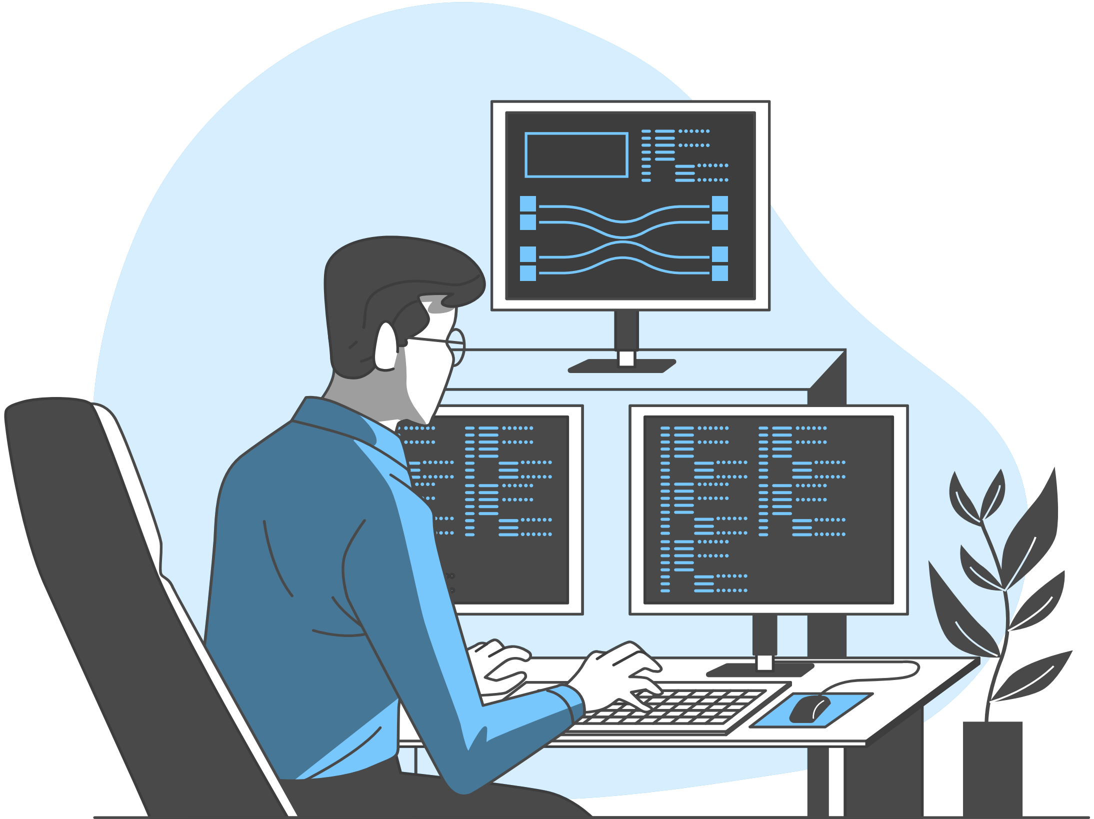


Subreddit Classification

Group 1:
Huimin, Ramkumar,
Rahayu, Shi Min, Eric

Context

Who are we?

We are a team of Data Analysts in a Tech Magazine Firm

Audience

Editor-in-chief and technology journalists

Agenda

01 Problem Statement

02 Data Scraping

03 Data Filtering

04 Exploratory Data Analysis

05 Modelling & Interpretations

06 Conclusion

01. Problem Statement

01. Problem Statement

Editor-in-chief wants to come up with a big year-end story on "Brand Dominance between Samsung and Apple"

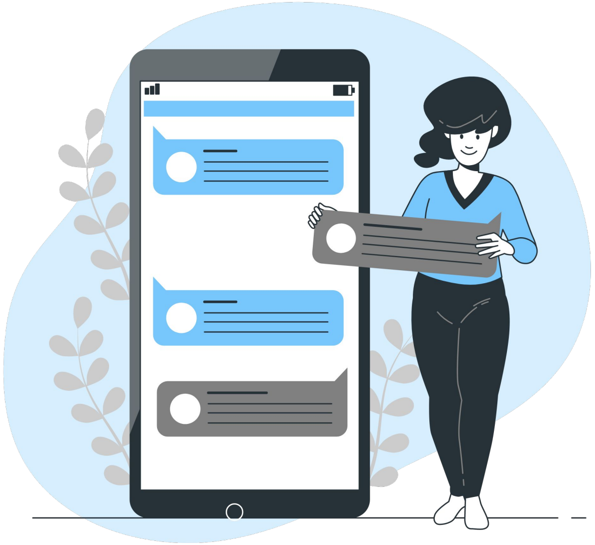
TECH TALK

Brand Dominance between Samsung and Apple

Technology Journalists need a quick sense of the online chatters on Samsung and Apple

Data Analysts will develop a text classifier that is capable of distinguishing whether an online post is about Samsung or Apple and derive meaningful insights

How will a Successful Model look like?



Fairly Accurate

At least 80% accuracy and minimally better than baseline of about 50% accuracy in classifying a post

Little Overfitting

Difference between train and test accuracy is < 5%

Interpretable

Able to identify common features that distinguish each class of post

02. Data Scraping

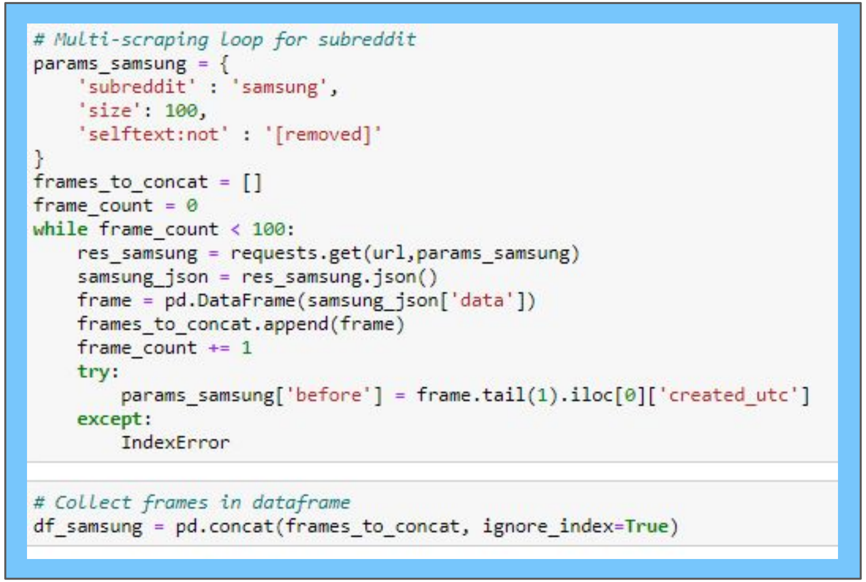
02. Data Scraping

reddit

Data acquisition

Data was scraped from the two subreddits (r/Apple and r/Samsung) using Pushshift's API and selecting **https://api.pushshift.io/reddit/search/submissions/** endpoint.

