

# Stock Market Sentiment Analysis Tutorial

April 25, 2022

```
[ ]: #Description: This program predicts if the stock price of a company will ↵  
      ↪increase or decrease  
      #              based on top news headlines.
```

```
[ ]: pip install vaderSentiment
```

```
Collecting vaderSentiment  
  Downloading vaderSentiment-3.3.2-py2.py3-none-any.whl (125 kB)  
    |                               | 125 kB 5.2 MB/s  
Requirement already satisfied: requests in /usr/local/lib/python3.7/dist-  
packages (from vaderSentiment) (2.23.0)  
Requirement already satisfied: idna<3,>=2.5 in /usr/local/lib/python3.7/dist-  
packages (from requests->vaderSentiment) (2.10)  
Requirement already satisfied: urllib3!=1.25.0,!1.25.1,<1.26,>=1.21.1 in  
/usr/local/lib/python3.7/dist-packages (from requests->vaderSentiment) (1.24.3)  
Requirement already satisfied: certifi>=2017.4.17 in  
/usr/local/lib/python3.7/dist-packages (from requests->vaderSentiment)  
(2021.10.8)  
Requirement already satisfied: chardet<4,>=3.0.2 in  
/usr/local/lib/python3.7/dist-packages (from requests->vaderSentiment) (3.0.4)  
Installing collected packages: vaderSentiment  
Successfully installed vaderSentiment-3.3.2
```

```
[ ]: #Import the libraries  
import pandas as pd  
import numpy as np  
from textblob import TextBlob  
import re  
from vaderSentiment.vaderSentiment import SentimentIntensityAnalyzer  
from sklearn.model_selection import train_test_split  
from sklearn.metrics import accuracy_score, classification_report  
from sklearn.discriminant_analysis import LinearDiscriminantAnalysis
```

```
[ ]: #Load the data  
from google.colab import files  
files.upload()
```

Output hidden; open in <https://colab.research.google.com> to view.

```
[ ]: #Store the data into variables
df1 = pd.read_csv('Dow_Jones_Industrial_Average_News.csv')
df2 = pd.read_csv('Dow_Jones_Industrial_Average_Stock.csv')
```

```
[ ]: #Show the first 3 rows of data for df1
df1.head(3)
```

```
[ ]:      Date  Label      Top1 \
0  2008-08-08      0  b'Georgia 'downs two Russian warplanes' as cou...
1  2008-08-11      1  b'Why wont America and Nato help us? If they w...
2  2008-08-12      0  b'Remember that adorable 9-year-old who sang a...
```

```
                                Top2 \
0      b'BREAKING: Musharraf to be impeached.'
1  b'Bush puts foot down on Georgian conflict'
2      b'"Russia 'ends Georgia operation'"
```

```
                                Top3 \
0  b'Russia Today: Columns of troops roll into So...
1  b'"Jewish Georgian minister: Thanks to Israeli ...
2  b'"If we had no sexual harassment we would hav...
```

```
                                Top4 \
0  b'Russian tanks are moving towards the capital...
1  b'Georgian army flees in disarray as Russians ...
2  b'"Al-Qa'eda is losing support in Iraq because ...
```

```
                                Top5 \
0  b'"Afghan children raped with 'impunity,' U.N. ...
1      b'"Olympic opening ceremony fireworks 'faked'"
2  b'Ceasefire in Georgia: Putin Outmaneuvers the...
```

```
                                Top6 \
0  b'150 Russian tanks have entered South Ossetia...
1  b'What were the Mossad with fraudulent New Zea...
2  b'Why Microsoft and Intel tried to kill the X0...
```

```
                                Top7 \
0  b'"Breaking: Georgia invades South Ossetia, Rus...
1  b'Russia angered by Israeli military sale to G...
2  b'Stratfor: The Russo-Georgian War and the Bal...
```

```
                                Top8 ... \
0  b'"The 'enemy combatent' trials are nothing but... ...
1  b'An American citizen living in S.Ossetia blam... ...
2  b'I'm Trying to Get a Sense of This Whole Geor... ...
```

Top16 \

0 b'Georgia Invades South Ossetia - if Russia ge...

1 b'Israel and the US behind the Georgian aggres...

2 b'U.S. troops still in Georgia (did you know t...

Top17 \

0 b'Al-Qaeda Faces Islamist Backlash'

1 b'"Do not believe TV, neither Russian nor Geor...

2 b'Why Russias response to Georgia was right'

Top18 \

0 b'Condoleezza Rice: "The US would not act to p...

1 b'Riots are still going on in Montreal (Canada...

2 b'Gorbachev accuses U.S. of making a "serious ...

Top19 \

0 b'This is a busy day: The European Union has ...

1 b'China to overtake US as largest manufacturer'

2 b'Russia, Georgia, and NATO: Cold War Two'

Top20 \

0 b"Georgia will withdraw 1,000 soldiers from Ir...

1 b'War in South Ossetia [PICS]'

2 b'Remember that adorable 62-year-old who led y...

Top21 \

0 b'Why the Pentagon Thinks Attacking Iran is a ...

1 b'Israeli Physicians Group Condemns State Tort...

2 b'War in Georgia: The Israeli connection'

Top22 \

0 b'Caucasus in crisis: Georgia invades South Os...

1 b' Russia has just beaten the United States ov...

