

Product/Service Monitoring System

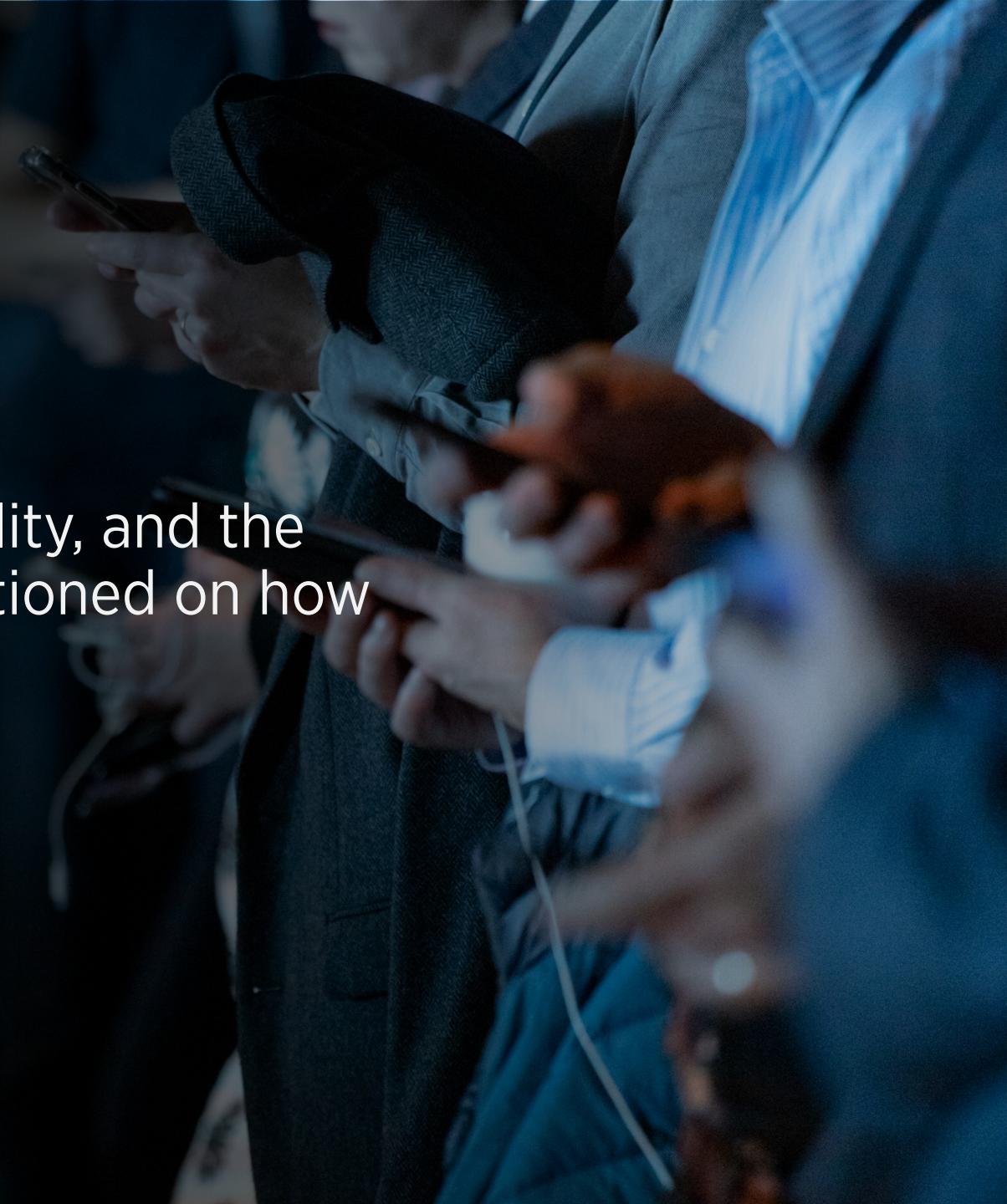
Real-Time Twitter Sentiment Analysis

Sung Bae

The Importance of Communication

“Our beliefs and perceptions of reality, and the choices we make, are largely conditioned on how others see and evaluate the world”

- Bing Liu , University of Illinois, Chicago



Twitter

145 million daily users

22% of Americans are on Twitter

500 million tweets sent each day

65.8% of US companies use Twitter for marketing

80% of Twitter users have mentioned a brand in a tweet

77% of Twitter users feel more positive when their tweet
has been replied to.

