

News and Stock Price Position Analysis

March 17, 2024

Description : Predicts if the stock price of a company will increase or decrease based on top news headlines

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

```
[157]: # store the data into variables
df1 = pd.read_csv(r"C:\Users\HP\Desktop\Combined_News_DJIA.csv")
df2 = pd.read_csv(r"C:\Users\HP\Desktop\DJIA_price.csv")
```

```
[210]: # show the first 5 rows of the data for df1
df1.head(5)
```

```
[210]:
```

	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...	

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

		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 ...

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...

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...

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...

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. ...

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,... ...

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...
- 3 b'Elephants extinct by 2020?'
- 4 b'Bank analyst forecast Georgian crisis 2 days...

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'
3 b'US humanitarian missions soon in Georgia - i...
4 b'"Georgia confict could set back Russia's US r...

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 ...
3 b'"Georgia's DDOS came from US sources"
4 b'War in the Caucasus is as much the product o...

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'
3 b'Russian convoy heads into Georgia, violating...
4 b'"Non-media" photos of South Ossetia/Georgia ...

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...
3 b'Israeli defence minister: US against strike ...
4 b'Georgian TV reporter shot by Russian sniper ...

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'
3 b'Gorbachev: We Had No Choice'
4 b'Saudi Arabia: Mother moves to block child ma...

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'

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...

```

                                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...

```

```

                                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  b'2006: Nobel laureate Aleksander Solzhenitsyn...
4  b'Philippines : Peace Advocate say Muslims nee...

```

[5 rows x 27 columns]

```
[96]: # get the number of rows and columns
df1.shape
```

[96]: (1989, 27)

```
[211]: # show the first 5 rows of the data for df1
df2.head(5)
```

```
[211]:
```

	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
3	2016-06-28	17190.509766	17409.720703	17190.509766	17409.720703
4	2016-06-27	17355.210938	17355.210938	17063.080078	17140.240234

	Volume	Adj Close
0	82160000	17949.369141
1	133030000	17929.990234
2	106380000	17694.679688
3	112190000	17409.720703
4	138740000	17140.240234

```
[98]: # show the first 5 rows of the data for df1
df2.shape
```

[98]: (1989, 7)

```
[167]: # merge the dataset on the datafield
merge = df1.merge(df2, on='Date', how='inner')
merge
```

[167]:

	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 & amp...	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
```

```
[168]: headlines = []

for row in range(0, len(merge.index)):
    headlines.append(' '.join( str(x) for x in merge.iloc[row, 2:25] ) )
```

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

```
[170]: '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?\"\"

```
[171]: # clean the data
clean_headlines = []

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

```
[172]: # show the combined cleaned headlines
clean_headlines[0]
```

```
[172]: '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?"

```
[173]: # Add the clean headlines to the merge dataset
merge['Combined_News'] = clean_headlines

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

```
[173]: '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?"

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

```
[174]:      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]

```

[175]: # 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

```

```

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

```

```

[177]: # Show the new data in the merge dataset
merge.head(3)

```

```

[177]:      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... ...

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...	0.269961	-0.046731
1	Why wont America and Nato help us? If they won...	0.367851	0.100954
2	Remember that adorable 9-year-old who sang at ...	0.539786	-0.052157

[3 rows x 36 columns]

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

```
[185]: # 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'])
```

```
[213]: # Store the sentiment score in each dataset
merge['Compound'] = compound
merge['Negative'] = neg
merge['Neutral'] = neu
merge['Positive'] = pos
```

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

```
[214]:
```

	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	Positive	Neutral	Negative
0	0.269961	-0.046731	-0.9965	0.053	0.742	0.205
1	0.367851	0.100954	-0.9800	0.096	0.713	0.190
2	0.539786	-0.052157	-0.9767	0.054	0.805	0.141

[3 rows x 40 columns]

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

```
df = merge[keep_columns]
df
```

```
[215]:
```

	Open	High	Low	Volume	Subjectivity \
0	11432.089844	11759.959961	11388.040039	212830000	0.269961
1	11729.669922	11867.110352	11675.530273	183190000	0.367851
2	11781.700195	11782.349609	11601.519531	173590000	0.539786
3	11632.809570	11633.780273	11453.339844	182550000	0.379552
4	11532.070312	11718.280273	11450.889648	159790000	0.369669
...
1984	17355.210938	17355.210938	17063.080078	138740000	0.369654
1985	17190.509766	17409.720703	17190.509766	112190000	0.324424
1986	17456.019531	17704.509766	17456.019531	106380000	0.381896
1987	17712.759766	17930.609375	17711.800781	133030000	0.382566
1988	17924.240234	18002.380859	17916.910156	82160000	0.352137

	Polarity	Compound	Positive	Negative	Neutral	Label
0	-0.046731	-0.9965	0.053	0.205	0.742	0
1	0.100954	-0.9800	0.096	0.190	0.713	1
2	-0.052157	-0.9767	0.054	0.141	0.805	0
3	0.017951	-0.9801	0.058	0.147	0.795	0
4	0.039728	-0.9901	0.080	0.201	0.718	1
...
1984	-0.025628	-0.9842	0.086	0.173	0.741	0
1985	0.038339	-0.6549	0.098	0.107	0.795	1
1986	0.039689	-0.9975	0.099	0.242	0.658	1
1987	0.011243	-0.9967	0.066	0.193	0.741	1
1988	-0.054701	-0.9974	0.073	0.227	0.699	1

```
[1989 rows x 11 columns]
```

```
[216]: # Drop the 'Label' column to create features
X = df.drop(['Label'], axis=1).values
y = df['Label'].values
```

```
[217]: # split the data into 80% training and 20% testing
X_train, X_test, y_train, y_test = train_test_split(X,y, test_size=0.2,
↳ random_state=0)
```

```
[218]: from sklearn.discriminant_analysis import LinearDiscriminantAnalysis
```

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

```
[220]: # Show the models prediction
predictions = model.predict(X_test)
predictions
```



```
[220]: array([1, 1, 0, 0, 1, 1, 0, 0, 0, 0, 0, 0, 1, 0, 1, 0, 1, 1, 1, 0, 1, 0, 1,
0, 1, 1, 0, 0, 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, 0, 1, 0, 1, 0, 1, 1, 1, 0, 1,
0, 1, 0, 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, 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, 0, 0, 1, 0,
1, 1, 1, 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, 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, 1, 0, 1, 1, 0, 0, 0, 1, 0, 1, 1, 1, 1, 1, 1,
0, 0], dtype=int64)
```

```
[221]: y_test
```

```
[221]: array([1, 1, 0, 0, 0, 1, 0, 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, 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, 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], dtype=int64)
```

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

	precision	recall	f1-score	support
0	0.85	0.79	0.82	193

1	0.81	0.87	0.84	205
accuracy			0.83	398
macro avg	0.83	0.83	0.83	398
weighted avg	0.83	0.83	0.83	398