



When Trump Tweets, Wall Street Trades

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Dec 5, 2018

Overview

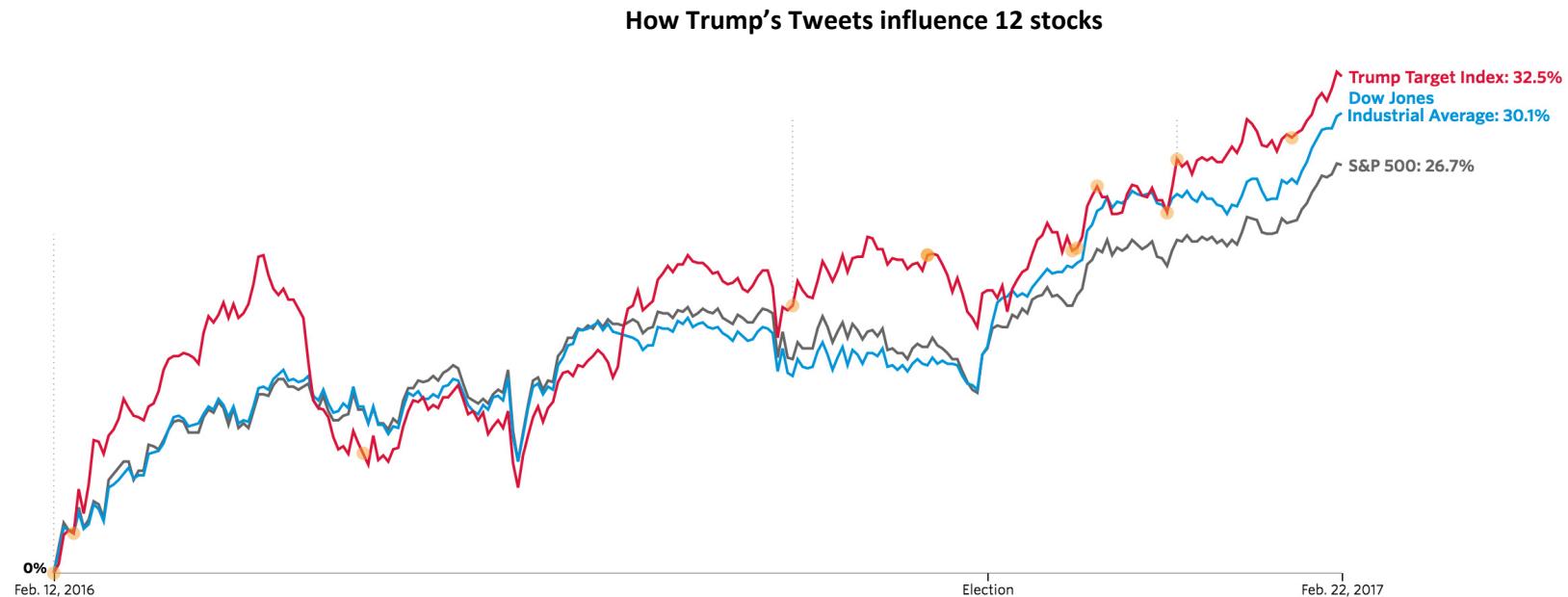
Dataset

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Discussion

- **Trump's tweets have the ability to provide an abundance of short-term volatility to stock market**
- **Wall Street Journal:**
 - 12 stocks