Goals

Create a dashboard that can

- [1] stream tweets with filters so that we listen to relevant key words and phrases
- [2] effectively classify tweets into **negative**, neutral, and positive sentiments
- [3] Flag the strongly negative tweets so they can be dealt with if necessary

Models: TextBlob vs. BERT vs. VADER

Best Accuracy: BERT Best Negative Recall: BERT Best Compute Time: VADER

	model	accuracy	negative_recall	average_time_per_tweet (ms)
0	TextBlob	0.631	0.352823	0.576984
1	BERT	0.834	0.854839	833.463886
2	VADER	0.664	0.689516	0.122489

BERT

- Neural Network
- Powerful (highest accuracy and negative recall)
- Heavy and slow

VADER

- Lexicon based (sentiment-related words)
- Performs relatively well in social media
- low accuracy

Implementation: We will use VADER to initially classify sentiments, then use BERT model for extreme tweets ONLY.

Dashboard

- Keywords to look for
(Up to two comparisons!)
- Change the number of data displayed in the graph



Sentiment distribution

Dashboard

- Press this button to generate word clouds associated with the keywords
 - Visualize what words are used frequently with your service/product
 - Visualize trends associate with your service/product or other competitors
 - Further analysis can be done

GENERATE WORD CLOUD!

Positive Sentiment - Microsoft



Negative Sentiment - Microsoft



Positive Sentiment - Fedex



Negative Sentiment - Fedex



Dashboard

Live update of flagged tweets.
These flagged tweets are confirmed by
BERT model which has 83% accuracy.

Date	Tweet	Sentiment	Link
2020-12-11T15:04:23.208000	@Microsoft Request for payment to Microsoft for the invention of Windows. https://t.co/kMjE8lxgrn https://t.co/lKVYDcooI3	0	Link
2020-12-11T15:04:14.784000	Microsoft has finally released the first preview of x64 emulation for apps, running on Windows devices with ARM arc.. https://t.co/S86dAbXG66	0.125	Link
2020-12-11T15:04:13.991000	FedEx @FedEx has the worst customer service. When you call for help you are trapped in an endless robocall, and the.. https://t.co/nEtjSShy0rz	-0.44166666666666665	Link
2020-12-11T15:03:57.509000	@ascarbabs I use Microsoft OneNote for Windows. Stored "in the cloud", accessible by both my PCs anywhere.	0.375	Link
2020-12-11T15:03:55.971000	Microsoft to Add Game Awards Star Performer Among Us to the Xbox Game Pass - https://t.co/e8OAB9tLcb	-0.4	Link
2020-12-11T15:03:50.626000	@Luke_UnitedUs @RoyalMail @herdtheword @DPDgroup_news @FedEx Fantastic! Such a kind gesture! ❤️🙏 *	0.4166666666666667	Link
2020-12-11T15:03:39.115000	@9to5macParody Trying to copy Microsoft surface laptop 🍏🍏... come on Apple stop being garbage !!	0	Link
2020-12-11T15:03:35.785000	Me looking out my window at the fedex guy finally delivering my shit after two months https://t.co/baeWxSyAnT	-0.1	Link
2020-12-11T15:03:23.218000	@BillGates Request for payment to Microsoft for the invention of Windows. https://t.co/kMjE8lxgrn https://t.co/SNG2rl4lEy	0	Link
2020-12-11T15:03:17.472000	2. Exclusive: Inside UPS/FedEx vaccine plan https://t.co/4YEuupaxUxt #axiosam	0	Link
2020-12-11T15:03:09.362000	Exam AZ-900 Microsoft Azure Fundamentals Study Guide Episode 36: Azure Policy https://t.co/6fzE10gmMc	0	Link
2020-12-11T15:03:04.159000	There he goes again! Here's a new Microsoft DevOps course from John Savill. Microsoft DevOps Solutions: Generat... https://t.co/EIUJyHSe	0.13636363636363635	Link
2020-12-11T15:02:54.782000	@Trademarkman23 @TheInitiative @majornelson @Xbox @Microsoft Make a company and do something about it, oh wait.....	0	Link
2020-12-11T15:02:45.611000	@washingtonpost Request for payment to Microsoft for the invention of Windows. https://t.co/kMjE8lxgrn https://t.co/jBqmzbdfpF	0	Link
2020-12-11T15:02:38.556000	AZ-303: Microsoft Azure Architect Technologies December 14th #AzureSMF1X Save 25% with code GIFT25 ... https://t.co/TKRnjboZjkx	0	Link

