

Roku User Review Analysis:

Does product upgrade improve user experience?

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Problem Analysis

1. What is Roku?

- A digital media player
- Stream media content from the internet to TV
- The first Roku model was developed in collaboration with Netflix.

1. Project Objective

- Identify what users like and dislike about their Roku product
- Offer suggestions for the next product development.

1. Methodology

- We investigate the sentiment of Roku users for each upgraded version: **OS 9.4, OS 10, and OS 10.5:**
- Visualization: Word Cloud
- LDA topic modeling
- Sentiment analysis
- Text analysis





Data Preparation

1. Twitter Data

- Used **Twitter API platform** to obtain tweets
- Filtered location to the **US**
- Obtained around **1K tweets** for each OS version

1. Amazon Data

- Used **Rainforest API** to extract user comments
- Time: Sep, 2020 ~ Feb, 2022
- Mean Number of Words per Reviews: **65**

1. Data Cleaning

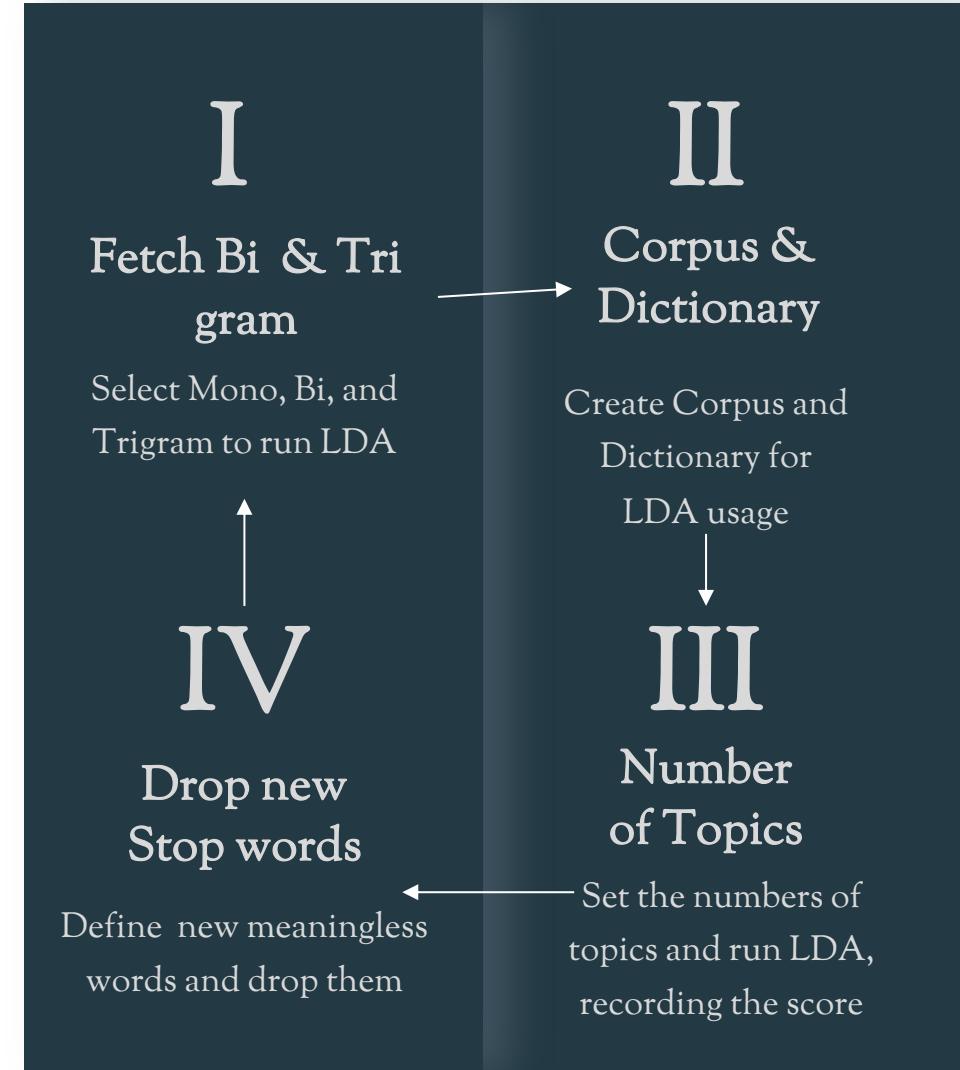
- Deleting special character and numbers
- Limit the length of comments
- Excluding stopwords & Non-English words
- Stemming
- **Combining Twitter and Amazon**