Example of a function created for scraping data:

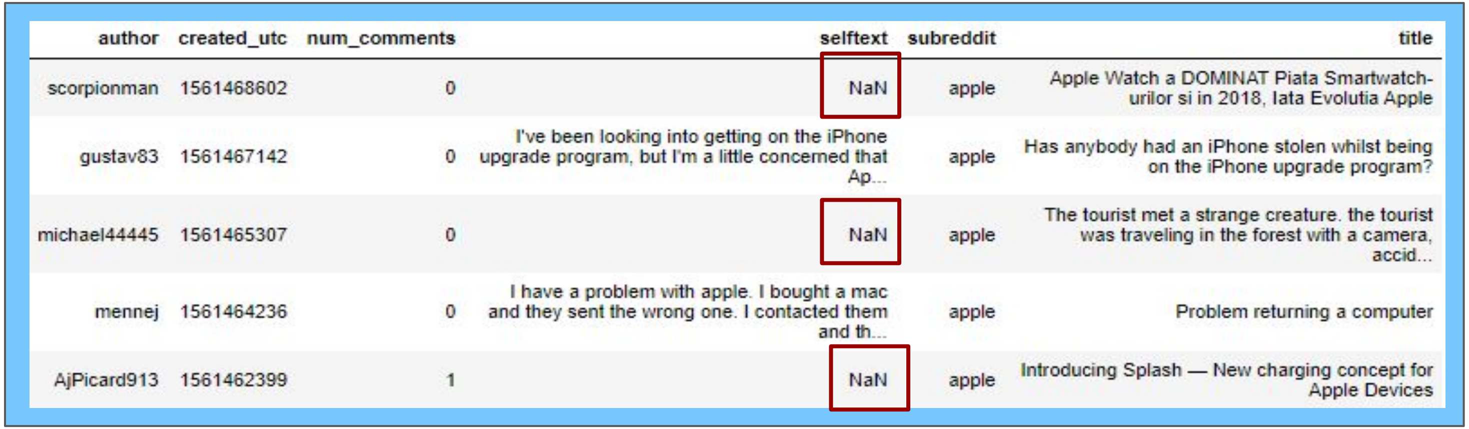


```
# Multi-scraping loop for subreddit
params_samsung = {
    'subreddit' : 'samsung',
    'size': 100,
    'selftext:not' : '[removed]'
}
frames_to_concat = []
frame_count = 0
while frame_count < 100:
    res_samsung = requests.get(url,params_samsung)
    samsung_json = res_samsung.json()
    frame = pd.DataFrame(samsung_json['data'])
    frames_to_concat.append(frame)
    frame_count += 1
    try:
        params_samsung['before'] = frame.tail(1).iloc[0]['created_utc']
    except:
        IndexError
```

```
# Collect frames in dataframe
df_samsung = pd.concat(frames_to_concat, ignore_index=True)
```

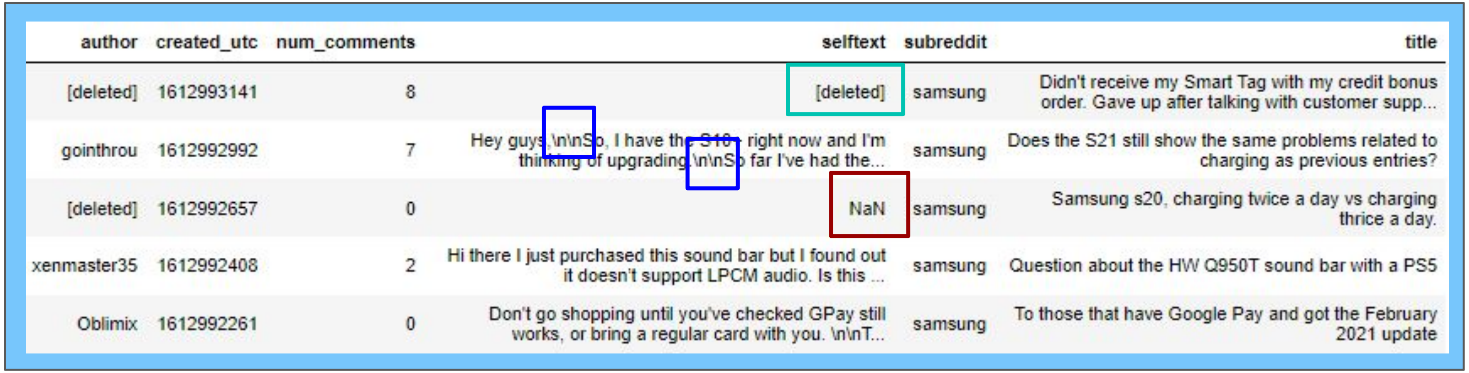
Examples of Data Scraped

From
r/Apple :



author	created_utc	num_comments	selftext	subreddit	title
scorpionman	1561468602	0	NaN	apple	Apple Watch a DOMINAT Piata Smartwatch-urilor si in 2018, Iata Evolutia Apple
gustav83	1561467142	0	I've been looking into getting on the iPhone upgrade program, but I'm a little concerned that Ap...	apple	Has anybody had an iPhone stolen whilst being on the iPhone upgrade program?
michael44445	1561465307	0	NaN	apple	The tourist met a strange creature. the tourist was traveling in the forest with a camera, accid...
mennej	1561464236	0	I have a problem with apple. I bought a mac and they sent the wrong one. I contacted them and th...	apple	Problem returning a computer
AjPicard913	1561462399	1	NaN	apple	Introducing Splash — New charging concept for Apple Devices

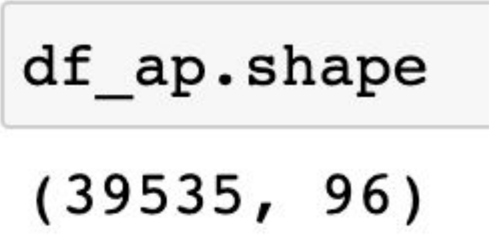
From
r/Samsung :



author	created_utc	num_comments	selftext	subreddit	title
[deleted]	1612993141	8	[deleted]	samsung	Didn't receive my Smart Tag with my credit bonus order. Gave up after talking with customer supp...
gointhrou	1612992992	7	Hey guys \n\nSo, I have the S10 right now and I'm thinking of upgrading \n\nSo far I've had the...	samsung	Does the S21 still show the same problems related to charging as previous entries?
[deleted]	1612992657	0	NaN	samsung	Samsung s20, charging twice a day vs charging thrice a day.
xenmaster35	1612992408	2	Hi there I just purchased this sound bar but I found out it doesn't support LPCM audio. Is this ...	samsung	Question about the HW Q950T sound bar with a PS5
Oblimix	1612992261	0	Don't go shopping until you've checked GPay still works, or bring a regular card with you. \n\nT...	samsung	To those that have Google Pay and got the February 2021 update

03. Data Filtering

03. Data Filtering

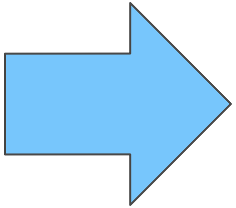


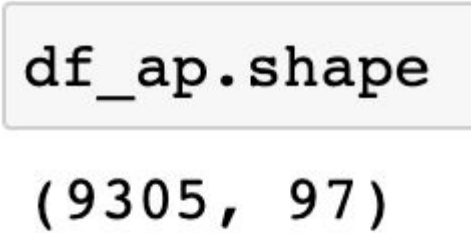
```
df_ap.shape
```

```
(39535, 96)
```

Rows

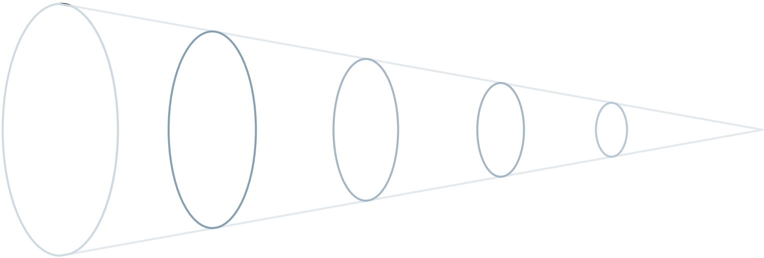
Columns





```
df_ap.shape
```

```
(9305, 97)
```