Date	Tweet	Sentiment	Link	Dealt
2020-12-11T15:04:13.991000	FedEx @FedEx has the worst customer service. When you call for help you are trapped in an endless robocall, and the.. https://t.co/nEtjSShy0rz	-0.4415849789977074	Link	0
2020-12-11T14:48:15.022000	@FedEx WTF @FedEx I received an email that I had package delivered on 12/9, but still haven't received! Your custom.. https://t.co/y8nd2xmVN	-0.5555847659707069	Link	0
2020-12-11T14:47:26.709000	Fedex is terrible in accountability and tracking parcels. After one week the status is still pending. Covid is just.. https://t.co/lVLBp02oA	-0.9957578778266907	Link	0
2020-12-11T14:38:22.915000	@MicrosoftHelps I've been trying to buy the windows game pass but I CANT ENTER MY DEBIT CARD!! WHY???????	-0.6247860193252563	Link	0
2020-12-11T14:37:20.326000	Worst mistake microsoft did is replacing Windows Photo Viewer with Photos in Windows 10. It takes 3-4 business days to open a photo	-0.4997148811817169	Link	0
2020-12-11T14:34:19.965000	@Andrew_kersten oh my god.. so sorry to hear this. sony and microsoft dropped the ball!	-0.624791607260704	Link	0
2020-12-11T14:34:14.785000	i hate microsoft- no more windows for me!	-0.5545629035681486	Link	0
2020-12-11T14:30:38.298000	@Afiegennn @MaxWinsbach It's mad why Microsoft. That's why it doesn't work on the Mac	-0.6246861815452576	Link	0
2020-12-11T14:12:41.971000	@SenCapito @SenateCommerce @SecretaryLevine @UPS_Hcare @FedEx Two reasons LAME DUCK DONALD won't acknowledge h.. https://t.co/dm1zmdJosX	-0.49786576628685	Link	0
2020-12-11T14:09:23.381000	Well, everybody...@FedEx is the WORST delivery service EVER! For the last two days, my package has been on the tru.. https://t.co/c6Bf0msWfp	-0.49985387921333313	Link	0
2020-12-11T13:34:22.455000	@Microsoft Sad, I want to buy a Xbox series x console. 😊😊	-0.4998297095298767	Link	0
2020-12-11T13:11:50.483000	@Lisanuevomil kamp; fedex is a awful shipping company & i won't trust them to ship shoes let alone the vaccines	-0.999721109867096	Link	0
2020-12-11T12:59:56.251000	@FedEx @FedExHelp ur customer support system is shit and insulting to customers. You failed to deliver a package fo.. https://t.co/sqALaSzPjKd	-0.5662634154160817	Link	0
2020-12-11T12:54:59.102000	@traktorgrl @UPS It is horrible and the Prime trucks and FedEx trucks are just as bad. It's really bad for our wild.. https://t.co/kX9MKX9iZ5	-0.7995912551879881	Link	0
2020-12-11T12:51:01.739000	Privacy Tip #263 – Fake Emails and Texts Spoofing UPS and FedEx https://t.co/8cmwvK3cIn via @RobinsonCole https://t.co/kQsRNW6JLc0	-0.47402119636535645	Link	0

Live update of tweets.
Predicted by TextBlob Model which has low accuracy but high efficiency!

Make sure you press “GENERATE CSV FILE” to prepare “CSV” files for further analysis!

Download Raw Data GENERATE CSV FILE Download Flagged Data

Make sure you click “GENERATE CSV FILE” button BEFORE you press download buttons!