2 b'All signs point to the US encouraging Georgi...

Top23 \

0 b'Indian shoe manufactory - And again in a se...

1 b'Perhaps \*the\* question about the Georgia - R...

2 b'Christopher King argues that the US and NATO...

Top24 \

0 b'Visitors Suffering from Mental Illnesses Ban...

1 b'Russia is so much better at war'

2 b'America: The New Mexico?'

Top25

```

0          b"No Help for Mexico's Kidnapping Surge"
1  b"So this is what it's come to: trading sex fo...
2  b"BBC NEWS | Asia-Pacific | Extinction 'by man...

```

[3 rows x 27 columns]

```

[ ]: #Get the number of rows and columns
df1.shape

```

```

[ ]: (1989, 27)

```

```

[ ]: #Print the first 3 rows of data for df2
df2.head(3)

```

```

[ ]:
      Date      Open      High      Low      Close \
0  2016-07-01  17924.240234  18002.380859  17916.910156  17949.369141
1  2016-06-30  17712.759766  17930.609375  17711.800781  17929.990234
2  2016-06-29  17456.019531  17704.509766  17456.019531  17694.679688

      Volume      Adj Close
0    82160000  17949.369141
1   133030000  17929.990234
2   106380000  17694.679688

```

```

[ ]: #get the number of rows and columns
df2.shape

```

```

[ ]: (1989, 7)

```

```

[ ]: #Merge the data set on the date field
merge = df1.merge(df2, how='inner', on='Date')

```

```

[ ]: #Show the merged data set
merge

```

```

[ ]:
      Date  Label      Top1 \
0  2008-08-08    0  b"Georgia 'downs two Russian warplanes' as cou...
1  2008-08-11    1  b'Why wont America and Nato help us? If they w...
2  2008-08-12    0  b'Remember that adorable 9-year-old who sang a...
3  2008-08-13    0  b' U.S. refuses Israel weapons to attack Iran:...
4  2008-08-14    1  b'All the experts admit that we should legalis...
...      ...    ...      ...
1984  2016-06-27    0  Barclays and RBS shares suspended from trading...
1985  2016-06-28    1  2,500 Scientists To Australia: If You Want To ...
1986  2016-06-29    1  Explosion At Airport In Istanbul
1987  2016-06-30    1  Jamaica proposes marijuana dispensers for tour...
1988  2016-07-01    1  A 117-year-old woman in Mexico City finally re...

```

Top2 \

0 b'BREAKING: Musharraf to be impeached.'

1 b'Bush puts foot down on Georgian conflict'

2 b"Russia 'ends Georgia operation'"

3 b"When the president ordered to attack Tskhinv..."

4 b'War in South Osetia - 89 pictures made by a ...

...

1984 Pope says Church should ask forgiveness from g...

1985 The personal details of 112,000 French police ...

1986 Yemeni former president: Terrorism is the offs...

1987 Stephen Hawking says pollution and 'stupidity'...

1988 IMF chief backs Athens as permanent Olympic host

Top3 \

0 b'Russia Today: Columns of troops roll into So...

1 b"Jewish Georgian minister: Thanks to Israeli ...

2 b'"If we had no sexual harassment we would hav...

3 b' Israel clears troops who killed Reuters cam...

4 b'Swedish wrestler Ara Abrahamian throws away ...

...

1984 Poland 'shocked' by xenophobic abuse of Poles ...

1985 S&P cuts United Kingdom sovereign credit r...

1986 UK must accept freedom of movement to access E...

1987 Boris Johnson says he will not run for Tory pa...

1988 The president of France says if Brexit won, so...

Top4 \

0 b'Russian tanks are moving towards the capital...

1 b'Georgian army flees in disarray as Russians ...

2 b"Al-Qa'eda is losing support in Iraq because ...

3 b'Britain\'s policy of being tough on drugs is...

4 b'Russia exaggerated the death toll in South O...

...

1984 There will be no second referendum, cabinet ag...

1985 Huge helium deposit found in Africa

1986 Devastated: scientists too late to captive bre...

1987 Six gay men in Ivory Coast were abused and for...

1988 British Man Who Must Give Police 24 Hours' Not...

Top5 \

0 b"Afghan children raped with 'impunity,' U.N. ...

1 b"Olympic opening ceremony fireworks 'faked'"

2 b'Ceasefire in Georgia: Putin Outmaneuvers the...

3 b'Body of 14 year old found in trunk; Latest (...

4 b'Missile That Killed 9 Inside Pakistan May Ha...

...

1984 Scotland welcome to join EU, Merkel ally says  
 1985 CEO of the South African state broadcaster qui...  
 1986 British Labor Party leader Jeremy Corbyn loses...  
 1987 Switzerland denies citizenship to Muslim immig...  
 1988 100+ Nobel laureates urge Greenpeace to stop o...

Top6 \

0 b'150 Russian tanks have entered South Ossetia...  
 1 b'What were the Mossad with fraudulent New Zea...  
 2 b'Why Microsoft and Intel tried to kill the XO...  
 3 b'China has moved 10 \*million\* quake survivors...  
 4 b'Rushdie Condemns Random House's Refusal to P...  
 ...  
 1984 Sterling dips below Friday's 31-year low amid ...  
 1985 Brexit cost investors \$2 trillion, the worst o...  
 1986 A Muslim Shop in the UK Was Just Firebombed Wh...  
 1987 Palestinian terrorist stabs israeli teen girl ...  
 1988 Brazil: Huge spike in number of police killing...