Filtering the pulled data

Links

Removed

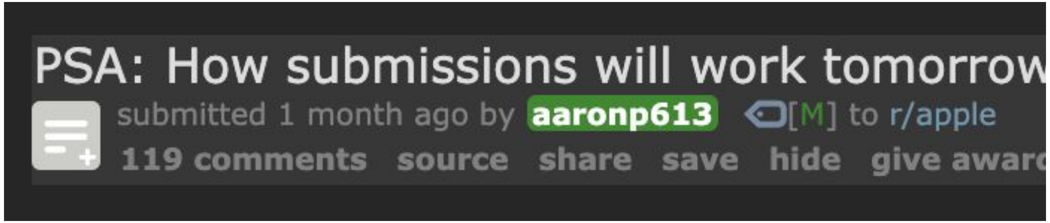
Regex was utilized to remove links

Newline characters

Removed

\n

Found using python string methods



PSA: How submissions will work tomorrow

submitted 1 month ago by aaronp613 [M] to r/apple

119 comments source share save hide give awar

Moderator posts

Removed

Author value counts/

Looking at authors’ flairs

Filtering the pulled data

Null values in ‘selftext’

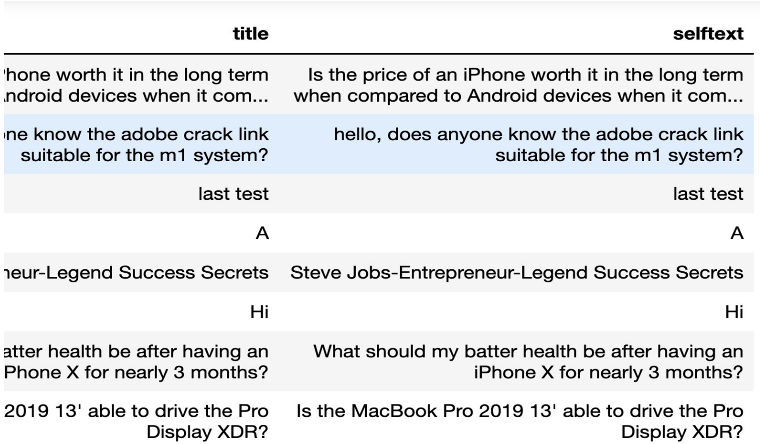
Replaced

Singled out using boolean filtering/ built-in methods

[‘deleted’] as ‘selftext’

Replaced

Conditional filtering



title	selftext
·hone worth it in the long term .ndroid devices when it com...	Is the price of an iPhone worth it in the long term when compared to Android devices when it com...
›ne know the adobe crack link suitable for the m1 system?	hello, does anyone know the adobe crack link suitable for the m1 system?
last test	last test
A	A
ıeur-Legend Success Secrets	Steve Jobs-Entrepreneur-Legend Success Secrets
Hi	Hi
atter health be after having an Phone X for nearly 3 months?	What should my batter health be after having an iPhone X for nearly 3 months?
2019 13' able to drive the Pro Display XDR?	Is the MacBook Pro 2019 13' able to drive the Pro Display XDR?

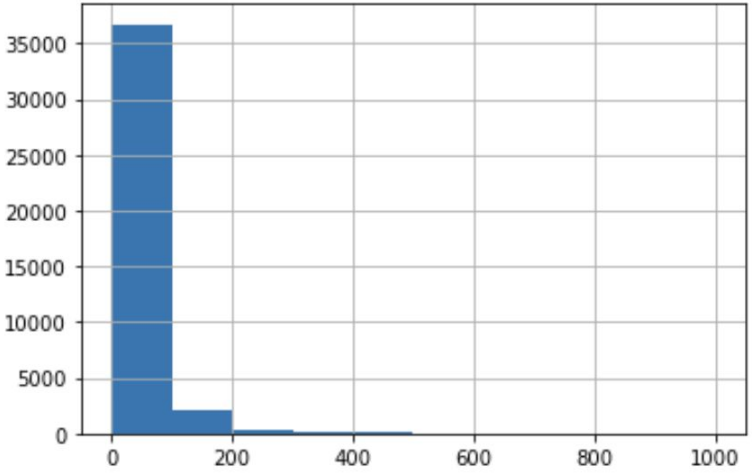
‘selftext’ = ‘title’

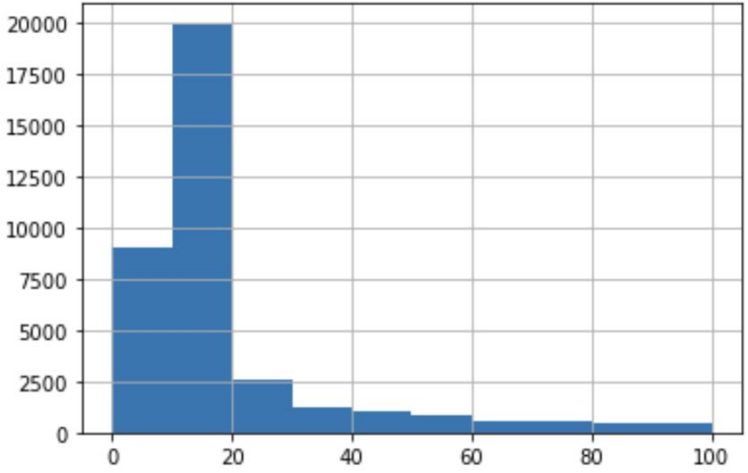
Replaced and later **Removed**

Filtering the pulled data

Number of Words per post in pulled data

(r/Apple)





Filtering and Feature engineering

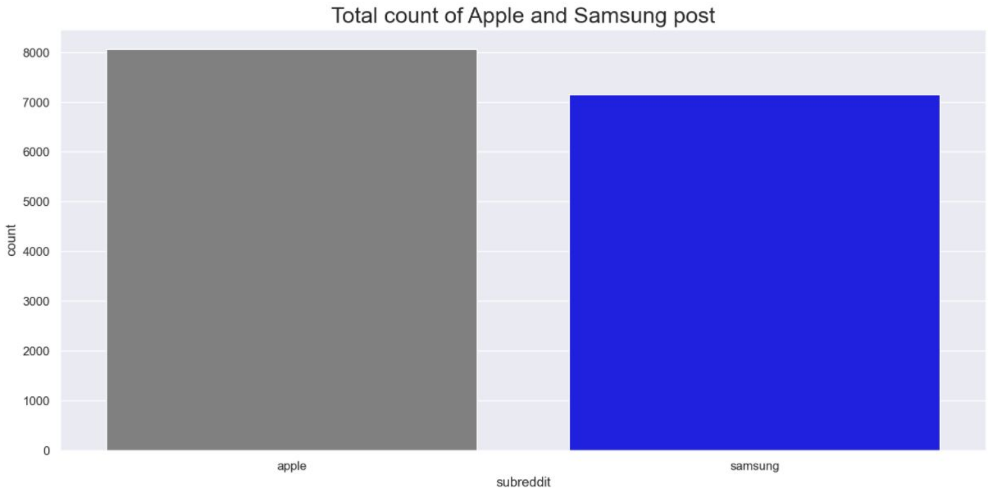
- **Combined the title and selftext**
- Number of words in the combined text
- Average sentence length in general is 15-20
- **Dropped rows with title + selftext having < 20 words**

