

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.

2. Project Objective

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

3. 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

2. Amazon Data

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

3. Data Cleaning

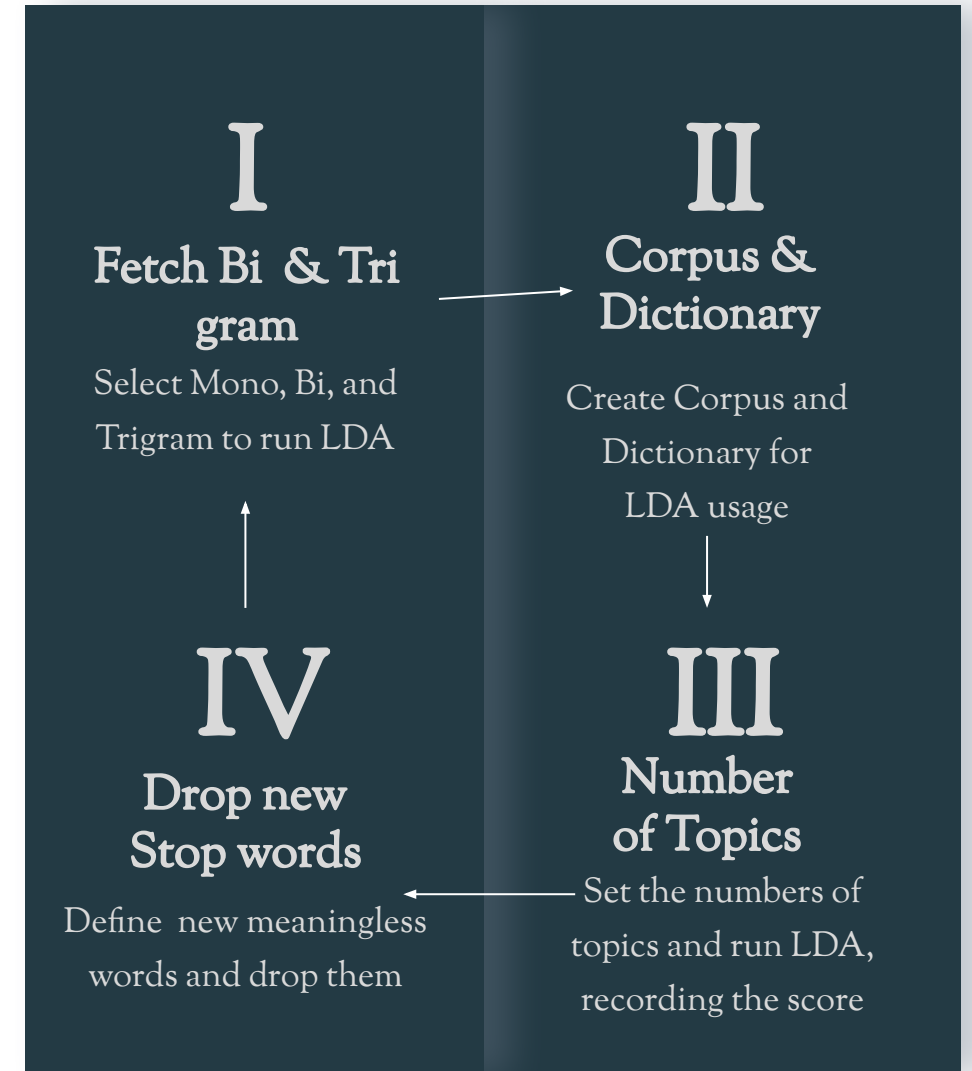
- Deleting special character and numbers
- Limit the length of comments
- Excluding stopwords & Non-English words
- Stemming
- **Combining Twitter and Amazon**





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:

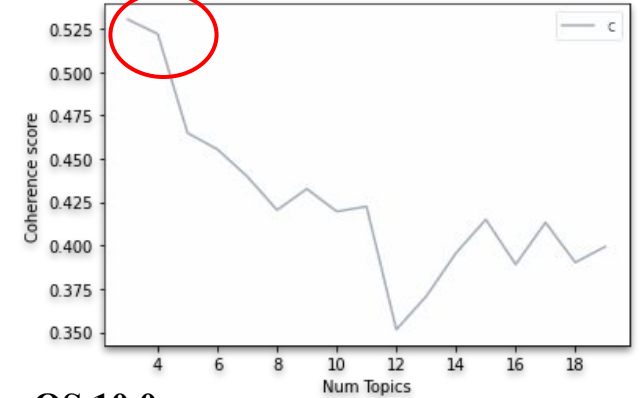
Coherence Score Table

	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)