Top7 \

0 b"Breaking: Georgia invades South Ossetia, Rus...  
 1 b'Russia angered by Israeli military sale to G...  
 2 b'Stratfor: The Russo-Georgian War and the Bal...  
 3 b"Bush announces Operation Get All Up In Russi...  
 4 b'Poland and US agree to missile defense deal. ...  
 ...  
 1984 No negative news about South African President...  
 1985 Hong Kong democracy activists call for return ...  
 1986 Mexican Authorities Sexually Torture Women in ...  
 1987 Puerto Rico will default on \$1 billion of debt...  
 1988 Austria's highest court annuls presidential el...

Top8 ... \

0 b"The 'enemy combatent' trials are nothing but... ...  
 1 b'An American citizen living in S.Ossetia blam... ...  
 2 b'I'm Trying to Get a Sense of This Whole Geor... ...  
 3 b'Russian forces sink Georgian ships ' ...  
 4 b'Will the Russians conquer Tblisi? Bet on it,... ...  
 ...  
 1984 Surge in Hate Crimes in the U.K. Following U.K... ...  
 1985 Brexit: Iceland president says UK can join 'tr... ...  
 1986 UK shares and pound continue to recover ...  
 1987 Republic of Ireland fans to be awarded medal f... ...  
 1988 Facebook wins privacy case, can track any Belg... ...

Top22 \

0 b'Caucasus in crisis: Georgia invades South Os...

1 b' Russia has just beaten the United States ov...  
 2 b'All signs point to the US encouraging Georgi...  
 3 b'Witness: Russian forces head towards Tbilisi...  
 4 b'Taliban wages war on humanitarian aid workers'

...  
 1984 Conservative MP Leave Campaigner: "The leave c...  
 1985 "Romanians for Remainians" offering a new home...  
 1986 Google Found Disastrous Symantec and Norton Vu...  
 1987 US permitted 1,200 offshore fracks in Gulf of ...  
 1988 Spain arrests three Pakistanis accused of prom...

Top23 \

0 b'Indian shoe manufactory - And again in a se...  
 1 b'Perhaps \*the\* question about the Georgia - R...  
 2 b'Christopher King argues that the US and NATO...  
 3 b' Quarter of Russians blame U.S. for conflict...  
 4 b'Russia: World "can forget about" Georgia\'s...

...  
 1984 Economists predict UK recession, further weake...  
 1985 Brexit: Gibraltar in talks with Scotland to st...  
 1986 Extremist violence on the rise in Germany: Dom...  
 1987 We will be swimming in ridicule - French beach...  
 1988 Venezuela, where anger over food shortages is ...

Top24 \

0 b'Visitors Suffering from Mental Illnesses Ban...  
 1 b'Russia is so much better at war'  
 2 b'America: The New Mexico?'  
 3 b'Georgian president says US military will ta...  
 4 b'Darfur rebels accuse Sudan of mounting major...

...  
 1984 New EU 'superstate plan by France, Germany: Cr...  
 1985 8 Suicide Bombers Strike Lebanon  
 1986 BBC News: Labour MPs pass Corbyn no-confidence...  
 1987 UEFA says no minutes of silence for Istanbul v...  
 1988 A Hindu temple worker has been killed by three...

Top25 Open \

0 b"No Help for Mexico's Kidnapping Surge" 11432.089844  
 1 b"So this is what it's come to: trading sex fo... 11729.669922  
 2 b"BBC NEWS | Asia-Pacific | Extinction 'by man... 11781.700195  
 3 b'2006: Nobel laureate Aleksander Solzhenitsyn... 11632.809570  
 4 b'Philippines : Peace Advocate say Muslims nee... 11532.070312  
 ...  
 1984 Pakistani clerics declare transgender marriage... 17355.210938  
 1985 Mexico's security forces routinely use 'sexual... 17190.509766  
 1986 Tiny New Zealand town with 'too many jobs' lau... 17456.019531

1987 Law Enforcement Sources: Gun Used in Paris Ter... 17712.759766  
 1988 Ozone layer hole seems to be healing - US &... 17924.240234

	High	Low	Close	Volume	Adj Close
0	11759.959961	11388.040039	11734.320312	212830000	11734.320312
1	11867.110352	11675.530273	11782.349609	183190000	11782.349609
2	11782.349609	11601.519531	11642.469727	173590000	11642.469727
3	11633.780273	11453.339844	11532.959961	182550000	11532.959961
4	11718.280273	11450.889648	11615.929688	159790000	11615.929688
...	...	...	...	...	...
1984	17355.210938	17063.080078	17140.240234	138740000	17140.240234
1985	17409.720703	17190.509766	17409.720703	112190000	17409.720703
1986	17704.509766	17456.019531	17694.679688	106380000	17694.679688
1987	17930.609375	17711.800781	17929.990234	133030000	17929.990234
1988	18002.380859	17916.910156	17949.369141	82160000	17949.369141