NLP Approaches I: LDA Topic Modeling

- **What is LDA?** Finding latent topics by calculating how far each words are with each other. Closer words form a topic.
- **Goal:** To maximize CV coherence score while keeping the topics interpretable.
- **Measurement:** CV coherence score
- **Limitations:**
 - 1. CV coherence score might not be a robust measure
 - 2. Twitter not dropping potential advertisement
 - 3. Optimization



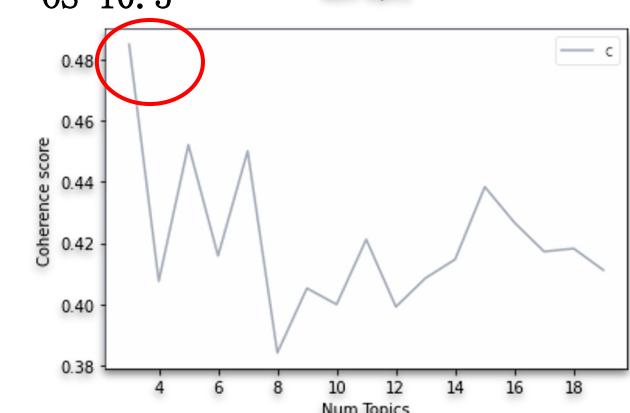
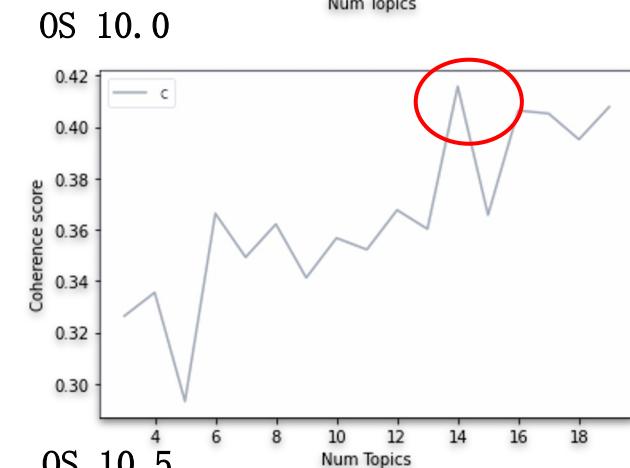
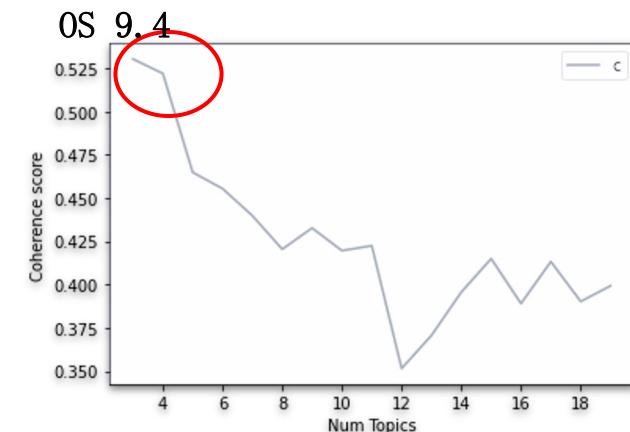
- LDA Result:

Coherence Score Table

	Amazon	Twitter	Combined
OS 9.4	0.3128 (# topics= 4)	0.3027 (# topics= 3)	0.5225 (# topics= 3)
OS 10.0	0.3215 (# topics= 14)	0.3191 (# topics= 12)	0.3593 (# topics= 14)
OS 10.5	0.4052 (# topics= 5)	0.2743 (# topics= 5)	0.4319 (# topics= 3)