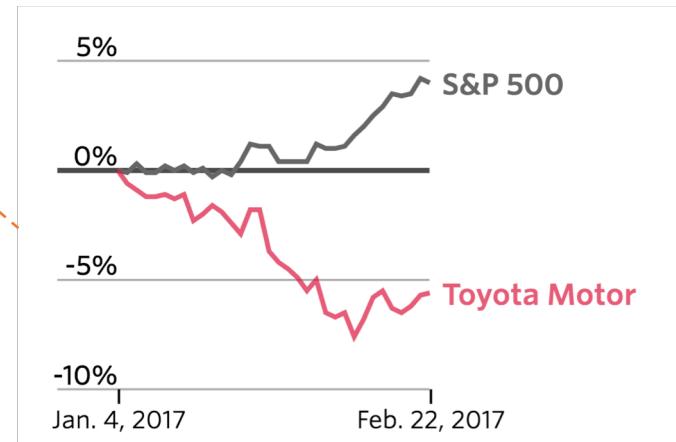
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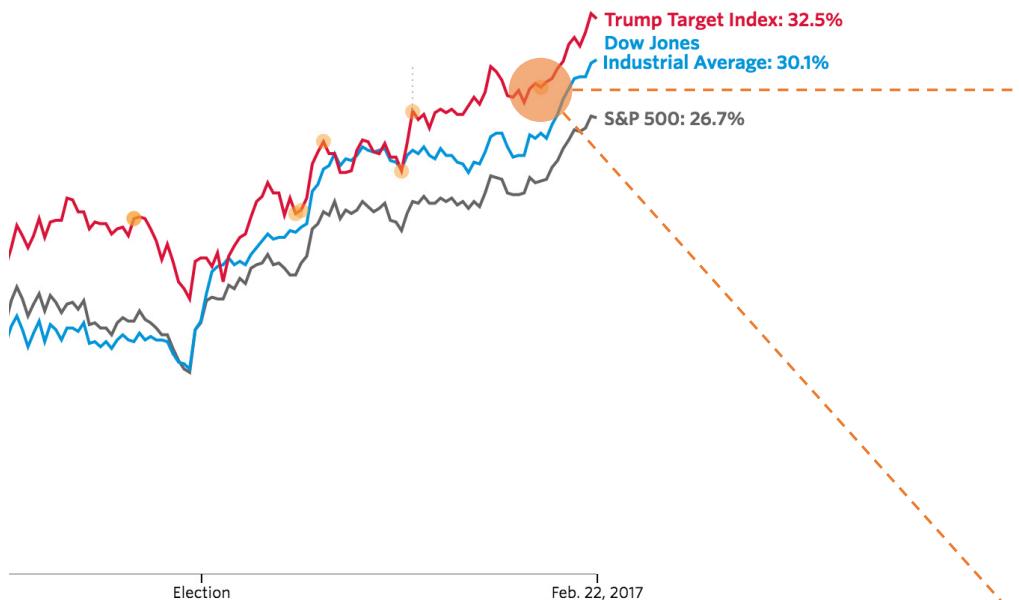
Jan. 5, 2017

Toyota Motor said will build a new plant in Baja, Mexico, to build Corolla cars for U.S. NO WAY! Build plant in U.S. or pay big border tax.

(source: Twitter)

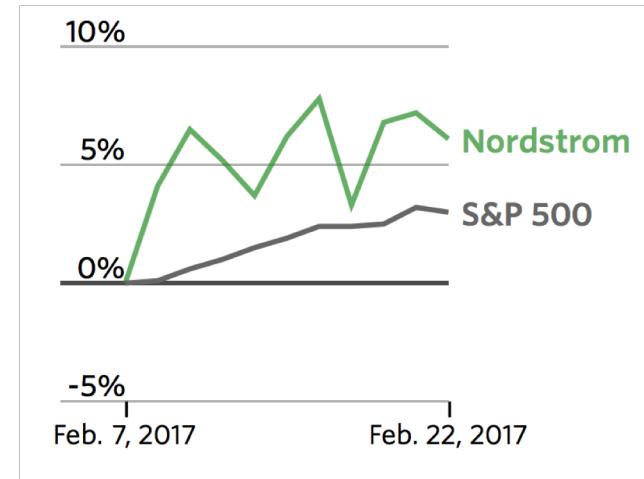
- Toyota Stock lost 1.2 billion in market cap in 5 minute following the tweet.





“
Feb. 8, 2017
My daughter Ivanka has been
treated so unfairly by
@Nordstrom. She is a great
person – always pushing me to
do the right thing! Terrible!
(source: Twitter)