[1989 rows x 33 columns]

```
[ ]: #Combine the top news headlines
headlines = []

for row in range(0, len(merge.index)):
    headlines.append(' '.join( str(x) for x in merge.iloc[row, 2:27]))
```

```
[ ]: #print a sample of the combined headlines
headlines[0]
```

```
[ ]: 'b"Georgia \'downs two Russian warplanes\' as countries move to brink of war"
b\'BREAKING: Musharraf to be impeached.\' b\'Russia Today: Columns of troops
roll into South Ossetia; footage from fighting (YouTube)\' b\'Russian tanks are
moving towards the capital of South Ossetia, which has reportedly been
completely destroyed by Georgian artillery fire\' b"Afghan children raped with
\'impunity,\' U.N. official says - this is sick, a three year old was raped and
they do nothing" b\'150 Russian tanks have entered South Ossetia whilst Georgia
shoots down two Russian jets.\' b"Breaking: Georgia invades South Ossetia,
Russia warned it would intervene on SO\'s side" b"The \'enemy combatent\' trials
are nothing but a sham: Salim Haman has been sentenced to 5 1/2 years, but will
be kept longer anyway just because they feel like it." b\'Georgian troops
retreat from S. Osettain capital, presumably leaving several hundred people
killed. [VIDEO]\' b\'Did the U.S. Prep Georgia for War with Russia?\' b\'Rice
Gives Green Light for Israel to Attack Iran: Says U.S. has no veto over Israeli
military ops\' b\'Announcing:Class Action Lawsuit on Behalf of American Public
Against the FBI\' b"So---Russia and Georgia are at war and the NYT\'s top story
is opening ceremonies of the Olympics? What a fucking disgrace and yet further
proof of the decline of journalism." b"China tells Bush to stay out of other
countries\' affairs" b\'Did World War III start today?\' b\'Georgia Invades
South Ossetia - if Russia gets involved, will NATO absorb Georgia and unleash a
```



full scale war?\' b\'Al-Qaeda Faces Islamist Backlash\' b\'Condoleezza Rice: "The US would not act to prevent an Israeli strike on Iran." Israeli Defense Minister Ehud Barak: "Israel is prepared for uncompromising victory in the case of military hostilities."\' b\'This is a busy day: The European Union has approved new sanctions against Iran in protest at its nuclear programme.\' b"Georgia will withdraw 1,000 soldiers from Iraq to help fight off Russian forces in Georgia\'s breakaway region of South Ossetia" b\'Why the Pentagon Thinks Attacking Iran is a Bad Idea - US News & World Report\' b\'Caucasus in crisis: Georgia invades South Ossetia\' b\'Indian shoe manufactory - And again in a series of "you do not like your work?"\' b\'Visitors Suffering from Mental Illnesses Banned from Olympics\' b"No Help for Mexico\'s Kidnapping Surge"

```
[ ]: #Clean the data
clean_headlines = []

for i in range(0, len(headlines)):
    clean_headlines.append(re.sub("b[(')]", '', headlines[i])) # remove b'
    clean_headlines[i] = re.sub('b[(")]', '', clean_headlines[i]) # remove b"
    clean_headlines[i] = re.sub("\'", '', clean_headlines[i]) #remove \'
```

```
[ ]: #Show the combined cleaned headlines
clean_headlines[20]
```

```
[ ]: 'A French judge has ordered two branches of Scientologists and their leaders to stand trial for fraud Russia in legal bid to ban South Park 60 Minutes Cut Ahmadinejads Statement, Solution Is Democracy in Israel/Palestine" U.S. drones kill 13 in missile attack in Pakistan Screw You, TSA: No Conviction on Key Charges in Liquid-Bomb Trial in London Scientology on trial for fraud in France! An EU ban on ads with sexist overtones? Another quasi-fictional piece of translucent flimflam Film Backs Afghans Claims of US Killings [of 90+ civilians] Giant Buddha found at Afghan site. After denying strenuously the US reopens inquiry into Afghan attack that may have killed upto 90 civilians Videos surface showing dead Afghan children after US raid, sparking a new investigation "Consortium" of Media Execs to Canadian Green Party: You can\\t participate in debate because the other parties don\\t want you there. Everything going wrong in the world .. in one convenient graphical display. Until yesterday the US military had insisted that only seven civilians were killed in Nawabad on the night of August 21 - the actual number is closer to 92 (Vid) Father rescues his toddler daughter after she is sucked down 150ft flooded drain. Greenpeace Mexico Scores Big with Green Sex Guide Afghanistan: Civilian Deaths From Airstrikes on the Rise Harrowing video film backs Afghan villagers claims of carnage caused by US troops" 1 in 4 facing fuel poverty" Russian warships are headed to the Caribbean Interrogating Human Rights and Climate Change Revealed: Shocking footage that could prove 90 Afghans - not seven - died in U.S. airstrike The Afghan government, human rights officials, and a U.N. investigation back up the account of villagers who say 90 civilians were killed in a U.S. airstrike.
```