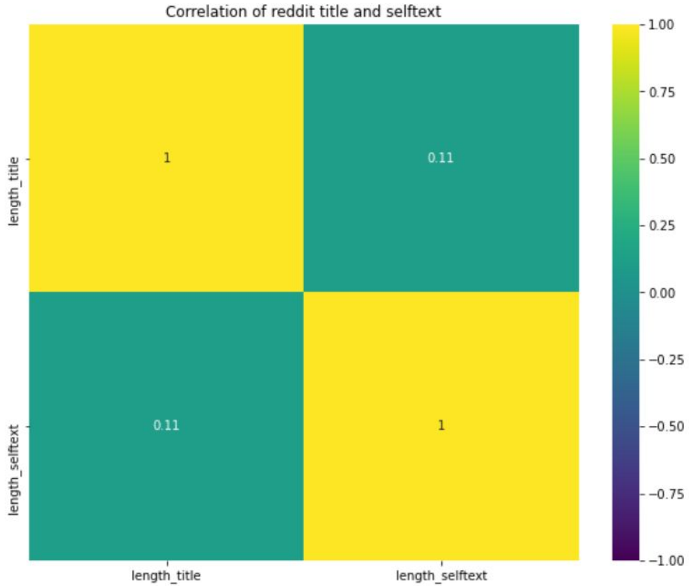
Cleaning the text

- Tokenization - Splitting text into a list of words
- Punctuation removal
- Removing words with non-ASCII printable characters
- Removing all empty strings
- Lowercasing
- Stopwords removal - Excluding words that occur frequently in all text
- Lemmatization - Reducing all words to their base form

04. EDA

04. Exploratory Data Analysis

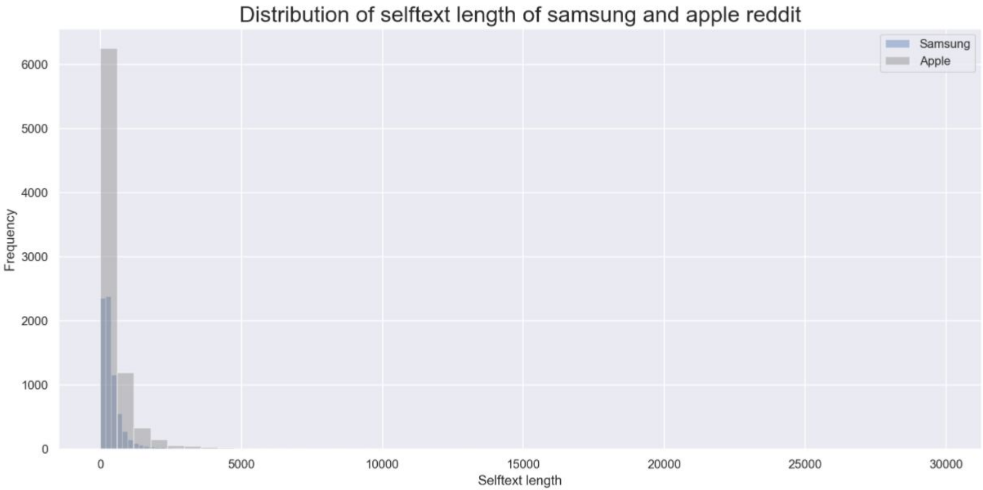


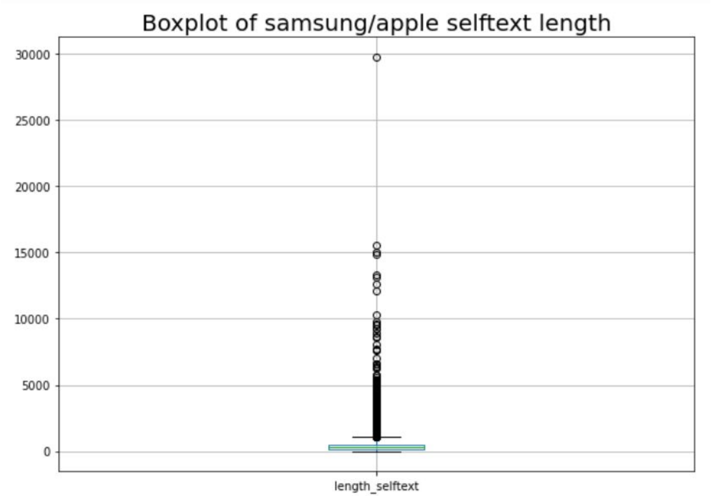


- ➔ Post counts after the data filtering steps
- ➔ Apple has a higher amount of posts at 8065
- ➔ Selftext and title length are not highly correlated

04. Exploratory Data Analysis

Distribution of self text length

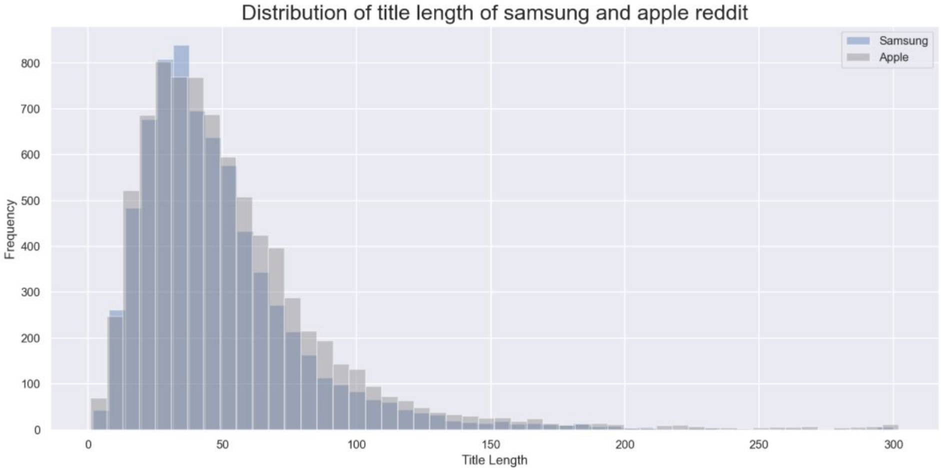

Distribution of selftext length of samsung and apple reddit

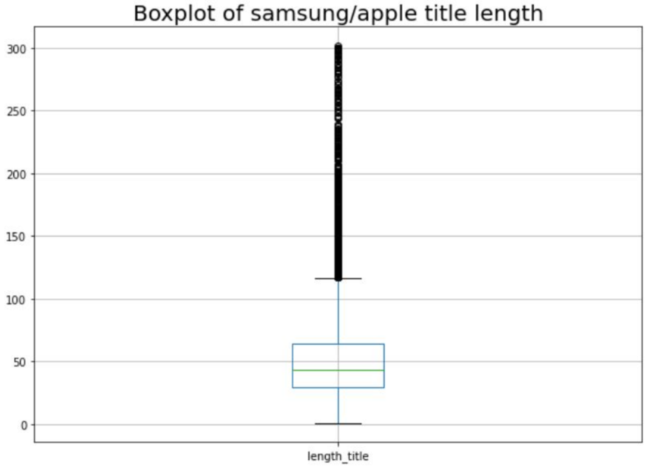

Boxplot of samsung/apple selftext length

- ➔ Right-skewed for both
- ➔ Range of characters between 1 - 29,770
- ➔ Median at 286 char