- Nordstrom stock fell 1% in the minute following the tweet



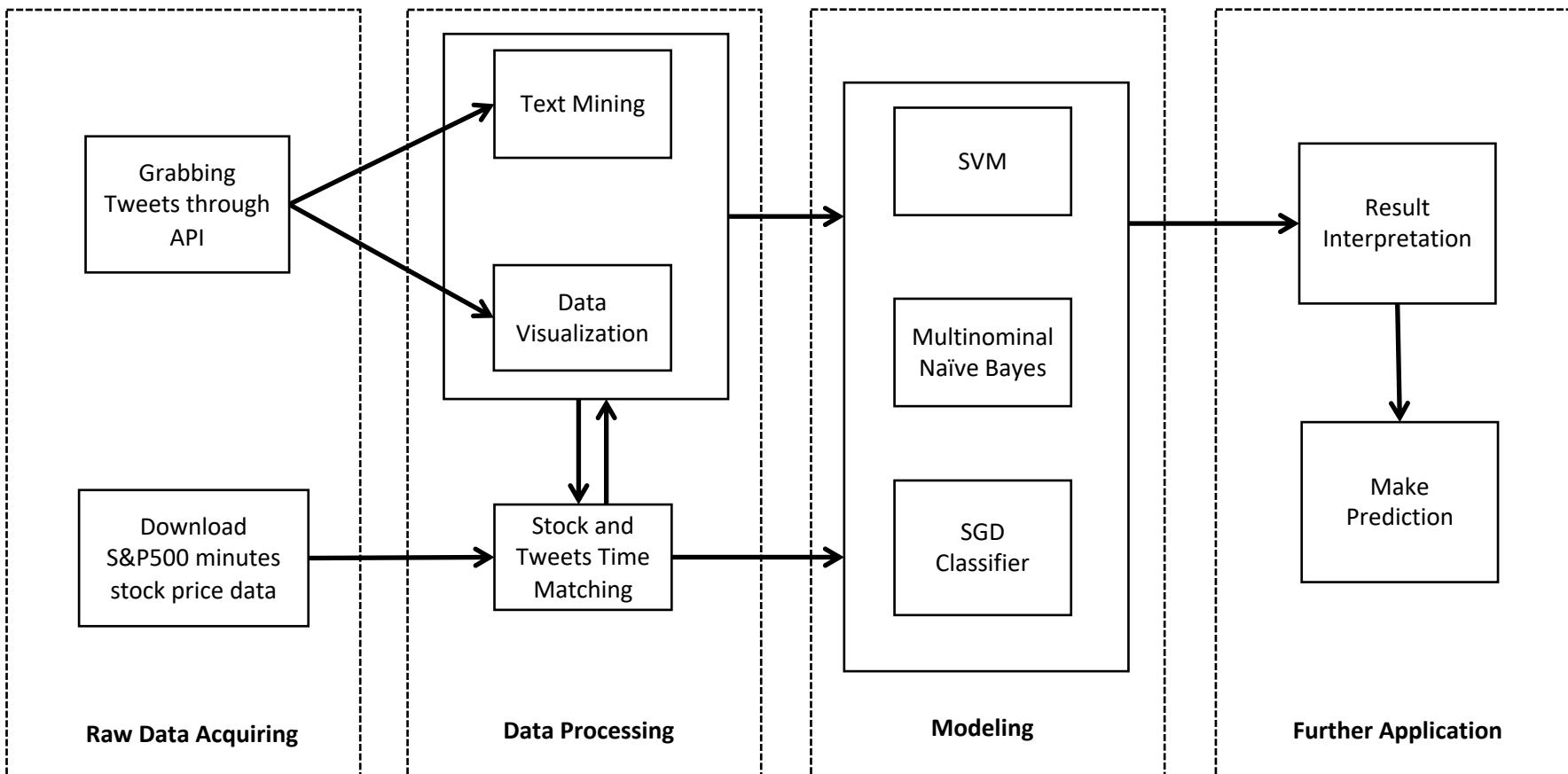
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■ Data description: Twitter

- Using Twitter API and ‘tweepy’ package, we got Trump’s twitter data from **2017-12-27 to 2018-12-01**, including tweet id, tweet text, tweet time, number of favorites, number of retweets.
- Tweet id is the unique id of the tweets, which is used to merge data frames later.
- The total number of records is **3214**.