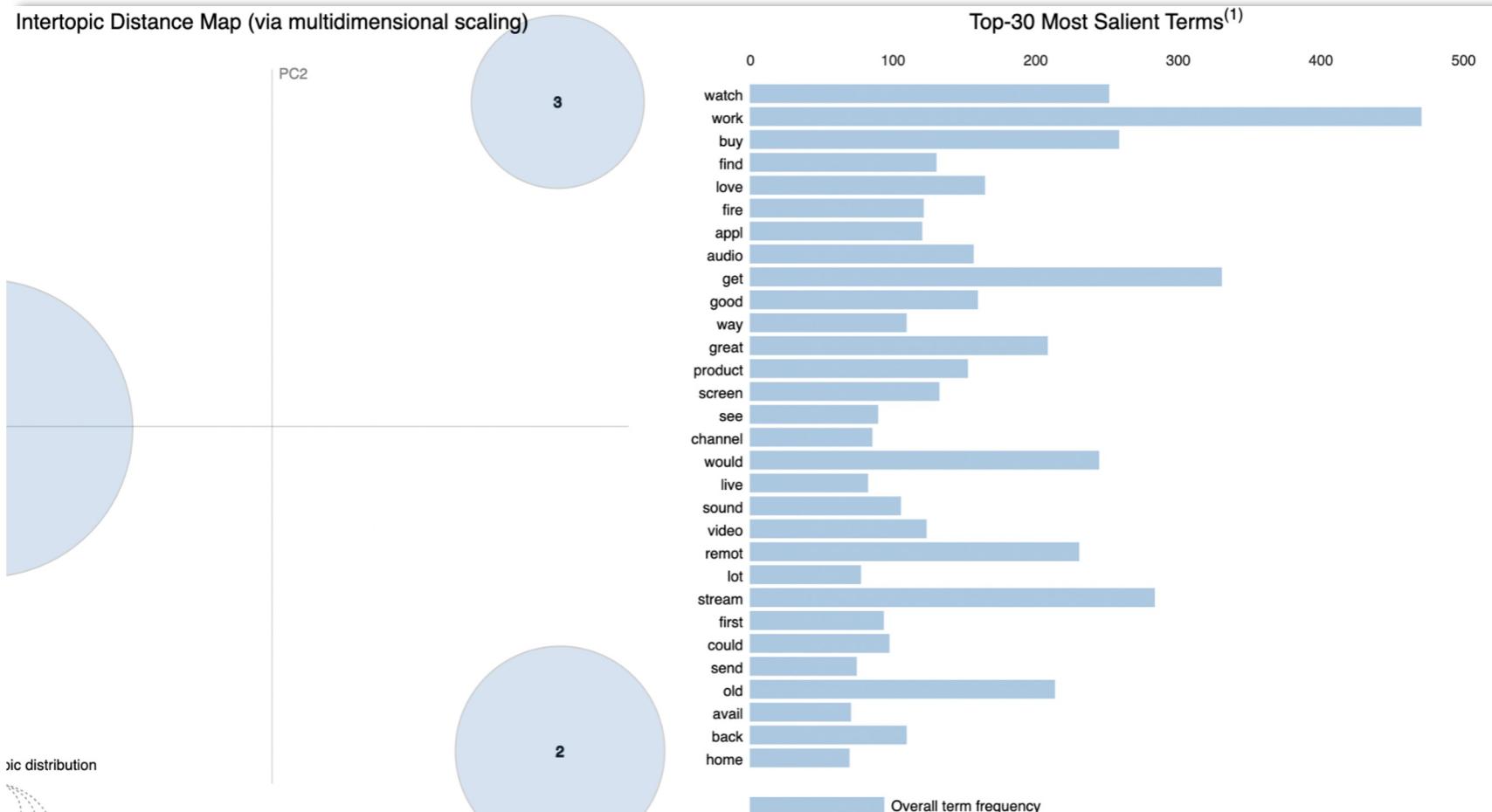
Combined Dataset Topics

	OS 9.4	OS 10.0	OS 10.5
T1	stream/pictur/support/atmo	watch/stream/channel/live	watch/steam/channel/live
T2	remot/stream/replac/unit	get/remot/love/stream	remot/great/day/good
T3	app/remot/watch/fire	work/like/remot/app	stream/devic/connect/issu
T4		work/stream/get/remot	
T5		remot/stream/watch/apl	