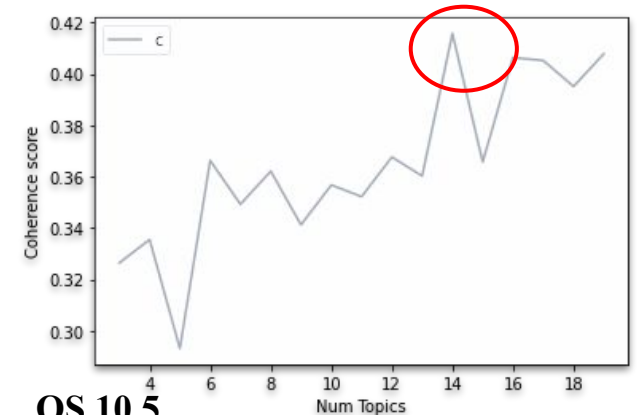
Combined Dataset Topics

	OS 9.4	OS 10.0	OS 10.5
T1	stream/pictur/support/atmo	watch/stream/channel/li ve	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	

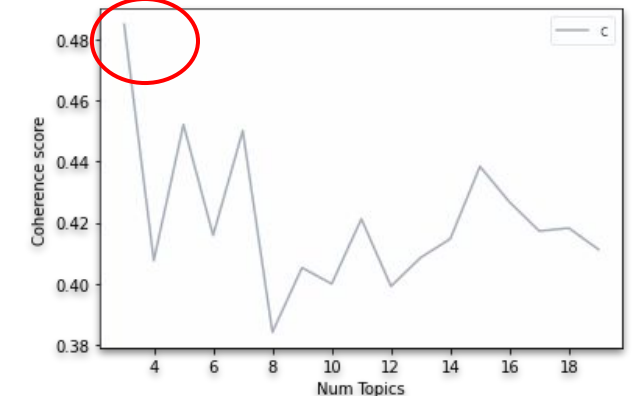
OS 9.4



OS 10.0

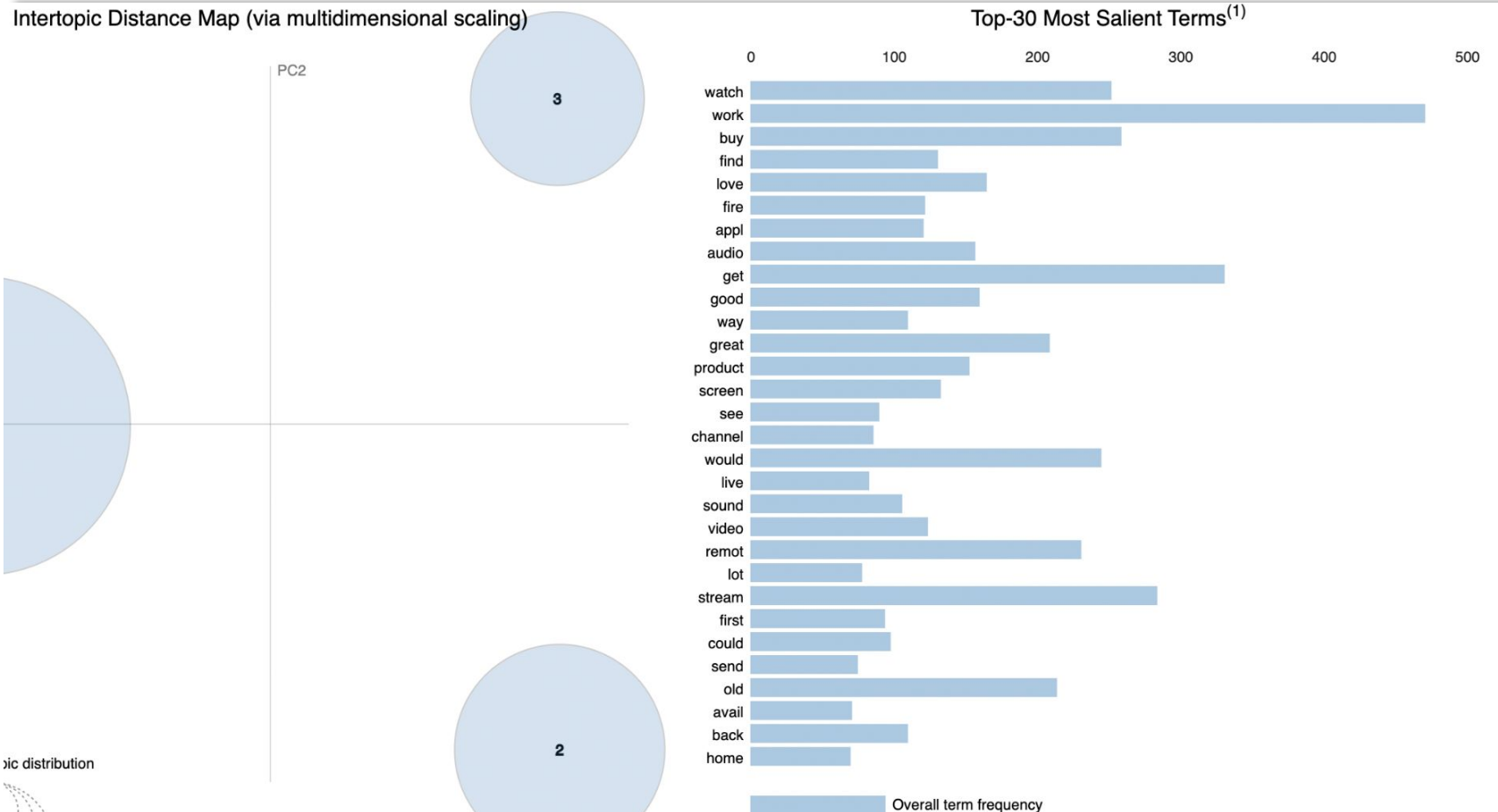


OS 10.5



- Intertopic Distance Interactive Map and Top 30 Salient Terms

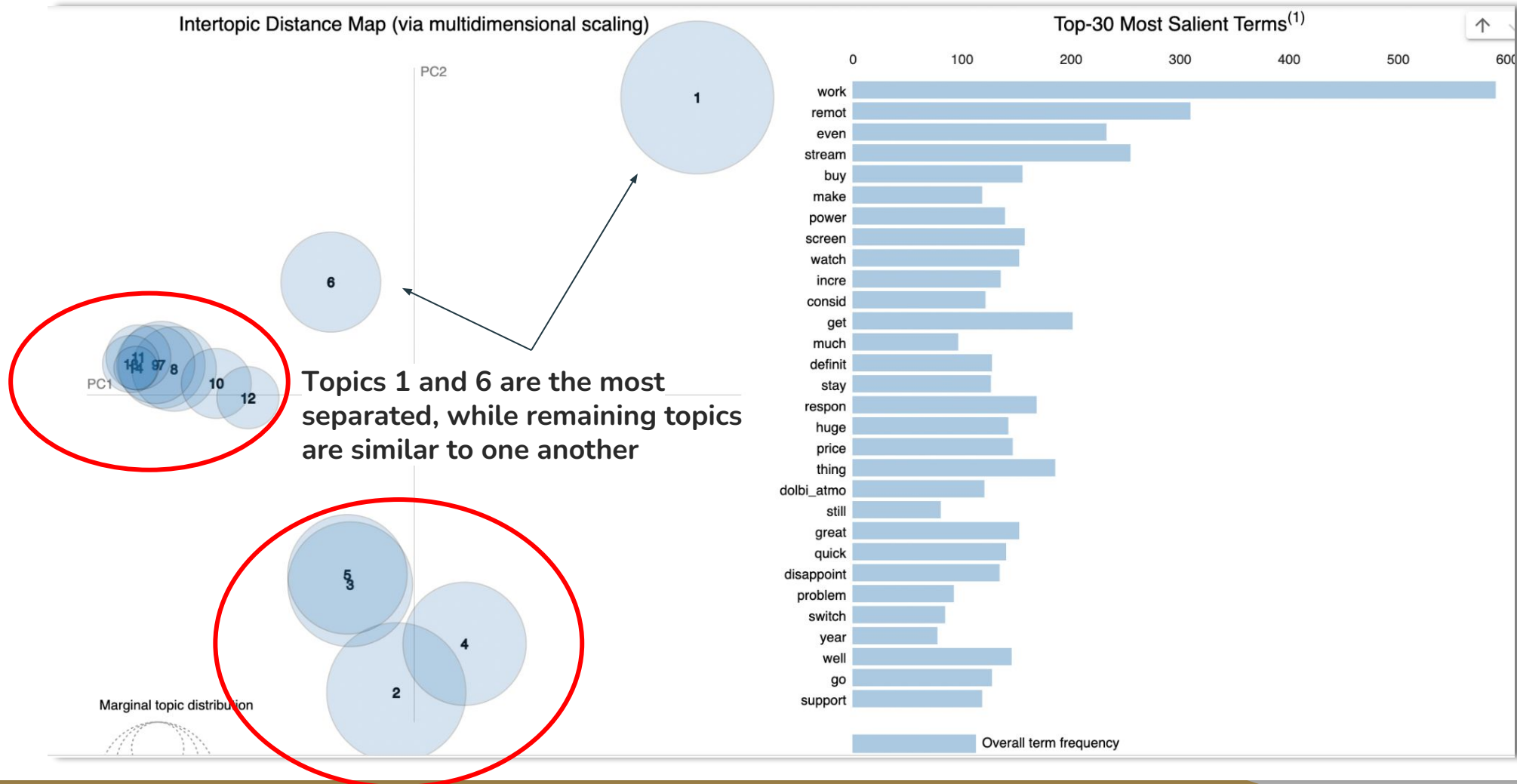
OS 9.4 :