Germany Discovers a War in Afghanistan Afghanistan - UN has video of U.S. airstrike aftermath'

```
[ ]: #Add the clean headlines to the merge data set
merge['Combined_News'] = clean_headlines

#Show the new column
merge['Combined_News'][0]
```

```
[ ]: 'Georgia downs two Russian warplanes as countries move to brink of war"
BREAKING: Musharraf to be impeached. Russia Today: Columns of troops roll into
South Ossetia; footage from fighting (YouTube) Russian tanks are moving towards
the capital of South Ossetia, which has reportedly been completely destroyed by
Georgian artillery fire Afghan children raped with impunity, U.N. official says
- this is sick, a three year old was raped and they do nothing" 150 Russian
tanks have entered South Ossetia whilst Georgia shoots down two Russian jets.
Breaking: Georgia invades South Ossetia, Russia warned it would intervene on SOs
side" The enemy combatent trials are nothing but a sham: Salim Haman has been
sentenced to 5 1/2 years, but will be kept longer anyway just because they feel
like it." Georgian troops retreat from S. Osettain capital, presumably leaving
several hundred people killed. [VIDEO] Did the U.S. Prep Georgia for War with
Russia? Rice Gives Green Light for Israel to Attack Iran: Says U.S. has no veto
over Israeli military ops Announcing:Class Action Lawsuit on Behalf of American
Public Against the FBI So---Russia and Georgia are at war and the NYTs top story
is opening ceremonies of the Olympics? What a fucking disgrace and yet further
proof of the decline of journalism." China tells Bush to stay out of other
countries affairs" Did World War III start today? Georgia Invades South Ossetia
- if Russia gets involved, will NATO absorb Georgia and unleash a full scale
war? Al-Qaeda Faces Islamist Backlash Condoleezza Rice: "The US would not act to
prevent an Israeli strike on Iran." Israeli Defense Minister Ehud Barak: "Israel
is prepared for uncompromising victory in the case of military hostilities."
This is a busy day: The European Union has approved new sanctions against Iran
in protest at its nuclear programme. Georgia will withdraw 1,000 soldiers from
Iraq to help fight off Russian forces in Georgias breakaway region of South
Ossetia" Why the Pentagon Thinks Attacking Iran is a Bad Idea - US News &
World Report Caucasus in crisis: Georgia invades South Ossetia Indian shoe
manufactory - And again in a series of "you do not like your work?" Visitors
Suffering from Mental Illnesses Banned from Olympics No Help for Mexicos
Kidnapping Surge"
```

```
[ ]: #Show the first 3 rows of the merge data set
merge.head(3)
```

```
[ ]:      Date  Label      Top1 \
0  2008-08-08      0  b"Georgia 'downs two Russian warplanes' as cou...
1  2008-08-11      1  b'Why wont America and Nato help us? If they w...
2  2008-08-12      0  b'Remember that adorable 9-year-old who sang a...
```

Top2 \

0 b'BREAKING: Musharraf to be impeached.'  
 1 b'Bush puts foot down on Georgian conflict'  
 2 b"Russia 'ends Georgia operation'"

Top3 \

0 b'Russia Today: Columns of troops roll into So...  
 1 b"Jewish Georgian minister: Thanks to Israeli ...  
 2 b'"If we had no sexual harassment we would hav..."

Top4 \

0 b'Russian tanks are moving towards the capital...  
 1 b'Georgian army flees in disarray as Russians ...  
 2 b"Al-Qa'eda is losing support in Iraq because ..."

Top5 \

0 b"Afghan children raped with 'impunity,' U.N. ...  
 1 b"Olympic opening ceremony fireworks 'faked'"  
 2 b'Ceasefire in Georgia: Putin Outmaneuvers the..."

Top6 \

0 b'150 Russian tanks have entered South Ossetia...  
 1 b'What were the Mossad with fraudulent New Zea...  
 2 b'Why Microsoft and Intel tried to kill the X0..."

Top7 \

0 b"Breaking: Georgia invades South Ossetia, Rus...  
 1 b'Russia angered by Israeli military sale to G...  
 2 b'Stratfor: The Russo-Georgian War and the Bal..."

Top8 ... \

0 b"The 'enemy combatent' trials are nothing but... ...  
 1 b'An American citizen living in S.Ossetia blam... ...  
 2 b"I'm Trying to Get a Sense of This Whole Geor... ..."

Top23 \

0 b'Indian shoe manufactory - And again in a se...  
 1 b'Perhaps \*the\* question about the Georgia - R...  
 2 b'Christopher King argues that the US and NATO..."

Top24 \

0 b'Visitors Suffering from Mental Illnesses Ban...  
 1 b'Russia is so much better at war'  
 2 b'America: The New Mexico?'

Top25

Open \

```

0          b"No Help for Mexico's Kidnapping Surge" 11432.089844
1  b"So this is what it's come to: trading sex fo... 11729.669922
2  b"BBC NEWS | Asia-Pacific | Extinction 'by man... 11781.700195

```

```

          High          Low          Close    Volume    Adj Close  \
0  11759.959961  11388.040039  11734.320312  212830000  11734.320312
1  11867.110352  11675.530273  11782.349609  183190000  11782.349609
2  11782.349609  11601.519531  11642.469727  173590000  11642.469727

```

```

                                Combined_News
0  Georgia downs two Russian warplanes as countri...
1  Why wont America and Nato help us? If they won...
2  Remember that adorable 9-year-old who sang at ...