- Intertopic Distance Interactive Map and Top 30 Salient Terms

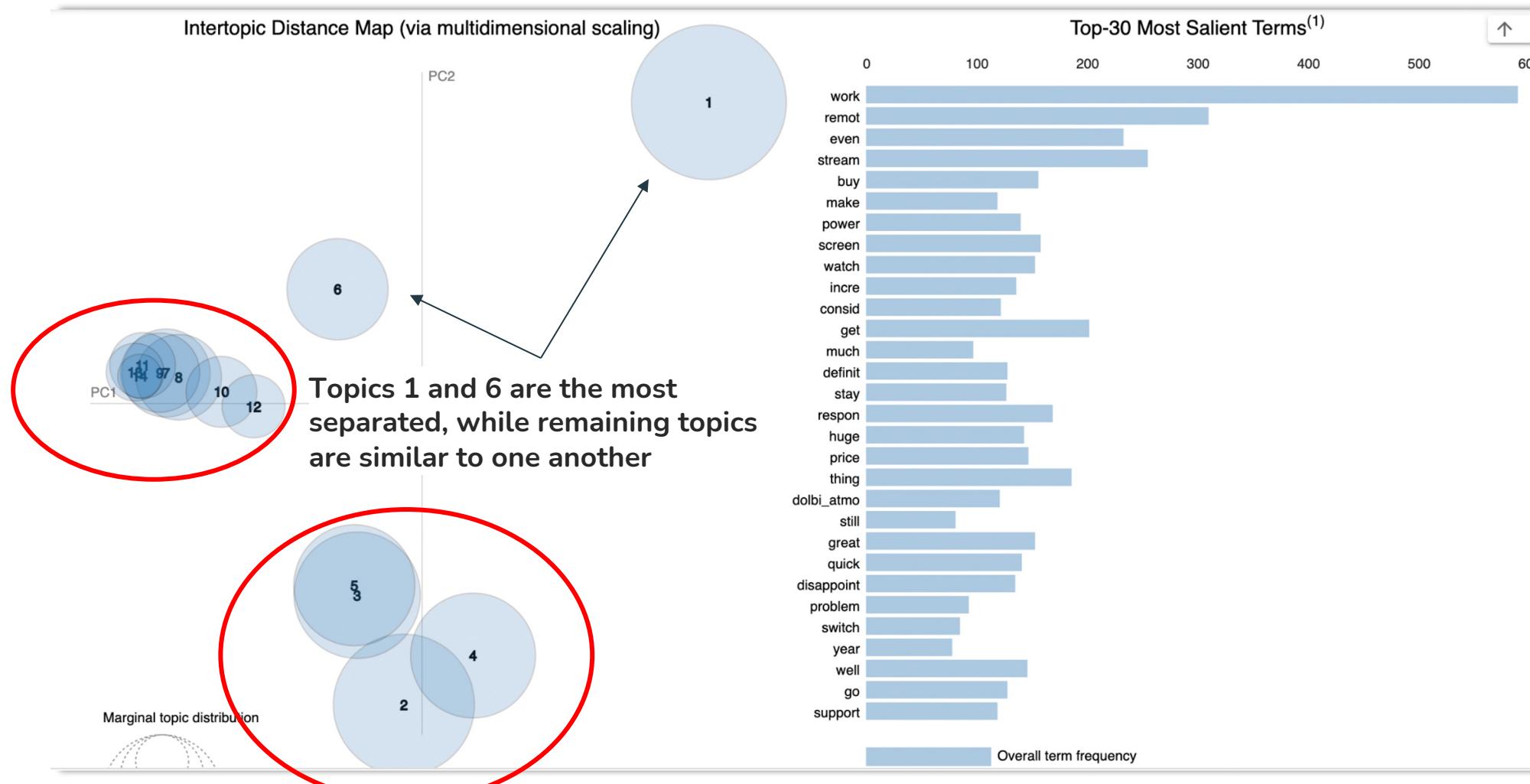
OS 9.4 :



