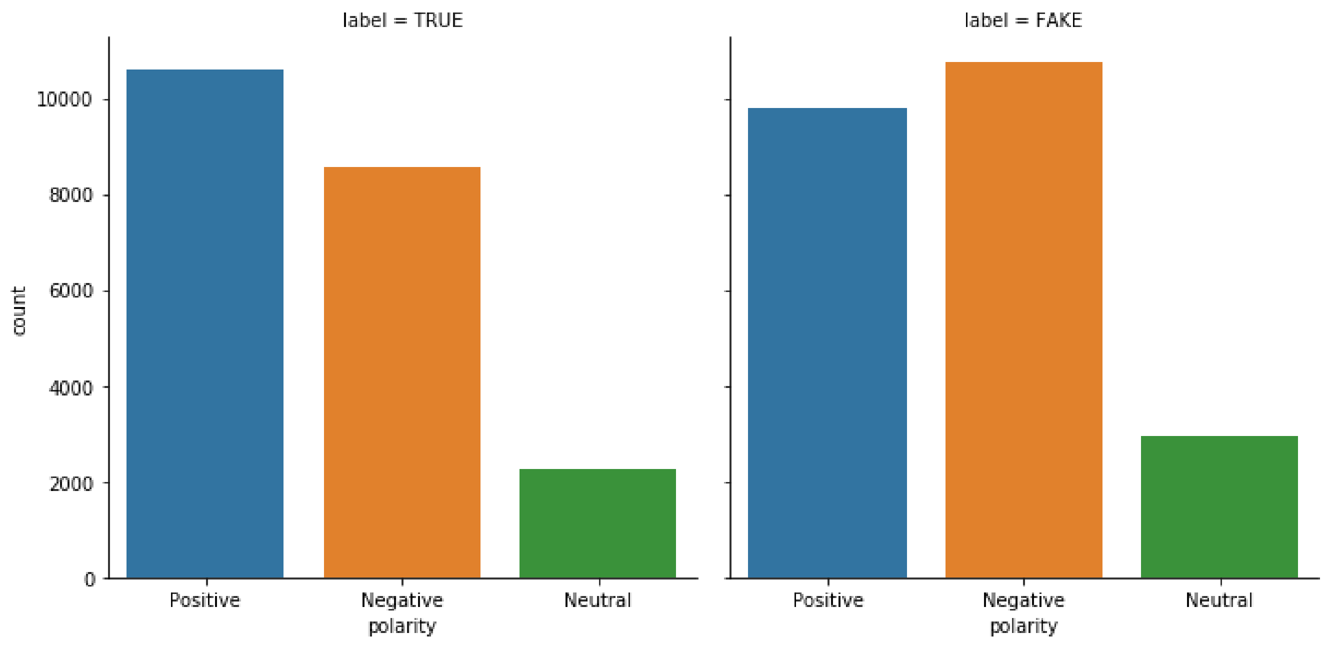
```
sns.catplot(x="polarity", y="text_len", col="label", data=news)
plt.show()
```



This plot is based on polarity which tell us the sentiment of news texts. This graph is plotted against news text length

In [49]:

```
sns.catplot(x="polarity", col="label",data=news,kind="count")
plt.show()
```



Here we can see that news with positive polarity are mostly True and news with negative and neutral polarity are mostly Fake

In [67]:

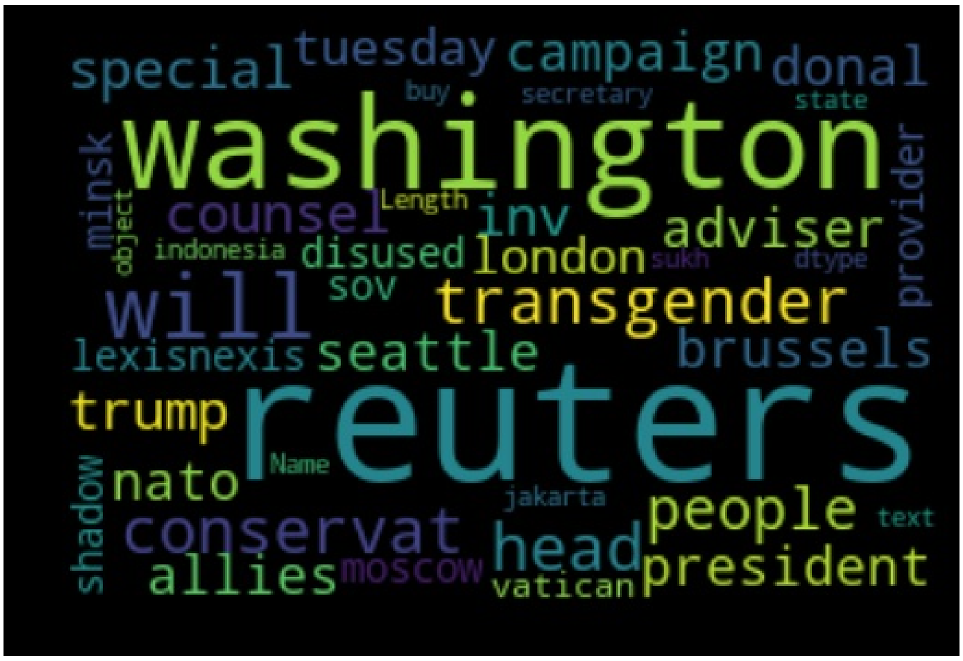
```
from wordcloud import WordCloud
```

In [68]:

```
def generate_word_cloud(text):
    wordcloud = WordCloud(
        width = 300,
        height = 200,
        background_color = 'black').generate(str(text))
    fig = plt.figure(
        figsize = (7, 7),
        facecolor = 'k',
        edgecolor = 'k')
    plt.imshow(wordcloud, interpolation = 'bilinear')
    plt.axis('off')
    plt.tight_layout(pad=0)
    plt.show()
```

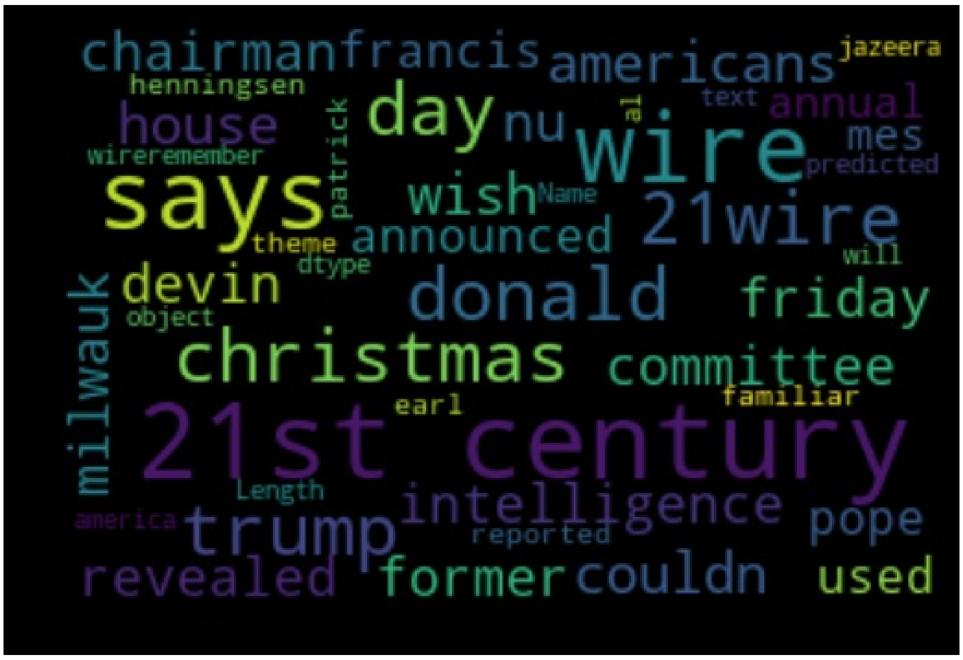
In [69]:

```
true_text = news[news['label']=='TRUE'].text
generate_word_cloud(true_text)
```



In [70]:

```
true_text = news[news['label']=='FAKE'].text
generate_word_cloud(true_text)
```



In [77]:

```
import re
nltk.download('wordnet')
```

```
[nltk_data] Downloading package wordnet to
[nltk_data]     C:\Users\saiak\AppData\Roaming\nltk_data...
[nltk_data]   Unzipping corpora\wordnet.zip.
```

Out[77]:

```
True
```

In [78]:

```
def basic_clean(text):
```

```python
    wnl = nltk.stem.WordNetLemmatizer()
    stopwords = nltk.corpus.stopwords.words('english')
    words = re.sub(r'[^\w\s]', '', text).split()
    return [wnl.lemmatize(word) for word in words if word not in stopwords]
```

In [82]:

```python
true_word = basic_clean(''.join(str(news[news['label']=='TRUE'].text.tolist())))
```

In [83]:

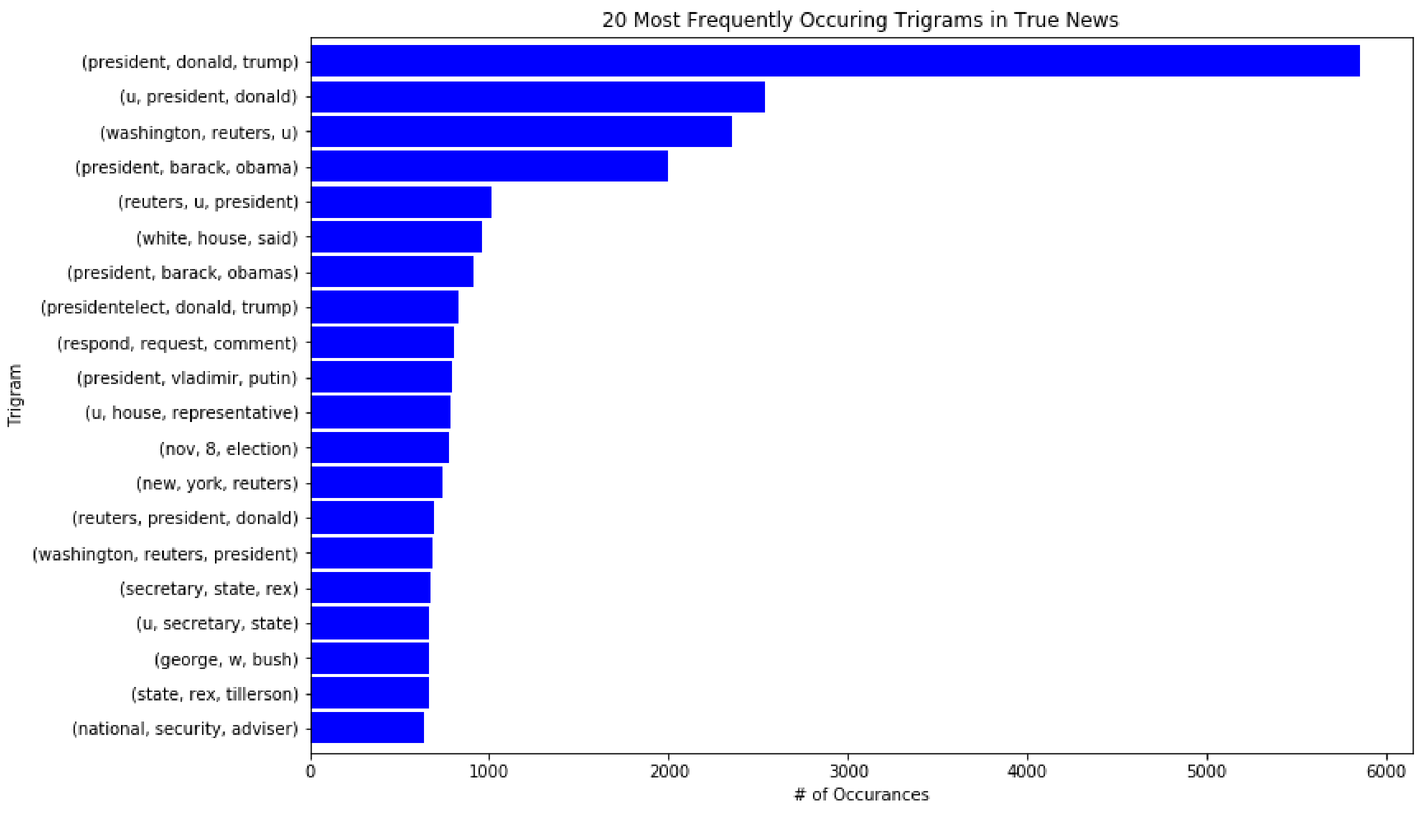
```python
true_trigrams_series = (pd.Series(nltk.ngrams(true_word, 3)).value_counts())[:20]
```

In [84]:

```python
true_trigrams_series.sort_values().plot.barh(color='blue', width=.9, figsize=(12, 8))
plt.title('20 Most Frequently Occuring Trigrams in True News')
plt.ylabel('Trigram')
plt.xlabel('# of Occurances')
```

Out[84]:

```
Text(0.5, 0, '# of Occurances')
```



In [86]:

```python
fake_word = basic_clean(''.join(str(news[news['label']=='FAKE'].text.tolist())))
```

In [87]:

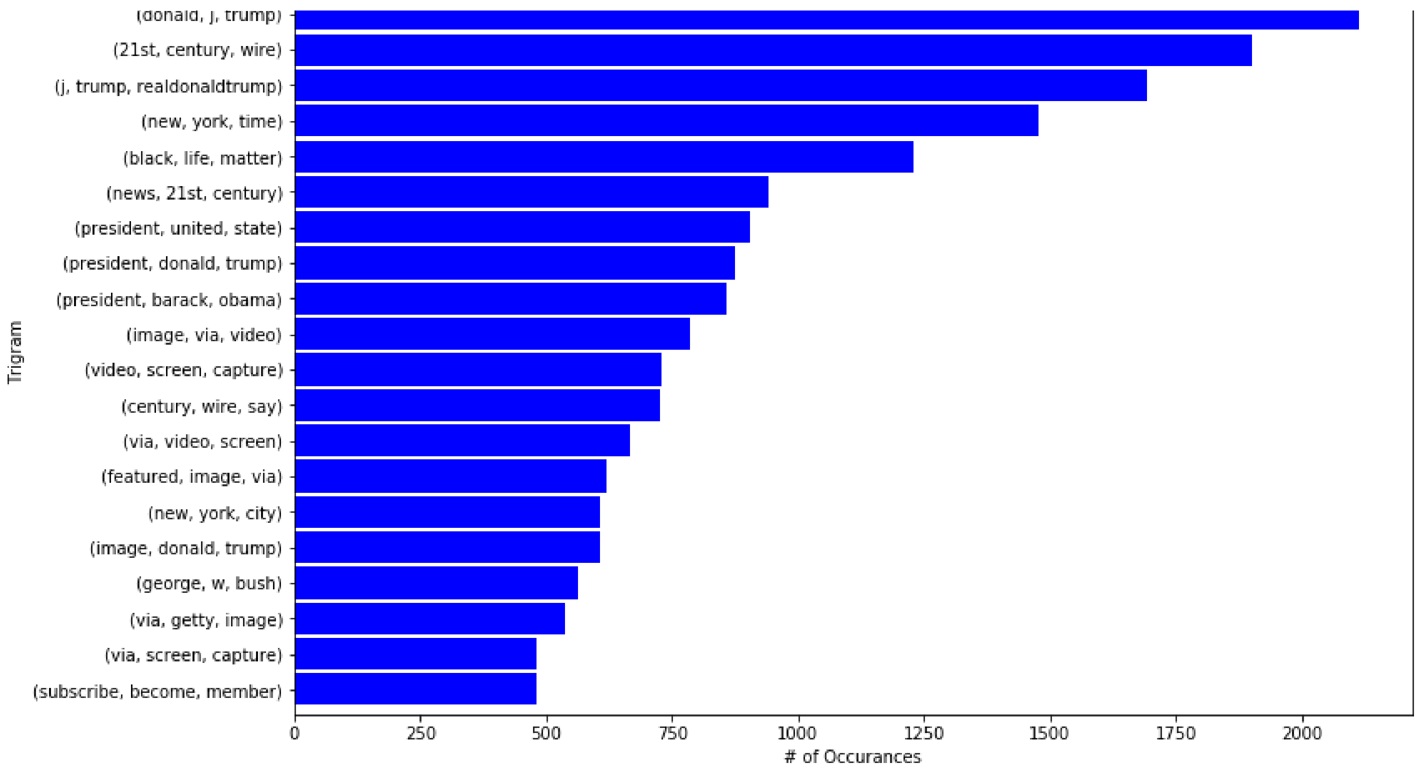
```python
fake_trigrams_series = (pd.Series(nltk.ngrams(fake_word, 3)).value_counts())[:20]
```

In [88]:

```python
fake_trigrams_series.sort_values().plot.barh(color='blue', width=.9, figsize=(12, 8))
plt.title('20 Most Frequently Occuring Trigrams in Fake News')
plt.ylabel('Trigram')
plt.xlabel('# of Occurances')
```

Out[88]:

```
Text(0.5, 0, '# of Occurances')
```



Model

In [125]:

```
from sklearn.model_selection import train_test_split

X_train, X_test, y_train, y_test = train_test_split(news["text"], news["label"],
                                                    test_size=0.30,
                                                    random_state=42)
```

In [126]:

```
from sklearn.pipeline import Pipeline
from sklearn.feature_extraction.text import CountVectorizer
from sklearn.feature_extraction.text import TfidfTransformer
from sklearn.decomposition import PCA
```

In [127]:

```
from sklearn import metrics
```

In [128]:

```
from sklearn.naive_bayes import MultinomialNB
```

In [129]:

```
classify = Pipeline(
                [('vect', CountVectorizer(stop_words= list_stops_words,ngram_range=(1,2)
)),
                 ('tfidf', TfidfTransformer()),
                 ('clf', MultinomialNB())
                 ])
```

In [130]:

```
classify.fit(X_train, y_train)
```

Out[130]:

```
Pipeline(memory=None,
     steps=[('vect', CountVectorizer(analyzer='word', binary=False, decode_error='strict'
,
        dtype=<class 'numpy.int64'>, encoding='utf-8', input='content',
        lowercase=True, max_df=1.0, max_features=None, min_df=1,
        ngram_range=(1, 2), preprocessor=None,
        stop_words=['i', 'me',...inear_tf=False, use_idf=True)), ('clf', MultinomialNB(al
pha=1.0, class_prior=None, fit_prior=True))])
```

In [131]:

```
classify.score(X_test, y_test)
```

Out[131]:

```
0.9540517961570593
```

In [ ]:

```

```