```

[3 rows x 34 columns]

```

[ ]: #Create a function to get the subjectivity
def getSubjectivity(text):
    return TextBlob(text).sentiment.subjectivity

#Create a function to get the polarity
def getPolarity(text):
    return TextBlob(text).sentiment.polarity

```

```

[ ]: #Create two new columns 'Subjectivity' and 'Polarity'
merge['Subjectivity'] = merge['Combined_News'].apply(getSubjectivity)
merge['Polarity'] = merge['Combined_News'].apply(getPolarity)

```

```

[ ]: #Show the new columns in the merge data set
merge.head(3)

```

```

[ ]:          Date  Label          Top1  \
0  2008-08-08      0  b"Georgia 'downs two Russian warplanes' as cou...
1  2008-08-11      1  b'Why wont America and Nato help us? If they w...
2  2008-08-12      0  b'Remember that adorable 9-year-old who sang a...

```

```

                                Top2  \
0          b'BREAKING: Musharraf to be impeached.'
1  b'Bush puts foot down on Georgian conflict'
2          b"Russia 'ends Georgia operation'"

```

```

                                Top3  \
0  b'Russia Today: Columns of troops roll into So...
1  b"Jewish Georgian minister: Thanks to Israeli ..."
2  b'"If we had no sexual harassment we would hav...'

```

```

                                Top4  \

```

```

0 b'Russian tanks are moving towards the capital...
1 b'Georgian army flees in disarray as Russians ...
2 b'Al-Qa'eda is losing support in Iraq because ...

```

Top5 \

```

0 b'"Afghan children raped with 'impunity,' U.N. ...
1 b'"Olympic opening ceremony fireworks 'faked'"
2 b'Ceasefire in Georgia: Putin Outmaneuvers the...

```

Top6 \

```

0 b'150 Russian tanks have entered South Ossetia...
1 b'What were the Mossad with fraudulent New Zea...
2 b'Why Microsoft and Intel tried to kill the XO...

```

Top7 \

```

0 b'"Breaking: Georgia invades South Ossetia, Rus...
1 b'Russia angered by Israeli military sale to G...
2 b'Stratfor: The Russo-Georgian War and the Bal...

```

Top8 ... \

```

0 b'"The 'enemy combatent' trials are nothing but... ...
1 b'An American citizen living in S.Ossetia blam... ...
2 b'I'm Trying to Get a Sense of This Whole Geor... ...

```

Top25 Open \

```

0 b'"No Help for Mexico's Kidnapping Surge" 11432.089844
1 b'"So this is what it's come to: trading sex fo... 11729.669922
2 b'"BBC NEWS | Asia-Pacific | Extinction 'by man... 11781.700195

```

	High	Low	Close	Volume	Adj Close \
0	11759.959961	11388.040039	11734.320312	212830000	11734.320312
1	11867.110352	11675.530273	11782.349609	183190000	11782.349609
2	11782.349609	11601.519531	11642.469727	173590000	11642.469727

	Combined_News	Subjectivity	Polarity
0	Georgia downs two Russian warplanes as countri...	0.267549	-0.048568
1	Why wont America and Nato help us? If they won...	0.374806	0.121956
2	Remember that adorable 9-year-old who sang at ...	0.536234	-0.044302

[3 rows x 36 columns]

```

[ ]: #Create a function to get the sentiment scores
def getSIA(text):
    sia = SentimentIntensityAnalyzer()
    sentiment = sia.polarity_scores(text)
    return sentiment

```

```
[ ]: #Get the sentiment scores for each day
compound = []
neg = []
pos = []
neu = []
SIA = 0

for i in range(0, len(merge['Combined_News'])):
    SIA = getSIA(merge['Combined_News'][i])
    compound.append(SIA['compound'])
    neg.append(SIA['neg'])
    neu.append(SIA['neu'])
    pos.append(SIA['pos'])
```

```
[ ]: #Store the sentiment scores in the merge data set
merge['Compound'] = compound
merge['Negative'] = neg
merge['Neutral'] = neu
merge['Positive'] = pos
```

```
[ ]: #Show the merge data
merge.head(3)
```

```
[ ]:      Date  Label      Top1 \
0  2008-08-08      0  b'Georgia 'downs two Russian warplanes' as cou...
1  2008-08-11      1  b'Why wont America and Nato help us? If they w...
2  2008-08-12      0  b'Remember that adorable 9-year-old who sang a...
```

```
Top2 \
0      b'BREAKING: Musharraf to be impeached.'
1  b'Bush puts foot down on Georgian conflict'
2      b"Russia 'ends Georgia operation'"
```

```
Top3 \
0  b'Russia Today: Columns of troops roll into So...
1  b"Jewish Georgian minister: Thanks to Israeli ..."
2  b'"If we had no sexual harassment we would hav..."
```

```
Top4 \
0  b'Russian tanks are moving towards the capital...'
1  b'Georgian army flees in disarray as Russians ...
2  b"Al-Qa'eda is losing support in Iraq because ..."
```

```
Top5 \
0  b"Afghan children raped with 'impunity,' U.N. ..."
1      b"Olympic opening ceremony fireworks 'faked'"
2  b'Ceasefire in Georgia: Putin Outmaneuvers the...
```

```

Top6 \
0 b'150 Russian tanks have entered South Ossetia...
1 b'What were the Mossad with fraudulent New Zea...
2 b'Why Microsoft and Intel tried to kill the XO...

```

```

Top7 \
0 b"Breaking: Georgia invades South Ossetia, Rus...
1 b'Russia angered by Israeli military sale to G...
2 b'Stratfor: The Russo-Georgian War and the Bal...