- “pyLDAvis” is a python library for interactive topic model visualization.
- pyLDAvis shows the following:
 - 1) **Distance between topics**, as a map in 2D plane.
 - 2) **Variance** in the topic-word distribution, as the size of a circle in this map.
 - 3) **the most salient terms** in each topic.

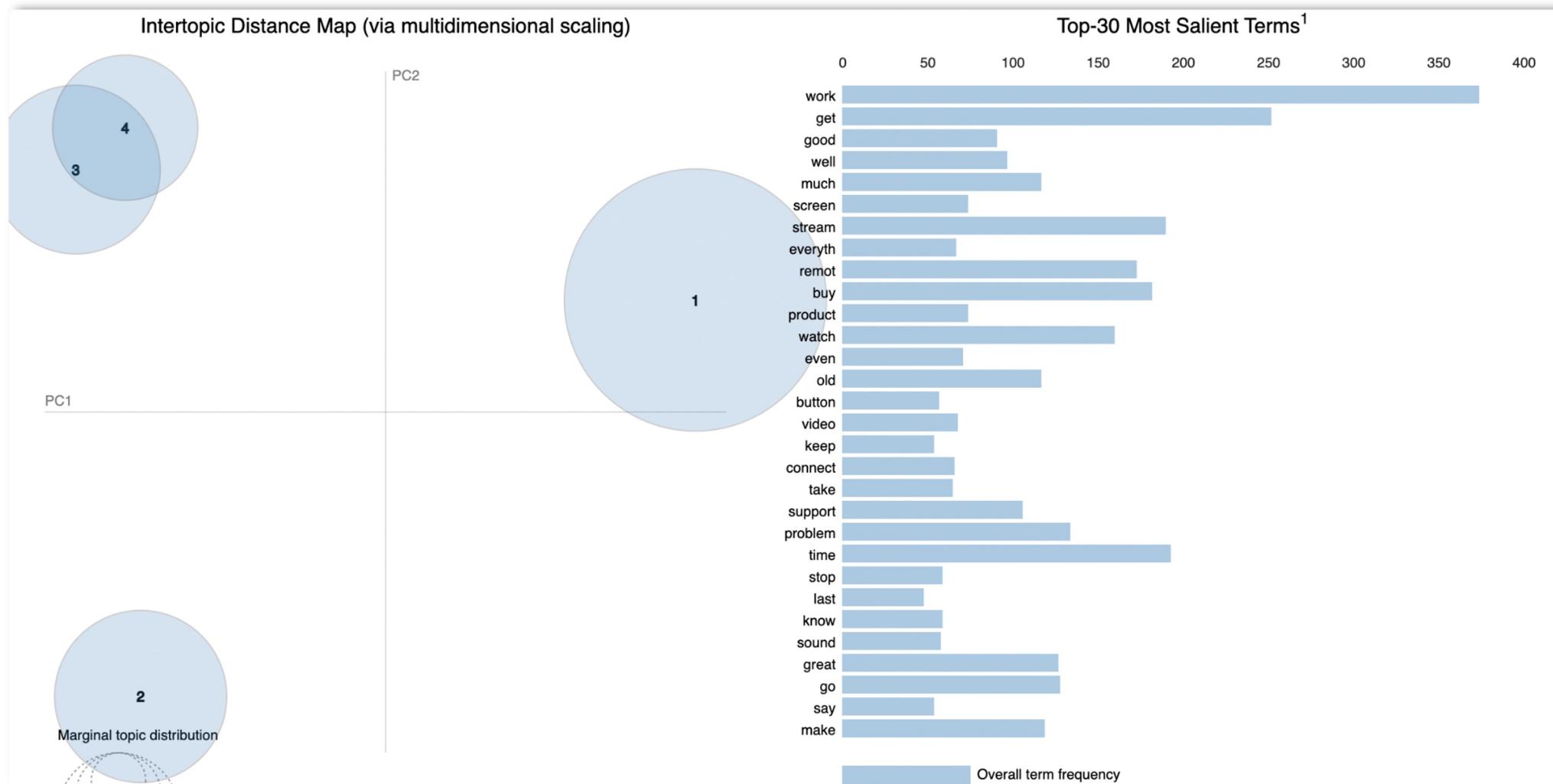
- Intertopic Distance Interactive Map and Top 30 Salient Terms