Twitter Dataset Sample

tweetid	created at	content	favorites #	retweets #
1068887938761660000	12/1/18 15:21However, out of respect for the Bush Family and former President George H.W. Bush led a long, successful and beautiful life.	74159	13171
1068887935838220000	12/1/18 15:21	I was very much looking forward to having a press conference just now.	73022	13950
1068826073775960000	12/1/18 11:16	President George H.W. Bush led a long, successful and beautiful life.	198901	30521
1068743940755660000	12/1/18 5:49	Statement from President Donald J. Trump and First Lady Melania Trump.	97203	26057
1068687025505590000	12/1/18 2:03	Watch @seanhannity on @FoxNews NOW. Enjoy!	52042	9798
1068661832578150000	12/1/18 0:23	Great day at the #G20Summit in Buenos Aires, Argentina. Thank you to all who worked so hard to make it a success.	75894	17609
1068601345949680000	11/30/18 20:23	Great reviews on the USMCA - sooo much better than NAFTA!	59967	12486
1068600355225690000	11/30/18 20:19	To the Great people of Alaska. You have been hit hard by a ,Äubig	100132	20875
1068516326010830000	11/30/18 14:45	Just signed one of the most important, and largest, Trade Deals in our history.	120116	27118
1068444287380020000	11/30/18 9:59Lightly looked at doing a building somewhere in Russia. Put up	83013	18557
1068442531887630000	11/30/18 9:52	Oh, I get it! I am a very good developer, happily living my life, wh	148895	30934



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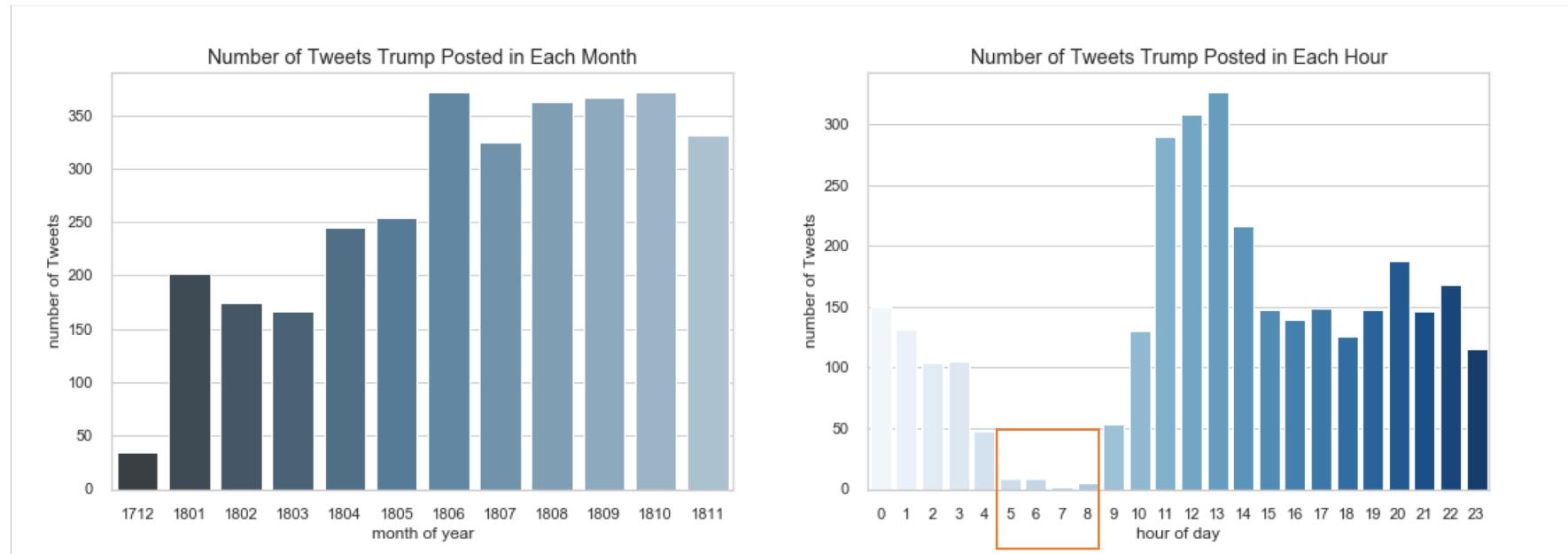
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■ Data description: Twitter



Mr. President only sleeps about 4 to 5 hours a day.