04. Exploratory Data Analysis

Distribution of title length

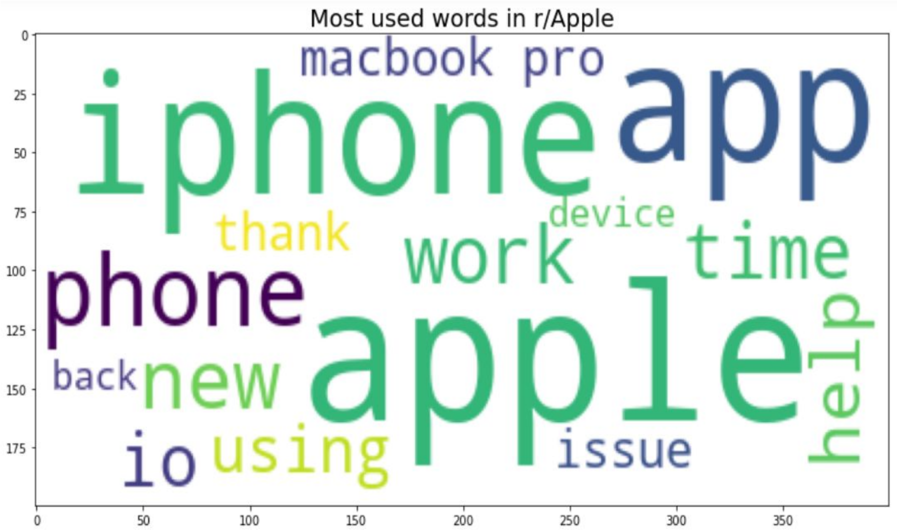


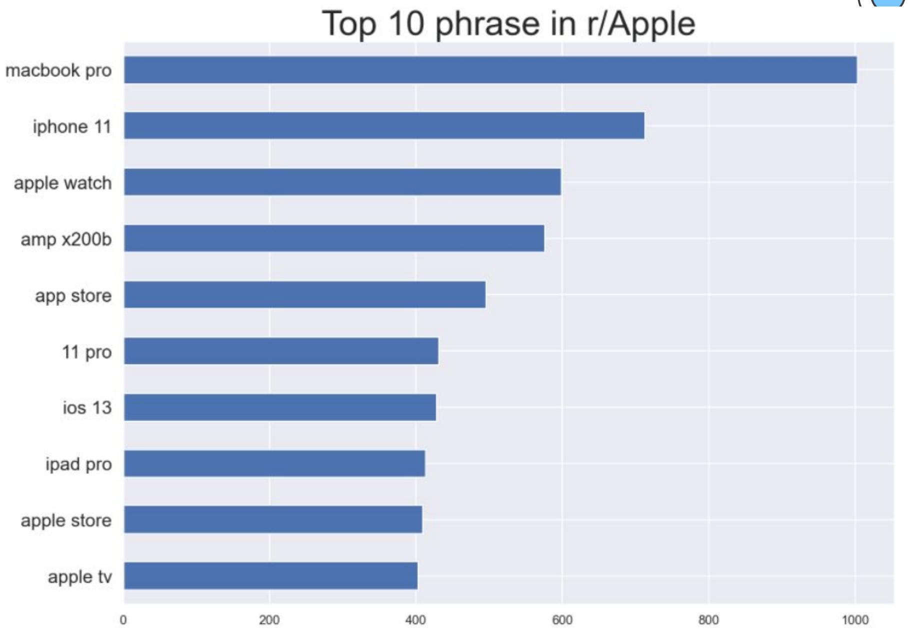


- ➔ Right-skewed for both
- ➔ Range of characters between 1 - 302
- ➔ Median at 43 char

04. Exploratory Data Analysis

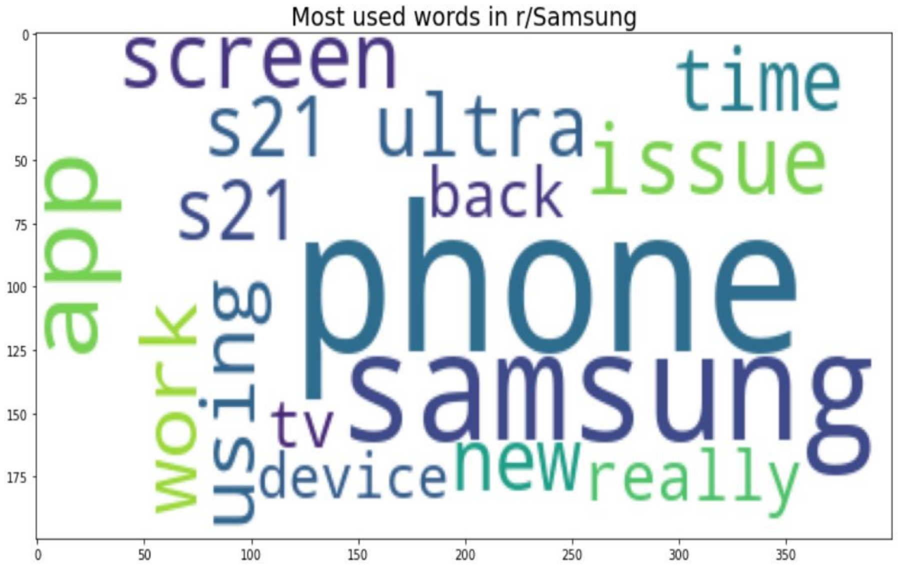
Most used words and phrases (without stopwords) in r/Apple

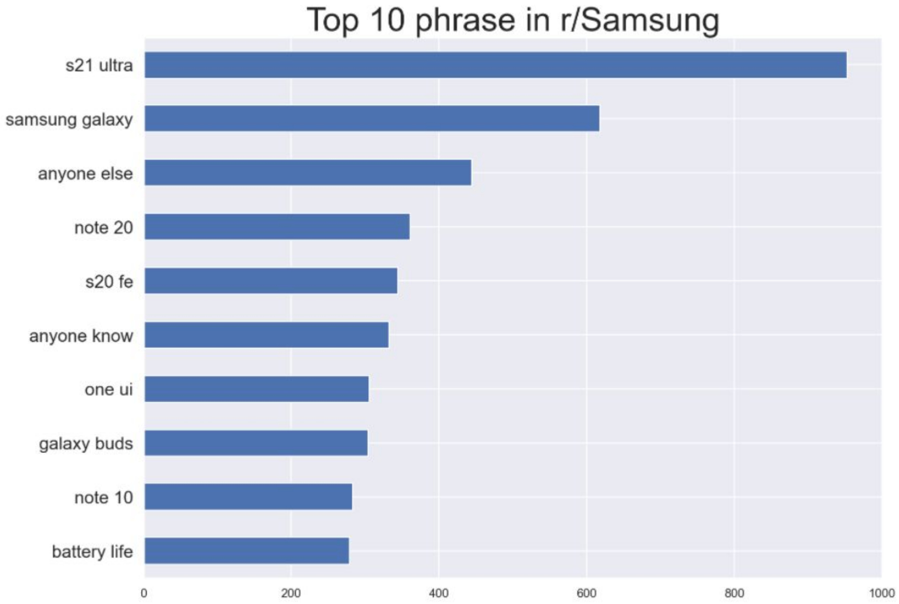




04. Exploratory Data Analysis

Most used words and phrases (without stopwords) in r/Samsung





05. Modelling & Interpretations

Defining the Modelling Problem

Recap of the Problem:

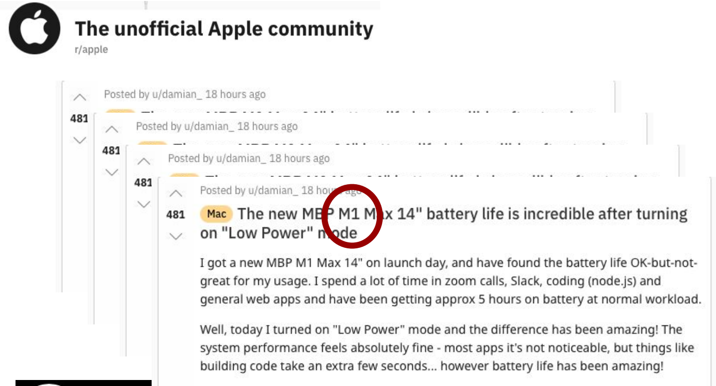
- Tech journalists need to assess the brand dominance of Samsung vs Apple
- Need a quick way to sieve through numerous online word posts and classify them as Samsung or Apple, so as to assess which brand is more talked about
- Bonus: To get insights on discussions that are specific to each brand, to know where the brand's edge is