OS 10.0 :



- Intertopic Distance Interactive Map and Top 30 Salient Terms

OS 10.5 :





NLP Approaches II

Word Cloud Visualizations

- Used Python inbuilt library to generate word cloud
- Cleaned the dataset by filtering non-English words, removing URLs, and removing stop words
- Frequent words are with bigger and bolder letters

Results:

- Overall, similar patterns of frequent words shown for both tweets and amazon reviews.
- More brand names (ie. apple, amazon, google, etc) appeared in tweets than in Amazon reviews.

OS 9.4

Tweets Word Cloud



OS 10.0



OS 10.5



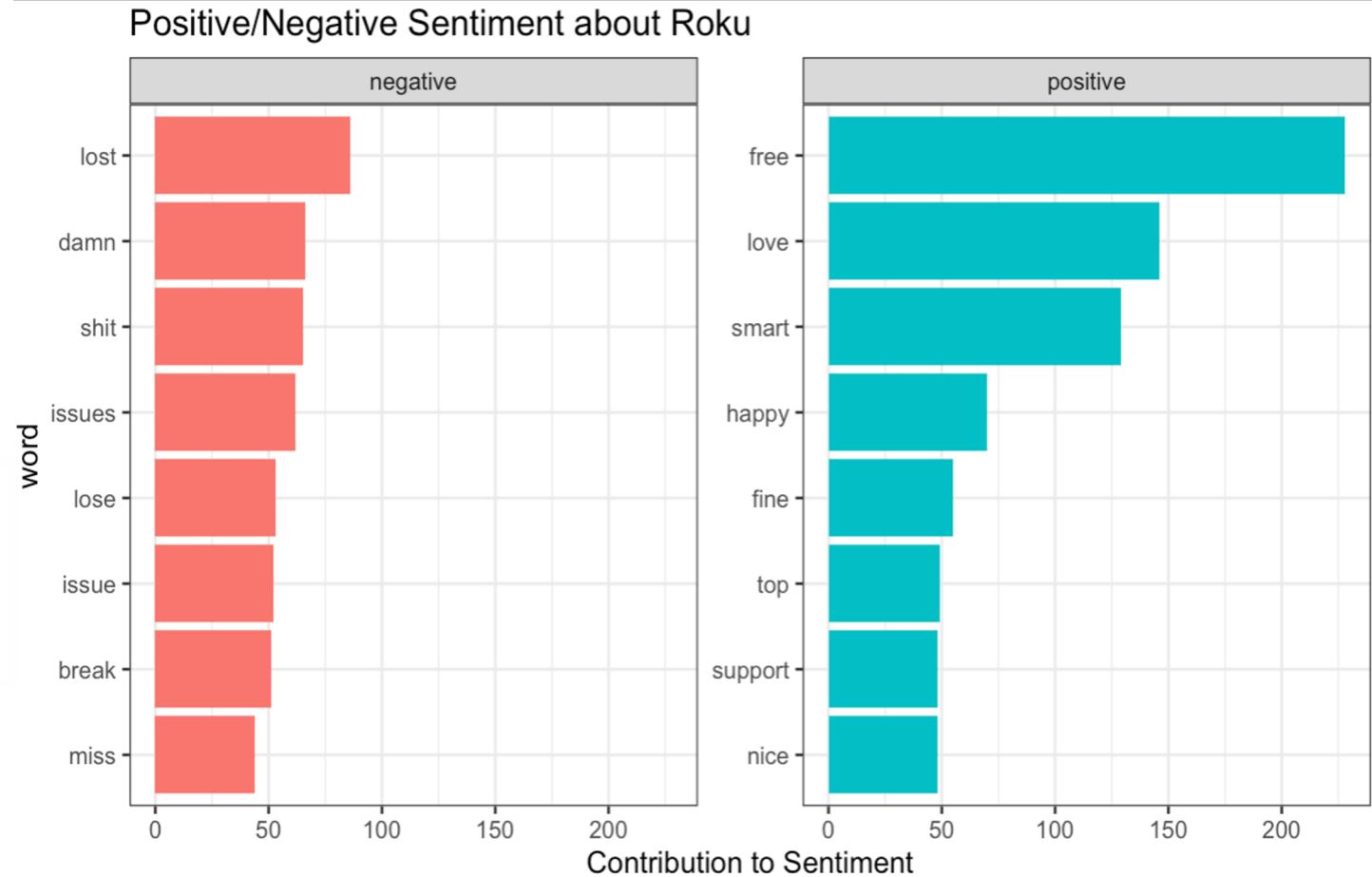
Amazon Reviews Word Cloud



- Global Positive and Negative Sentiments on Roku

* Global Sentiment Analysis on combined data (tweets and Amazon reviews) of three Roku OS versions all together

According to the analysis, it seems that the majority of consumers think positively about Roku products.





NLP Approaches III

Sentiment Proofreading

Method:

- For our sentiment analysis we used ***Hu and Bing 2004 dictionary***
- With each update we studied the change in sentiment score to identify a trend in the change in sentiment score over the 3 updates