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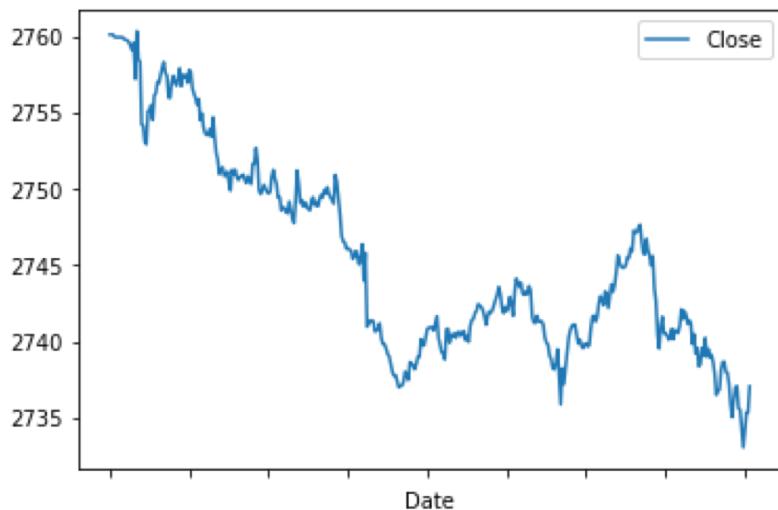
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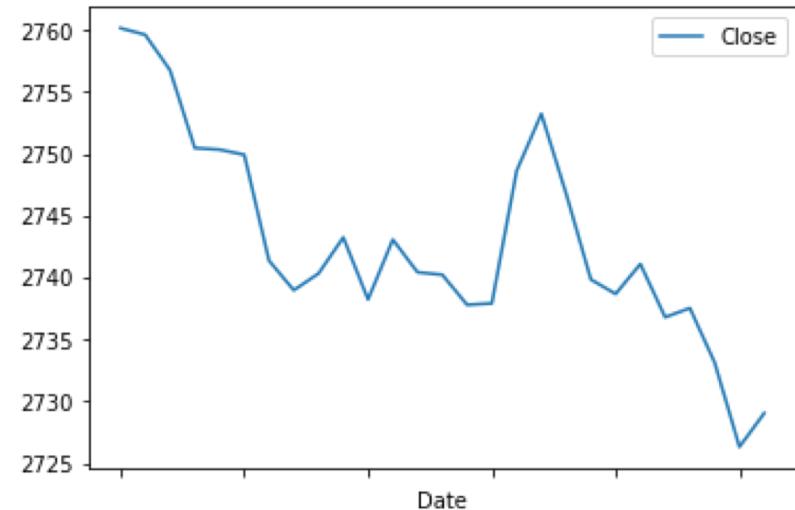
■ Data description: S&P 500

- Bloomberg Terminal
- Intraday historical S&P 500 index close price

Interval	Period	# entries	# days
1min	4/30/18 9:30 - 11/30/18 16:14	60807	150
3min	12/18/17 9:30 - 11/30/18 16:12	32421	240
5min	12/18/17 9:30 - 11/30/18 16:10	19453	240



S&P 500 Price Line by 1 minute interval (Nov 30)



S&P 500 Price Line by 30 minute interval (Nov 30)