```

```

Top8 ... Close \
0 b"The 'enemy combatent' trials are nothing but... ... 11734.320312
1 b'An American citizen living in S.Ossetia blam... ... 11782.349609
2 b'I'm Trying to Get a Sense of This Whole Geor... ... 11642.469727

```

```

Volume Adj Close Combined_News \
0 212830000 11734.320312 Georgia downs two Russian warplanes as countri...
1 183190000 11782.349609 Why wont America and Nato help us? If they won...
2 173590000 11642.469727 Remember that adorable 9-year-old who sang at ...

```

```

Subjectivity Polarity Compound Negative Neutral Positive
0 0.267549 -0.048568 -0.9982 0.235 0.724 0.041
1 0.374806 0.121956 -0.9858 0.191 0.721 0.089
2 0.536234 -0.044302 -0.9715 0.128 0.816 0.056

```

[3 rows x 40 columns]

```

[ ]: #Create a list of columns to keep
keep_columns = ['Open', 'High', 'Low', 'Volume', 'Subjectivity', 'Polarity', 'Compound', 'Negative', 'Neutral', 'Positive', 'Label']

df = merge[keep_columns]
df

```

```

[ ]:
Open High Low Volume Subjectivity \
0 11432.089844 11759.959961 11388.040039 212830000 0.267549
1 11729.669922 11867.110352 11675.530273 183190000 0.374806
2 11781.700195 11782.349609 11601.519531 173590000 0.536234
3 11632.809570 11633.780273 11453.339844 182550000 0.364021
4 11532.070312 11718.280273 11450.889648 159790000 0.375099
...
1984 17355.210938 17355.210938 17063.080078 138740000 0.352311
1985 17190.509766 17409.720703 17190.509766 112190000 0.352649
1986 17456.019531 17704.509766 17456.019531 106380000 0.389617
1987 17712.759766 17930.609375 17711.800781 133030000 0.382566
1988 17924.240234 18002.380859 17916.910156 82160000 0.320261

```

	Polarity	Compound	Negative	Neutral	Positive	Label
0	-0.048568	-0.9982	0.235	0.724	0.041	0
1	0.121956	-0.9858	0.191	0.721	0.089	1
2	-0.044302	-0.9715	0.128	0.816	0.056	0
3	0.011398	-0.9809	0.146	0.788	0.066	0
4	0.040677	-0.9882	0.189	0.717	0.094	1
...	...	...	...	...	...	...
1984	-0.014015	-0.9644	0.148	0.758	0.094	0
1985	0.046560	-0.9571	0.132	0.767	0.102	1
1986	0.052622	-0.9975	0.225	0.684	0.091	1
1987	0.011243	-0.9977	0.202	0.738	0.061	1
1988	-0.035458	-0.9983	0.212	0.729	0.059	1

[1989 rows x 11 columns]

```
[ ]: #Create the feature data set
X = df
X = np.array(X.drop(['Label'], 1))

#Create the target data set
y = np.array(df['Label'])
```

/usr/local/lib/python3.7/dist-packages/ipykernel\_launcher.py:3: FutureWarning:  
In a future version of pandas all arguments of DataFrame.drop except for the  
argument 'labels' will be keyword-only

This is separate from the ipykernel package so we can avoid doing imports  
until

```
[ ]: #Split the data into 80% training and 20% testing data sets
x_train, x_test, y_train, y_test = train_test_split(X, y, test_size = 0.2,
↳ random_state = 0)
```

```
[ ]: #Create and train the model
model = LinearDiscriminantAnalysis().fit(x_train, y_train)
```

```
[ ]: #Show the models predictions
predictions = model.predict(x_test)
predictions
```

```
[ ]: array([1, 1, 0, 0, 1, 1, 0, 0, 0, 0, 0, 1, 0, 1, 0, 1, 1, 1, 0, 1, 0, 1,
0, 1, 1, 0, 1, 0, 1, 0, 1, 0, 0, 1, 0, 1, 1, 1, 1, 1, 0, 0, 1, 0,
1, 1, 0, 1, 1, 0, 1, 1, 0, 0, 1, 1, 1, 1, 0, 1, 0, 1, 1, 1, 0, 1,
0, 1, 0, 0, 0, 0, 1, 1, 1, 0, 0, 1, 0, 0, 1, 0, 0, 1, 1, 1, 1,
1, 1, 0, 0, 0, 0, 1, 0, 1, 1, 0, 1, 0, 1, 0, 0, 0, 1, 0, 0, 0,
0, 0, 1, 0, 1, 1, 0, 0, 1, 0, 0, 0, 1, 1, 0, 1, 0, 1, 1, 0, 1, 1,
0, 0, 1, 1, 0, 0, 0, 1, 0, 1, 0, 0, 1, 1, 1, 1, 1, 0, 0, 1, 0, 1,
```



```

0, 0, 1, 0, 1, 0, 0, 1, 1, 1, 1, 0, 1, 1, 1, 1, 1, 0, 1, 0, 1, 0,
1, 1, 0, 1, 1, 1, 1, 0, 0, 0, 1, 0, 1, 1, 1, 0, 1, 1, 0, 0, 0, 1,
1, 0, 0, 1, 0, 1, 1, 0, 0, 0, 0, 0, 1, 1, 1, 1, 0, 1, 0, 0, 0, 1,
0, 1, 1, 0, 0, 1, 1, 0, 1, 0, 1, 0, 0, 1, 1, 1, 1, 1, 0, 1, 1, 0,
0, 1, 1, 0, 1, 1, 0, 1, 1, 0, 1, 1, 0, 0, 0, 0, 0, 1, 1, 0, 0, 0,
1, 0, 0, 0, 1, 1, 1, 0, 0, 0, 1, 1, 1, 1, 0, 1, 0, 1, 1, 1, 0, 0,
0, 0, 1, 1, 1, 1, 1, 1, 0, 0, 1, 0, 1, 1, 1, 1, 0, 1, 1, 1, 1, 1,
1, 1, 0, 1, 1, 0, 1, 1, 0, 1, 0, 1, 1, 1, 1, 1, 1, 1, 0, 1, 1,
1, 0, 1, 0, 0, 1, 1, 1, 0, 0, 0, 1, 1, 0, 0, 1, 1, 0, 1, 1, 0, 1,
1, 1, 1, 1, 1, 1, 1, 0, 0, 0, 0, 0, 0, 1, 1, 1, 1, 1, 0, 1, 1, 0,
0, 0, 1, 0, 1, 1, 0, 0, 1, 1, 0, 0, 0, 1, 0, 1, 1, 1, 1, 1, 1,
0, 0])