- Also studied the association between certain keywords and changes in sentiment
- Implemented **ANOVA test** to see if the changes we observed were due to chance



- Sentiment Result

- Results showed that each update resulted in a decrease in the sentiment score.
- Anova test results showed a p-value of <0.05 for each score indicating that the results were statistically significant.
- Certain keywords such as “connect” and “battery” surfaced in LDA
 - We postulated that the reviews containing these keywords were more likely to be negative reviews.
 - We ran sentiment analysis which confirmed our hypothesis that these keywords were associated with negative reviews since the presence of these keywords in a review often resulted in a lower sentiment score.

Sentiment Change Over Updates

	Amazon	Twitter	Combined
OS 9.4	0.5532	0.4282	0.4705
OS 10	0.5504	0.3934	0.4542
OS 10.5	0.4742	0.3829	0.4103
p-value	0.01	0.02	0.01

alpha=0.05, two-tailed

Keyword sentiment

review with “connect”	review without “connect”
0.4210	0.4890

review with “battery”	review without “battery”
0.3581	0.4857



Result Interpretation

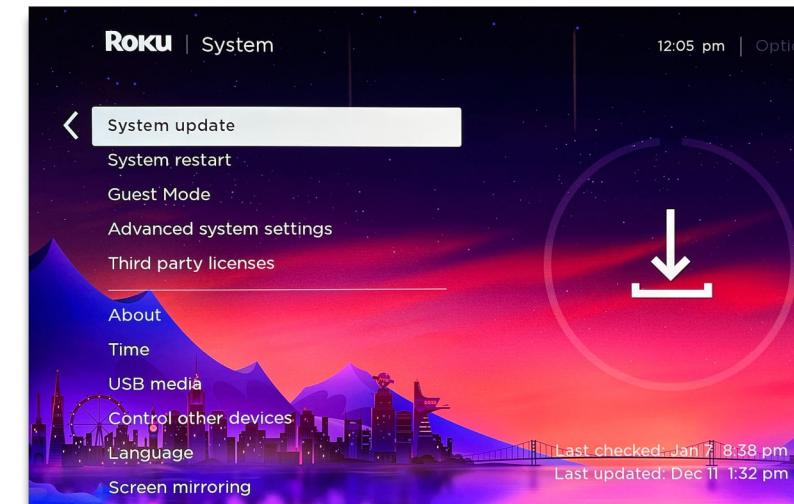
- Common features with frequently update