- “**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.

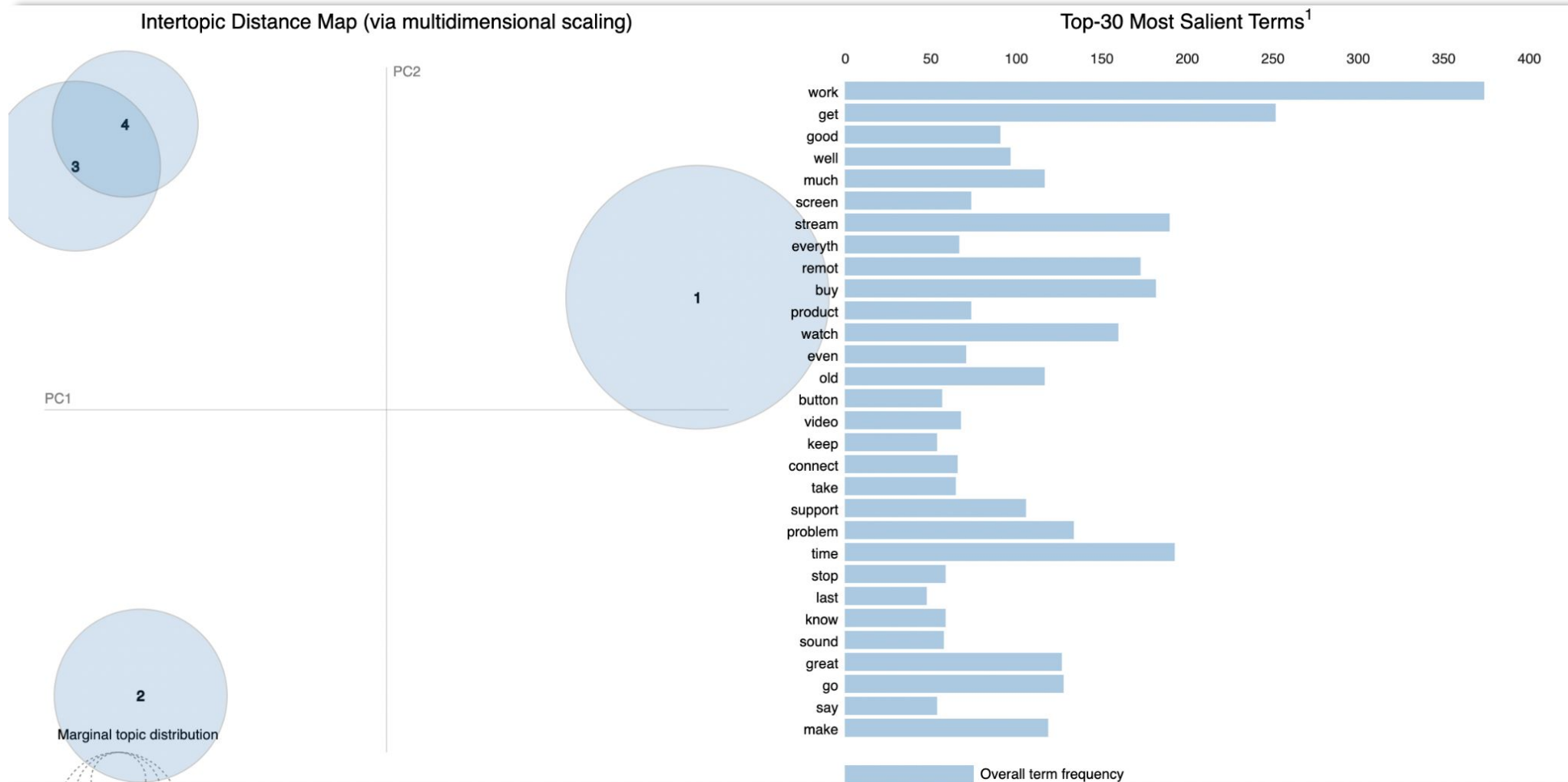
- Intertopic Distance Interactive Map and Top 30 Salient Terms