Binary Classification Problem

Able to identify keywords driving the classification model

Natural Language Processing needed

Modelling Pre-processing



The unofficial Apple community
r/apple

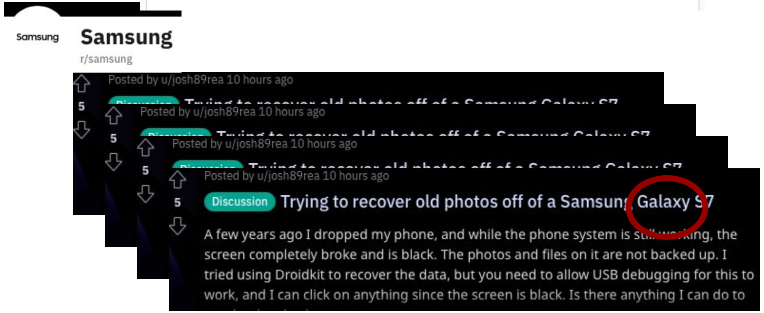
Posted by u/damian_ 18 hours ago

481

Mac The new MBP M1 Max 14" battery life is incredible after turning on "Low Power" mode

I got a new MBP M1 Max 14" on launch day, and have found the battery life OK-but-not-great for my usage. I spend a lot of time in zoom calls, Slack, coding (node.js) and general web apps and have been getting approx 5 hours on battery at normal workload.

Well, today I turned on "Low Power" mode and the difference has been amazing! The system performance feels absolutely fine - most apps it's not noticeable, but things like building code take an extra few seconds... however battery life has been amazing!



Samsung
r/samsung

Posted by u/josh89rea 10 hours ago

5

Discussion Trying to recover old photos off of a Samsung Galaxy S7

A few years ago I dropped my phone, and while the phone system is still working, the screen completely broke and is black. The photos and files on it are not backed up. I tried using Droidkit to recover the data, but you need to allow USB debugging for this to work, and I can click on anything since the screen is black. Is there anything I can do to

Tokenize,
Remove Stopwords,
Lemmatize,
Vectorize

Individual words from all posts

	M1	Galaxy	...	**Subreddit**
Post 1	1	0		Apple
Post 2	0	1		Samsung

Frequency of M1 appearing in post 1

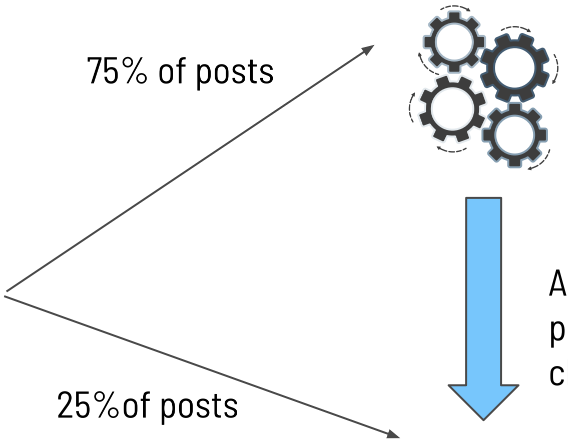
Model Train-Test

Individual words from all posts

	M1	Galaxy	...	**Subreddit**
Post 1	1	0		Apple
Post 2	0	1		Samsung

Frequency of M1 appearing in post 1

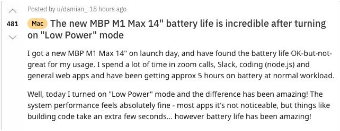
Train the model



75% of posts

25%of posts

Apply on unseen posts and predict a classification



Posted by u/damian_ 18 hours ago

481 Mac The new MBP M1 Max 14" battery life is incredible after turning on "Low Power" mode

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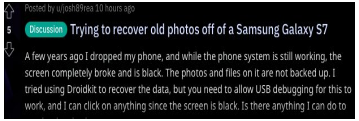
Well, today I turned on "Low Power" mode and the difference has been amazing! The system performance feels absolutely fine - most apps it's not noticeable, but things like building code take an extra few seconds... however battery life has been amazing!

Prediction: The unofficial Apple community r/apple



Posted by u/josh89rea 10 hours ago

5 Discussion Trying to recover old photos off of a Samsung Galaxy S7

A few years ago I dropped my phone, and while the phone system is still working, the screen completely broke and is black. The photos and files on it are not backed up. I tried using Droidkit to recover the data, but you need to allow USB debugging for this to work, and I can click on anything since the screen is black. Is there anything I can do to

Prediction: Samsung Samsung r/samsung

Shortlist of Model Choices

Multinomial Naive Bayes

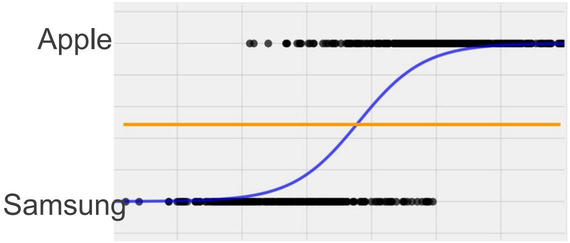
Logistic Regression

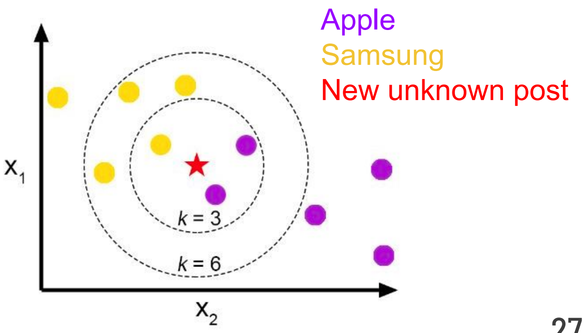
K-nearest neighbors

Calculates likelihood that a post belongs to Apple/Samsung, given the words in the post (conditional probability)

Predicts odds of a post belonging to Apple, based on its relationship with the words that appear in the posts

Predicts classification of each new post, by observing how similar the words in the post are to the training observations, and labelling the post similarly to their “neighbors”





Model Results

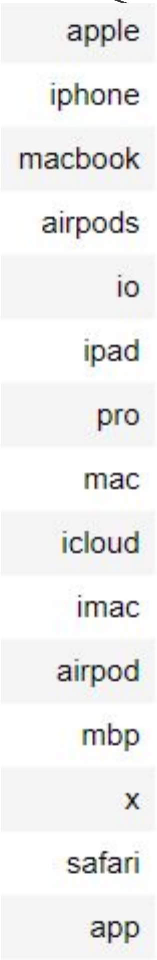
Test (Train)	Dummy Classifier	Multinomial Bayes	Logistic Regression	K-nearest neighbors
Accuracy	0.50 (0.50)	0.94 (0.96)	0.95 (0.99)	0.85 (0.86)
F1-score For Apple	0.67 (0.67)	0.94 (0.96)	0.95 (0.99)	0.83 (0.85)
F1-score For Samsung	0.00 (0.00)	0.94 (0.96)	0.95 (0.99)	0.87 (0.88)

Primary Metric

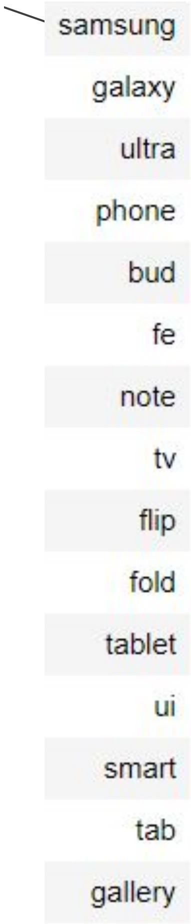
The Chosen Model: Logistic Regression

Criteria	Multinomial Bayes	Logistic Regression	K-nearest neighbors
Accuracy	★★★	★★★	★★☆
No Overfitting	★★★	★★★	★★★
Ease of Interpretability	★★☆	★★★	★★☆