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▪ Data processing: Twitter

Tweets

stop-words
removing

punctuation
removing

emotion icon
removing

word tokenizing

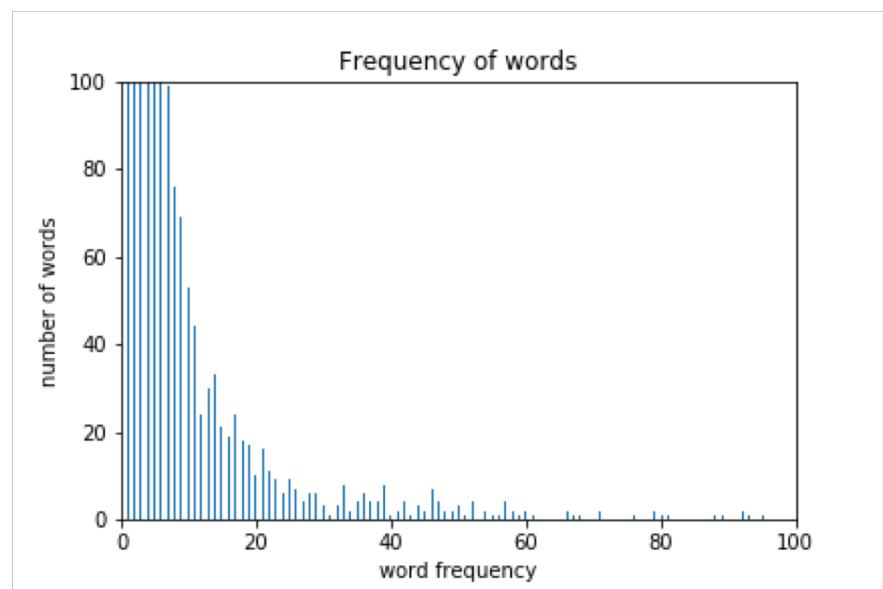
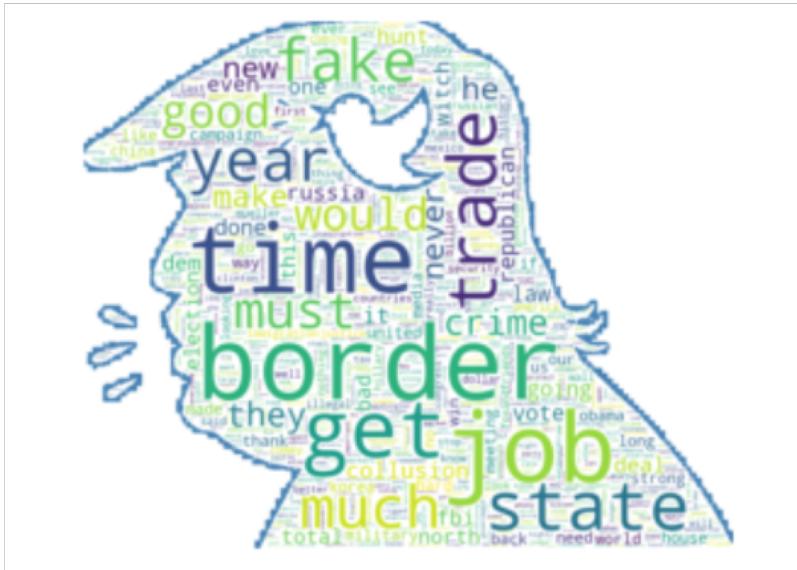
word frequency
counting

Screenshot After Cleaning

index	Date	Context	Tokenized text	Word frequency
28	2018-11-29 12:32:13	Billions of Dollars are pouring into the coffers of the U.S.A. because of the Tariffs being charged to China, and there is a long way to go. If companies don't want to pay Tariffs, build in the U.S.A. Otherwise, lets just make	['billions', 'dollars', 'pouring', 'coffers', 'u', 's', 'a', 'tariffs', 'charged', 'china', 'long', 'way', 'go', 'if', 'companies', 'pay', 'tariffs', 'build', 'u', 's', 'a', 'otherwise', 'lets', 'make', 'country', 'richer', 'ever']	{"billions": 1, "dollars": 1, "pouring": 1, "coffers": 1, "u": 2, "s": 2, "a": 2, "tariffs": 2, "charged": 1, "china": 1, "long": 1, "way": 1, "go": 1, "if": 1, "companies": 1, "pay": 1, "build": 1, "otherwise": 1, "lets": 1, "make": 1, "country": 1, "richer": 1, "ever": 1}
29	2018-11-29 12:16:12	When will this illegal Joseph McCarthy style Witch Hunt, one that has shattered so many innocent lives, ever end-or will it just go on forever? After wasting more than \$40,000,000 (is that possible?), it has proven only one thing-there was NO Collusion with Russia. So Ridiculous!	['when', 'illegal', 'joseph', 'mccarthy', 'style', 'witch', 'hunt', 'one', 'shattered', 'many', 'innocent', 'lives', 'ever', 'go', 'forever', 'after', 'wasting', 'possible', 'proven', 'one', 'thing', 'no', 'collusion', 'russia', 'so', 'ridiculous']	{"when": 1, "illegal": 1, "joseph": 1, "mccarthy": 1, "style": 1, "witch": 1, "hunt": 1, "one": 2, "shattered": 1, "many": 1, "innocent": 1, "lives": 1, "ever": 1, "go": 1, "forever": 1, "after": 1, "wasting": 1, "possible": 1, "proven": 1, "one": 1, "thing": 1, "no": 1, "collusion": 1, "russia": 1, "so": 1, "ridiculous": 1}