```

```
[ ]: y_test
```

```

[ ]: array([1, 1, 0, 0, 0, 1, 0, 0, 0, 0, 0, 0, 0, 1, 0, 1, 1, 1, 0, 0, 0, 1,
0, 1, 1, 1, 0, 0, 0, 0, 0, 0, 0, 1, 0, 1, 1, 0, 1, 1, 0, 0, 1, 1,
1, 1, 0, 1, 1, 0, 1, 1, 1, 0, 1, 1, 1, 0, 0, 1, 0, 1, 0, 1, 0, 1,
0, 1, 0, 0, 0, 0, 0, 1, 1, 1, 0, 1, 1, 0, 0, 1, 0, 0, 0, 1, 1, 0,
1, 1, 1, 0, 0, 0, 0, 0, 0, 1, 1, 0, 1, 0, 0, 0, 0, 0, 1, 0, 0, 0,
0, 0, 1, 0, 1, 1, 0, 1, 1, 0, 1, 1, 1, 0, 0, 1, 0, 1, 1, 0, 0, 1,
1, 0, 0, 0, 0, 0, 0, 1, 0, 0, 0, 1, 1, 1, 1, 0, 1, 0, 0, 0, 0, 1,
0, 1, 1, 0, 1, 0, 0, 1, 1, 1, 1, 0, 1, 1, 1, 1, 1, 0, 1, 0, 1, 0,
1, 1, 0, 1, 1, 1, 1, 0, 0, 0, 1, 0, 1, 1, 0, 0, 1, 1, 0, 0, 0, 1,
1, 0, 0, 1, 0, 0, 1, 0, 0, 0, 0, 0, 1, 0, 1, 1, 1, 1, 0, 0, 0, 1,
0, 1, 1, 0, 0, 0, 1, 1, 1, 1, 1, 0, 0, 1, 1, 1, 1, 1, 0, 0, 1, 1,
0, 1, 1, 0, 1, 1, 0, 1, 1, 1, 1, 1, 0, 0, 0, 1, 0, 1, 1, 1, 0, 0,
1, 0, 0, 0, 0, 1, 1, 0, 1, 0, 1, 1, 1, 1, 0, 0, 0, 1, 1, 1, 0, 0,
0, 0, 0, 1, 0, 1, 0, 1, 0, 0, 1, 0, 1, 1, 1, 1, 0, 1, 1, 0, 1, 1,
0, 1, 0, 1, 1, 0, 1, 1, 1, 1, 0, 1, 1, 1, 1, 1, 0, 1, 0, 0, 0,
1, 1, 1, 0, 0, 1, 1, 1, 0, 1, 0, 0, 1, 0, 1, 1, 1, 0, 1, 1, 0, 1,
1, 1, 1, 1, 1, 0, 1, 0, 0, 0, 0, 0, 1, 1, 1, 1, 1, 1, 0, 0, 1, 0,
0, 0, 1, 0, 1, 1, 0, 0, 0, 1, 0, 0, 0, 1, 0, 1, 1, 1, 0, 1, 1, 1,
0, 0])

```

```

[ ]: #Show the model metrics
print(classification_report(y_test, predictions))

```

	precision	recall	f1-score	support
0	0.86	0.79	0.83	193
1	0.82	0.88	0.85	205
accuracy			0.84	398
macro avg	0.84	0.84	0.84	398
weighted avg	0.84	0.84	0.84	398

```
[ ]: !wget -nc https://raw.githubusercontent.com/brpy/colab-pdf/master/colab_pdf.py
from colab_pdf import colab_pdf
colab_pdf('Stock Market Sentiment Analysis Tutorial.ipynb')
```

File 'colab\_pdf.py' already there; not retrieving.

Mounted at /content/drive/

WARNING: apt does not have a stable CLI interface. Use with caution in scripts.

WARNING: apt does not have a stable CLI interface. Use with caution in scripts.

Extracting templates from packages: 100%

```
[ ]:
```