Version	Amazon	Twitter	Combined
OS 9.4	<ul style="list-style-type: none">Roku device with their voice remotely using the Home app and Siri on iPhone, iPad, Mac, Apple Watch, or HomePod	<ul style="list-style-type: none">All Roku devices provide easy access to watch free TV, live news, sports, movies, and more.	<ul style="list-style-type: none">Not Founded
OS 10.0	<ul style="list-style-type: none">Live TV offers easy access to cable alternatives, including Hulu + Live TV, fuboTV, Philo, Sling, and YouTube TV	<ul style="list-style-type: none">All Roku devices provide easy access to watch free TV, live news, sports, movies, and more	<ul style="list-style-type: none">Not Founded
OS 10.5	<ul style="list-style-type: none">The Home tab provides easy access to the latest entertainment and channels, and offers a new way to explore Zones	<ul style="list-style-type: none">More access to streaming live TV (U.S.)	<ul style="list-style-type: none">Roku TV users have quick and easy access to live TVRoku Voice Remote Pro owners will also get tips on using hands-free voice



- System and Hardware Connection Upgrade

Version	Amazon	Twitter	Combined
OS 9.4	<ul style="list-style-type: none">Many people have the issue of the remote doesn't work even if they reset the device, so they have to open the app to control ROKU, which is annoying	<ul style="list-style-type: none">Roku TVs let you access free live broadcast TV using your home's antenna	<ul style="list-style-type: none">Often compared with apple TV
OS 10.0	<ul style="list-style-type: none">The earbud option of the remote uses up battery really quick	<ul style="list-style-type: none">Not Founded	<ul style="list-style-type: none">Not Founded
OS 10.5	<ul style="list-style-type: none">Roku able to combined in many ways to best suit your home setup speaker	<ul style="list-style-type: none">Improvements to the Roku mobile appUsers will experience faster channel launch.	<ul style="list-style-type: none">Not Founded



- New features and contents

Version	Amazon	Twitter	Combined
OS 9.4	<ul style="list-style-type: none"> Often compared with fire TV stick 	<ul style="list-style-type: none"> Often compared with fire TV stick 	<ul style="list-style-type: none"> Often compared with fire TV stick
OS 10.0	<ul style="list-style-type: none"> Support better Wifi connection Rich and immersive sound experience with the new Virtual Surround setting 	<ul style="list-style-type: none"> Consumer Bought it to watch the nanny Join the club to watch a show 	<ul style="list-style-type: none"> Not Founded
OS 10.5	<ul style="list-style-type: none"> Automatic Wi-Fi® network detection technology ensure smooth streaming experiences for Roku users Brings exciting new interactive features, full surround sound capability 	<ul style="list-style-type: none"> Live TV also offers easy access to cable alternatives, including Hulu + Live TV, fuboTV, Philo, Sling, and YouTube TV 	<ul style="list-style-type: none"> Not Founded



Conclusion

- 1) Our finding is parallel with our assumption that Roku's frequent software update contributed to enhanced user experience.
 - While there were negative sentiments expressed by users concerning "issues", "break", "miss", the overall user experience seemed very positive.
 - According to our sentiment analysis, while each OS update resulted in a decrease in the sentiment score, the overall score was positive, which again confirms our assumption that software update contributes to enhanced user experience.
- 1) According to the amazon reviews analysis, the keys for Roku's success can be attributed to:
 - Easy access to different cable alternatives and shows
 - Automatic switch wifi to provide better streaming experiences
 - Voice control functions and good sound system experience
- 1) We observed that there are unresolved issues with Roku software; in the reviews, people complained about the remote control not working even when they reset the device, and about the short-lived battery for the remote earbuds option.

Recommendation

We recommend the company to apply the NLP process for:

Sentiment Monitoring

Social Feedback

Precise Advertising

A general idea on how the customers/netizen's sentiment fluctuate

A pre-stage understanding about bugs or features that customers like before digging into each comments manually

Precisely put advertisements targeting features that a platform care more about