Use Recommendation 1

Monitoring Negative Trends/Features:

- Being able to monitor negative feedbacks/tweets from people would give a great way to respond to the customers swiftly and directly.
- By collecting more tweets about your products/services, you will be able to see which features need improvements

Use Recommendation 2

Monitoring Positive Trends/Features:

- Monitoring positive trends is as important as monitoring negative trends since it would give a chance to thank them and build upon positive features for improvements.

Use Recommendation 3

Real-Time Response - Public Relations (PR)

- The biggest strength of this dashboard is that it is a real-time monitor. So, monitoring the trends of the people would give deeper insight on how to strategize PR .

Future Direction

1. Database structure

- As the database size increases, it might get too much for sqlite3 to handle. So, we want to separate database into parts so only when a large number of data is requested, we can combine or join smaller databases.

2. Reply feature

- It would be nice if we could add a feature where you could reply to any of tweets shown in the dashboard without going to twitter page.

3. Multiple keywords

- It would be nice if multiple keywords can be analyzed and followed at a given time.

4. Table Editing Mode

- Modify flagged tweets in the dashboard so that a user can classify flagged tweets as 'resolved', 'false negative', or 'other' for further customer service / data analysis.

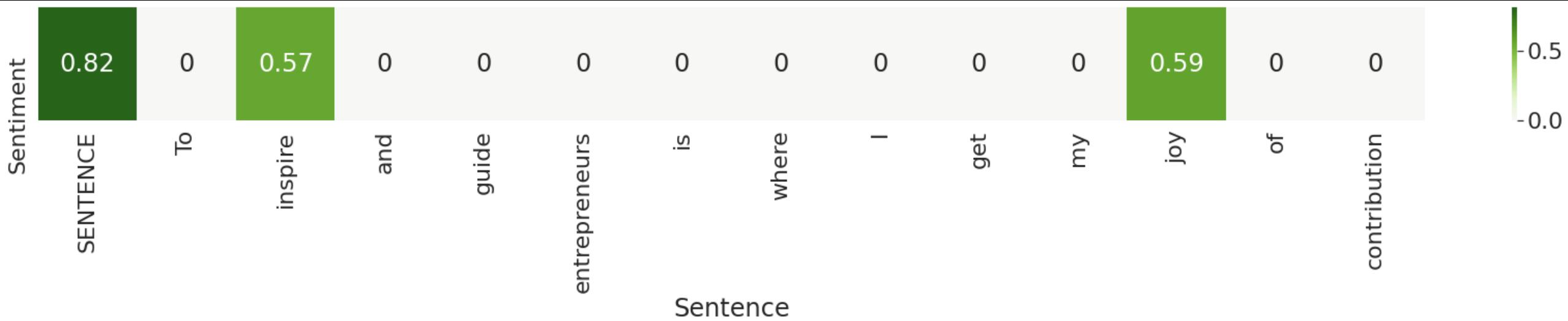
5. Further analysis on both positive and negative tweets

- Find any correlation between tweet trends with how the company is doing to help with future direction of a company.