Accuracy: >0.9: 3-stars, 0.8-0.9: 2-stars, 0.5-0.8: 1-star, <0.5: No stars
No Overfitting: Difference between train and test accuracy less than 0.05: 3 stars, 0.05-0.1: 2 stars, 0.1-0.2: 1 star, >0.2: 0-star
Ease of Interpretability is more subjective; takes into account how easy it is to explain how the model works, identify the key variables and how to interpret how important those variables are



apple
iphone
macbook
airpods
io
ipad
pro
mac
icloud
imac
airpod
mbp
x
safari
app



samsung
galaxy
ultra
phone
bud
fe
note
tv
flip
fold
tablet
ui
smart
tab
gallery

Key Predictors for Logistic Regression

- Brand names and product names
- May indicate which products are discussed most
  - Information for the upcoming magazine article?
- Consistent with what we saw from the EDA section

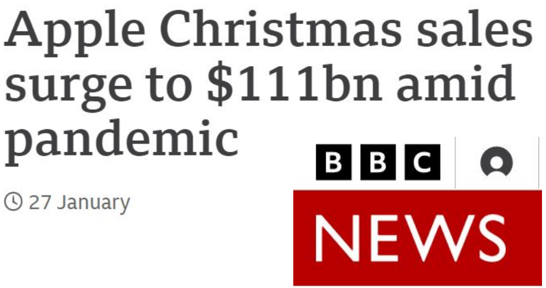
What if we want to look beyond these words?

Words filtered out

'apple', 'iphone', 'iphones', 'macbook', 'ipad', 'pro', 'pros', 'airpods', 'airpod', 'ios', 'mac', 'catalina','itunes', 'imac', 'icloud', 'safari', 'macos', 'max', 'air', 'mbp', 'ipod','samsung', 'galaxy', 'ultra', 'note', 'bud', 'buds', 'fold', 'ui', 'tab', 'flip', 'z', 'fe', 'exynos', 'oneui', 'bixby', 'siri', 'mini', 'xr', 'smart', 'gallery', 'applecare', 'lightning', 'id', 'x', 'xs', 'se', 'pencil', 'airplay', 'pen', 'pens', 'earbuds', 'edge', 'gen', 'snapdragon', 'lite', 'phone', 'phones', 'tablet', 'tablets', 'tv', 'tvs', 'dex', 'thunderbolt'

Predictors for Apple (product/ brand names excluded)

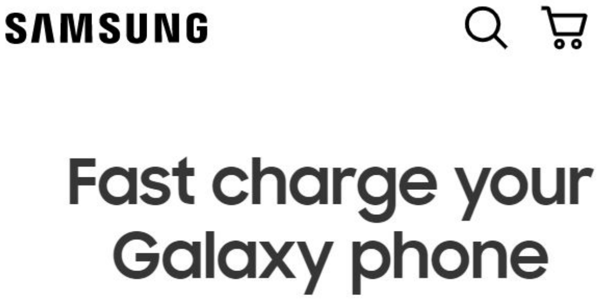
Words
product
store
computer
help
buy
music
feedback
subscription
library
passcode
amp
christmas
password
photo
free



Apple Christmas sales surge to $111bn amid pandemic

27 January

Predictors for Samsung (product/ brand names excluded)



Fast charge your Galaxy phone

Words
google
factory
fast
anyone
setting
sd
active
notification
unlocked
remote
good
camera
screen
frame
fingerprint

06. Conclusion

A Successful Model

Metric	Logistic Regression
Accuracy On Test Set	95%
Difference between Train and Test	4%
Interpretability	Key predictive words can be identified

Fairly Accurate

At least 80% accuracy and minimally better than baseline of about 50% accuracy in classifying a post

Little Overfitting

Difference between train and test accuracy is < 5%

Interpretable

Able to identify common features that distinguish each class of post

Summary and Recommendations

- The model is in a good position to be used as a tool by the Editor-in-chief
- Conduct Share of Voice analysis more efficiently to measure brand dominance
- Exploratory data analysis can reveal additional insights other than modelling

Sentiment analysis

- Positive and negative words
- Context of those words

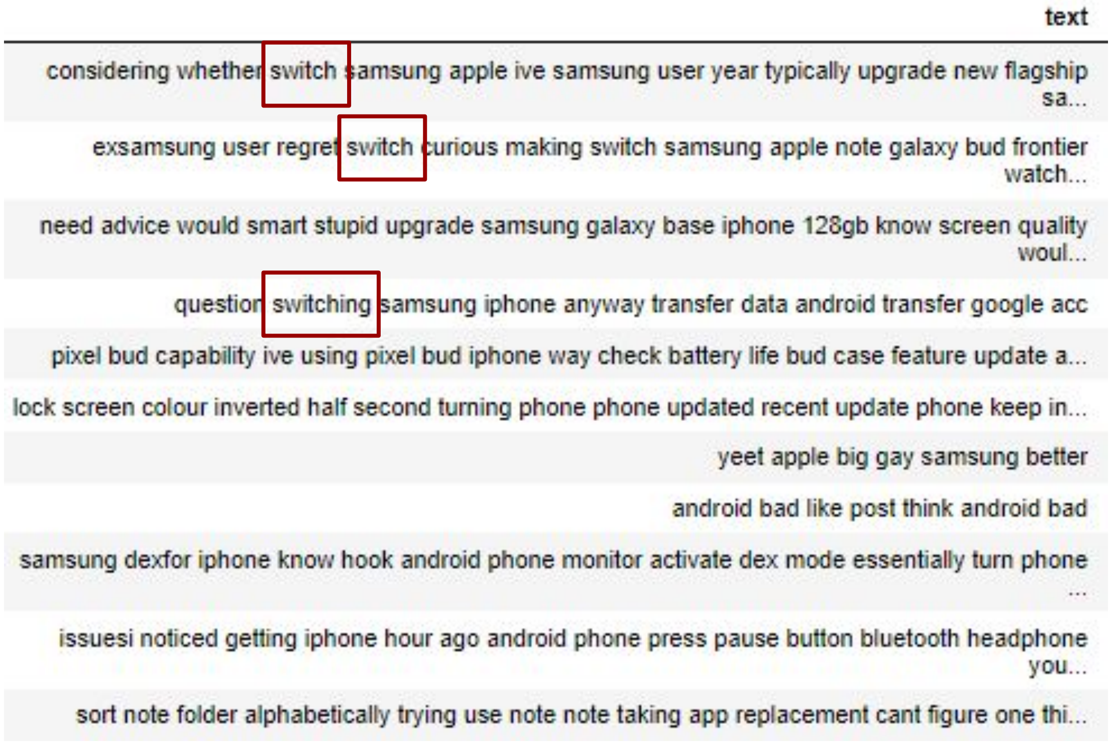
Types of text classified

- Social media
- Product reviews

Thank you!