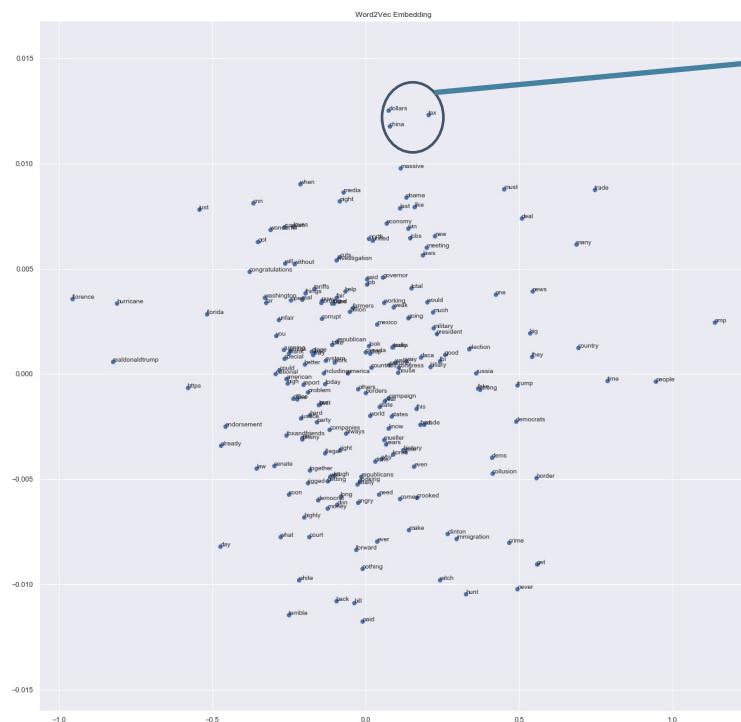
▪ Data processing: Twitter



- Word frequency: 1-977
 - We choose words of frequency from 2 to 100
 - i.e. ‘https’ 977



▪ Data processing: Twitter



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▪ **Data processing: S&P 500**

- Match the time of stock price and Trump's tweets
- Get price percent change and generate the tag (positive 1, negative -1, unchanged 0)



3min Interval		
Tag	#	%
-1	567	17.75%
0	20	0.63%
1	503	15.74%
Nan	2105	65.88%

*Tweets out of (9:30-16:00) range on weekdays
and tweets at weekends



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- Method

Model	Description
Multinomial Naive Bayes	Given class Y , words W are chosen independently from a multinomial distribution. Maximum likelihood estimating is applied to generate priori probability. Then we use Bayes rule to generate prediction
Linear SVC	Given label Y and feature X , this model aims to maximize the functional margin. Linear SVC uses the inner product as the kernel function
SGD Classifier	Same theory as SVM. But we choose different loss functions such as SoftMax loss function and hinge loss function to train the model



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Model	MultinomialNB		LinearSVC		SGDClassifier	
	Tf-idf	Count	Tf-idf	Count	Tf-idf	Count
1min	0.56	0.47	0.53	0.48	0.52	0.45
3min	0.48	0.48	0.47	0.52	0.5	0.5
5min	0.53	0.55	0.5	0.46	0.55	0.53
10min	0.52	0.51	0.53	0.53	0.44	0.47
15min	0.54	0.5	0.45	0.52	0.51	0.56
30min	0.57	0.52	0.5	0.58	0.52	0.52

- **Results:**

- 3 Models: MultinomialNB, LinearSVC, SGDClassifier (from package ‘sklearn’)
- 2 Vectorizer: TfidfVectorizer, CountVectorizer

- **Precision:**

- **Naïve Bayes + Tf-idf** performs better.
- **1-minute model and 30-minutes model** perform better.



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Positive Influence indicating the stock price may increase	Negative Influence indicating the stock price may decrease
border	worried
president	waste
well	wounded
exist	worse
republican	wacky
trade	visa
victory	transparency
family	tougher
hope	tiger
lover	build
vote	stop
strong	truly
law	horrible
north	necessary
year	badly
deal	disgraceful
look	employee
would	spectacular
job	tax

- Sort the words by importance



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■ Discussion:

Summary

- Naïve Bayes + Tf-idf beats others
- 1-minute model and 30-minute model perform better

Future Study

- Acquire larger dataset (only one year now)
- Conduct more detailed and comprehensive data processing
- Include other celebrities on Twitter
- Focus on currency exchange rate, yield curve...

Application

- Predict the stock price change

Trump's Twitter VS Stock Price

Please input Trump's tweet here:



Will the stock price increase or decrease?

Predict

Trump's Twitter VS Stock Price

Please input Trump's tweet here:



The stock price may increase!

Predict

Trump's Twitter VS Stock Price

Please input Trump's tweet here:



The stock price may decrease!

Predict





Q & A

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