Thank you for listening

Appendix

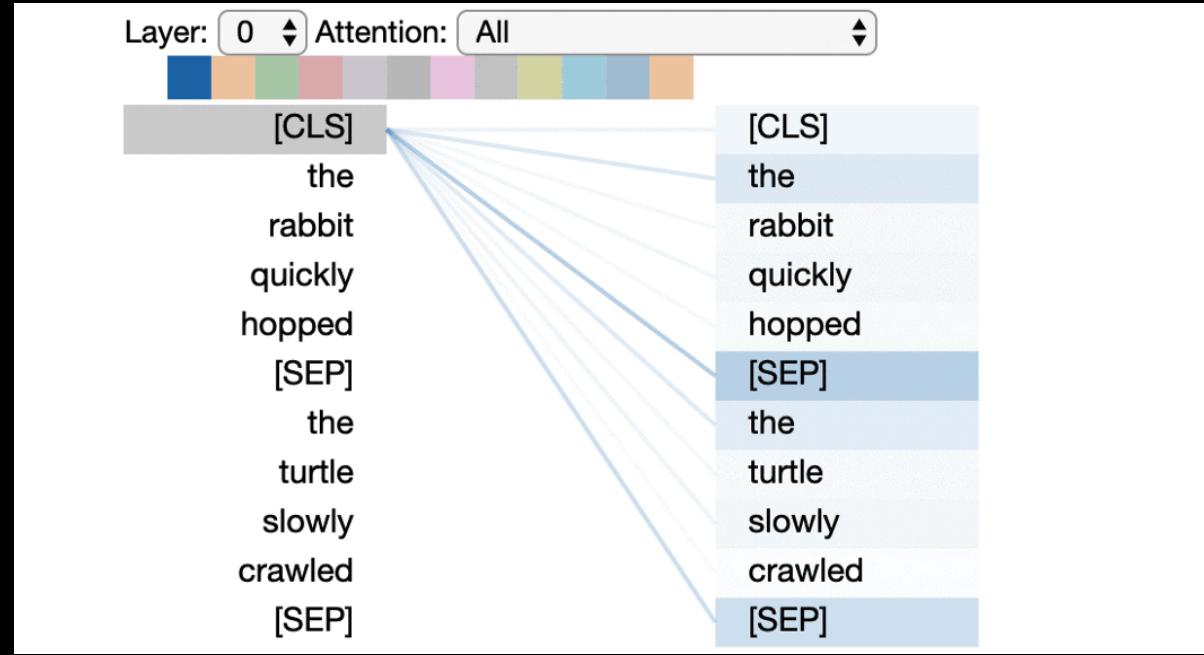
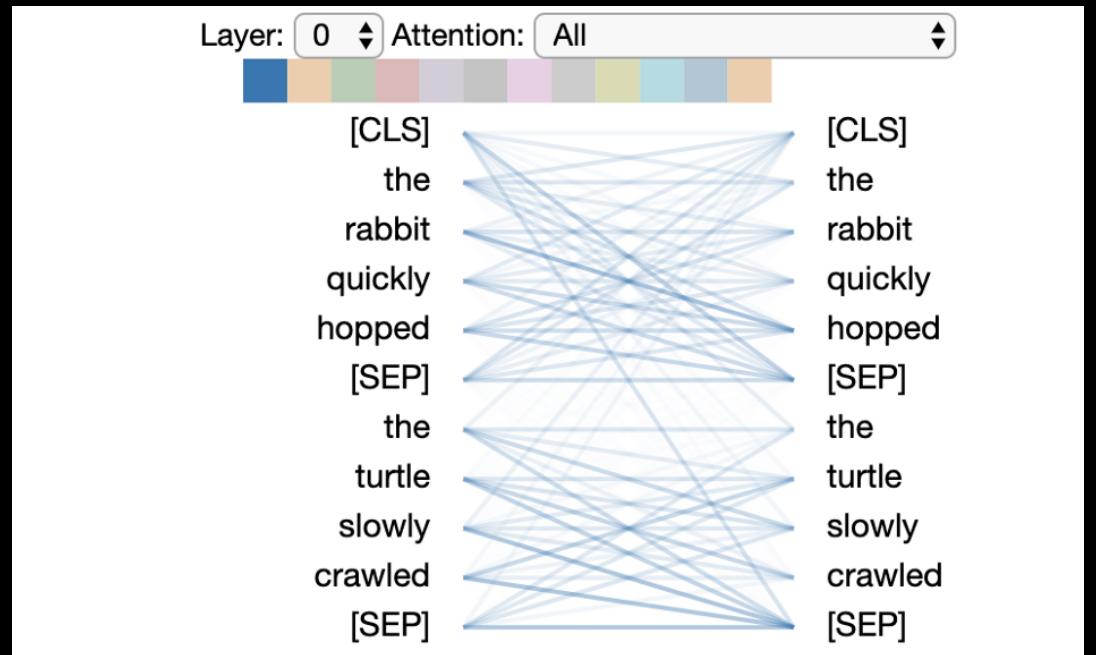
TextBlob and VADER: How they work?



Lexicon based: Each sentiment-related words have values assigned to them, and the sum of these values determine **the overall sentiment**

*The main difference between VADER and TextBlob is that VADER handles punctuations and emojis differently.

BERT: How it works?



The model learns how each word is used relatively to other words used in a text. So it is able to understand the context as well. It is a very popular and powerful model.