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.

Tweets Word Cloud



OS 9.4

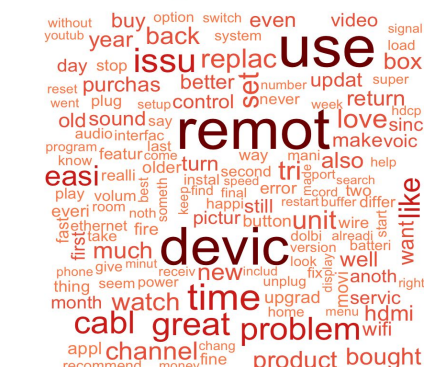


OS 10.0



OS 10.5

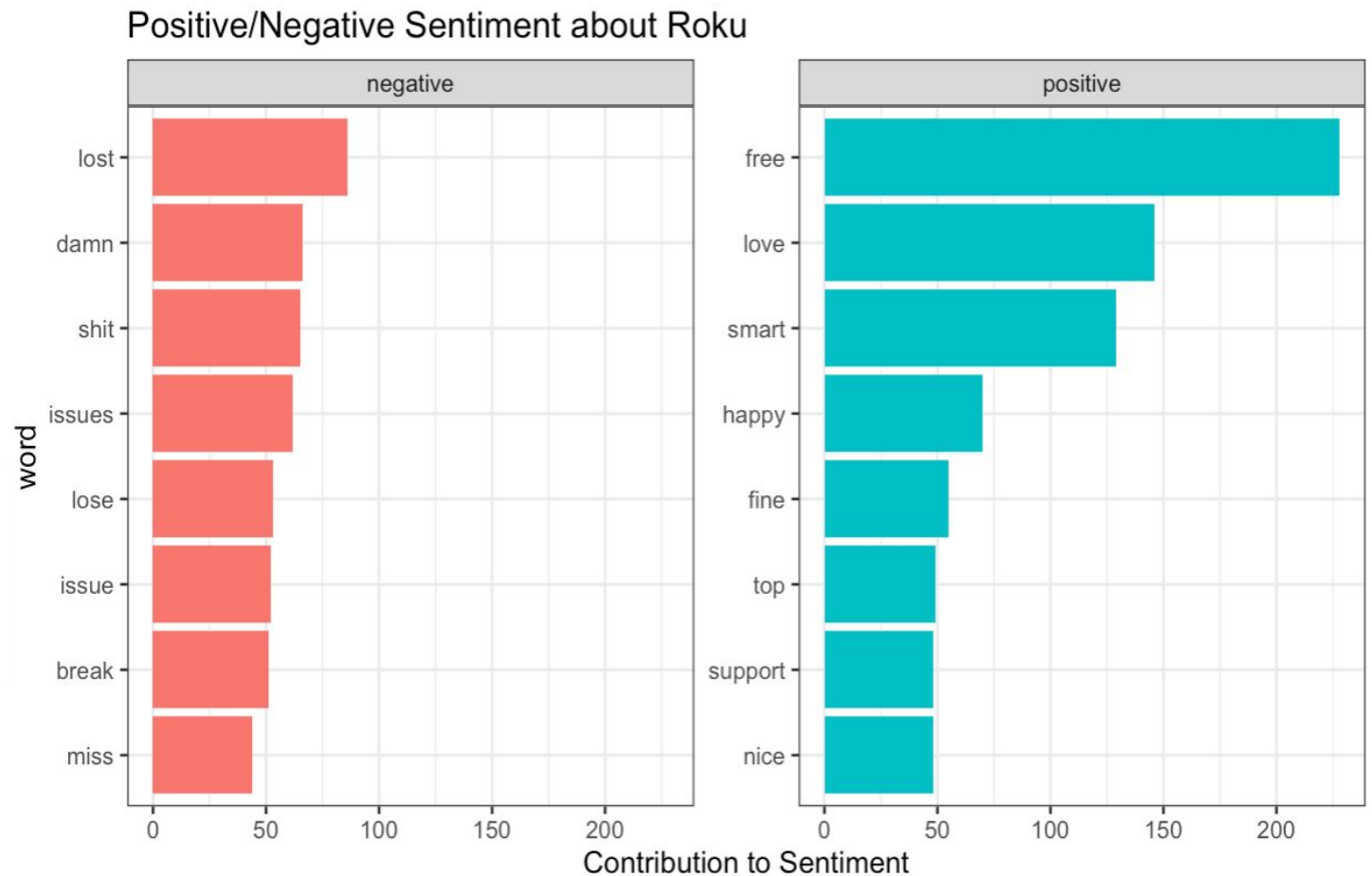
Amazon Reviews Word Cloud



- 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 “ <i>connect</i> ”	review without “ <i>connect</i> ”
0.4210	0.4890

review with “ <i>battery</i> ”	review without “ <i>battery</i> ”
0.3581	0.4857



Result Interpretation

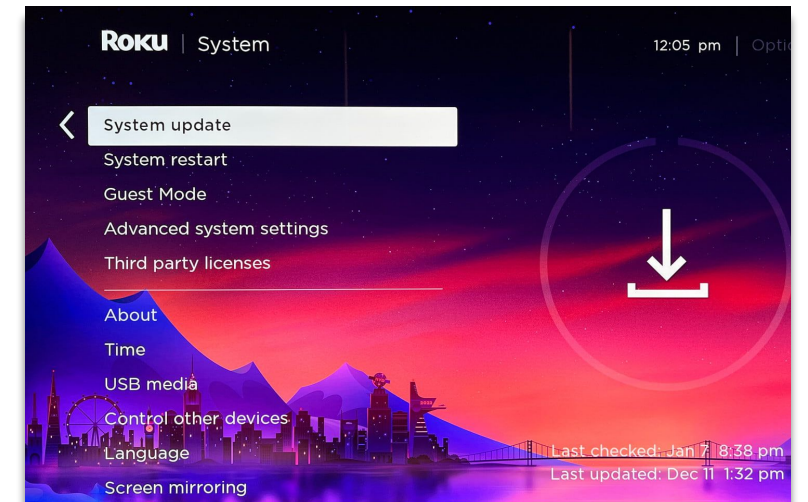
- Common features with frequently update

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 app Users 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

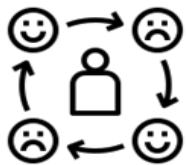
- 1) Our finding is parallel with our assumption that Roku's frequent software update contributed to enhanced user experience.
 - While there were negative sentiments expressed by users concerning "issues", "break", "miss", the overall user experience seemed very positive.
 - According to our sentiment 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.
- 2) 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
- 3) 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

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



Social
Feedback

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



Precise
Advertising

Precisely put advertisements targeting features that a platform care more about