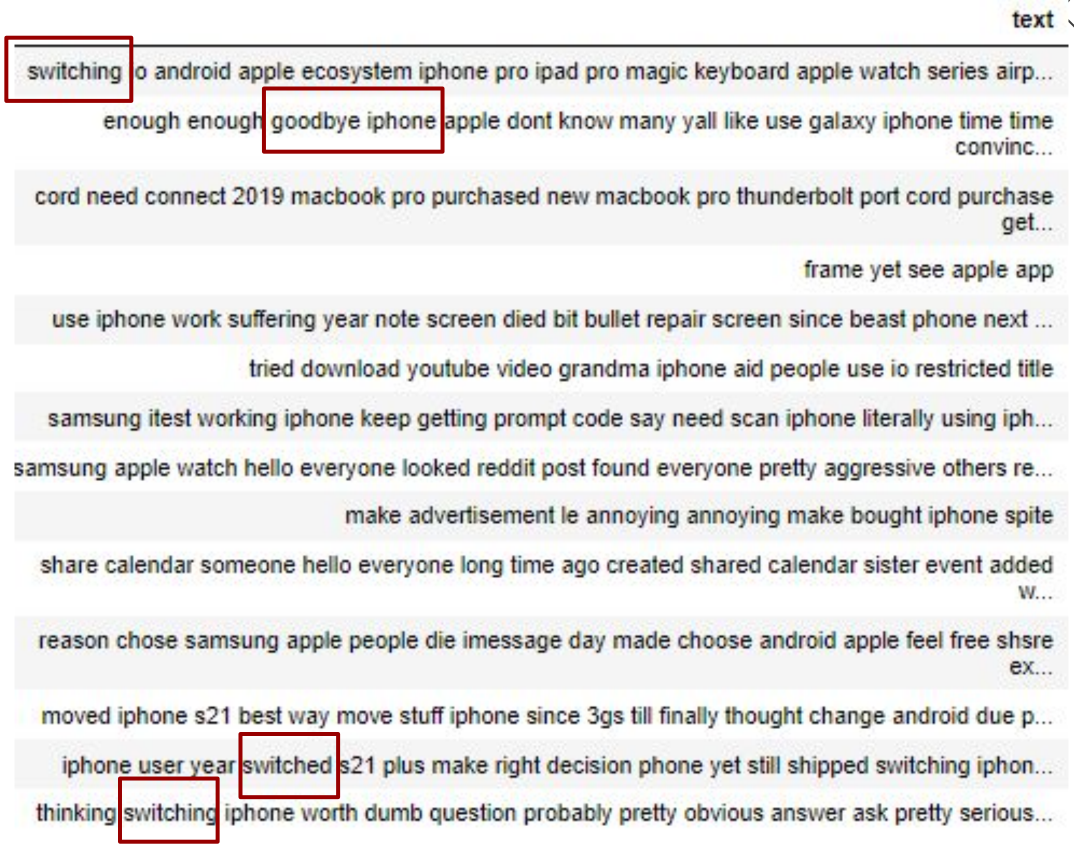
Appendix

Apple posts classified as Samsung posts



text
considering whether switch samsung apple ive samsung user year typically upgrade new flagship sa...
exsamsung user regret switch curious making switch samsung apple note galaxy bud frontier watch...
need advice would smart stupid upgrade samsung galaxy base iphone 128gb know screen quality woul...
question switching samsung iphone anyway transfer data android transfer google acc
pixel bud capability ive using pixel bud iphone way check battery life bud case feature update a...
lock screen colour inverted half second turning phone phone updated recent update phone keep in...
yeet apple big gay samsung better
android bad like post think android bad
samsung dexfor iphone know hook android phone monitor activate dex mode essentially turn phone ...
issuesi noticed getting iphone hour ago android phone press pause button bluetooth headphone you...
sort note folder alphabetically trying use note note taking app replacement cant figure one thi...

Samsung posts classified as Apple posts



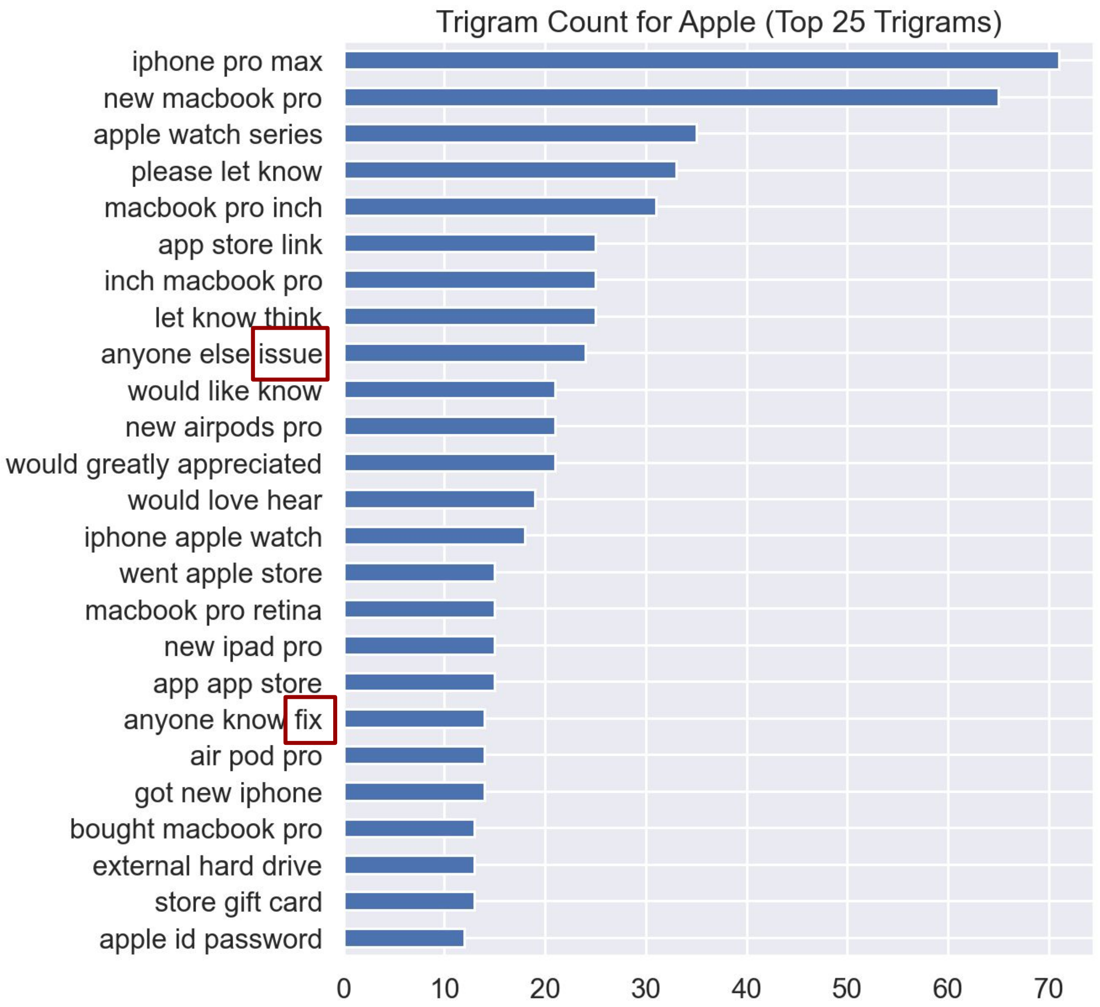
text
switching io android apple ecosystem iphone pro ipad pro magic keyboard apple watch series airp...
enough enough goodbye iphone apple dont know many yall like use galaxy iphone time time convinc...
cord need connect 2019 macbook pro purchased new macbook pro thunderbolt port cord purchase get...
frame yet see apple app
use iphone work suffering year note screen died bit bullet repair screen since beast phone next ...
tried download youtube video grandma iphone aid people use io restricted title
samsung itest working iphone keep getting prompt code say need scan iphone literally using iph...
samsung apple watch hello everyone looked reddit post found everyone pretty aggressive others re...
make advertisement le annoying annoying make bought iphone spite
share calendar someone hello everyone long time ago created shared calendar sister event added w...
reason chose samsung apple people die imessage day made choose android apple feel free shsre ex...
moved iphone s21 best way move stuff iphone since 3gs till finally thought change android due p...
iphone user year switched s21 plus make right decision phone yet still shipped switching iphon...
thinking switching iphone worth dumb question probably pretty obvious answer ask pretty serious...

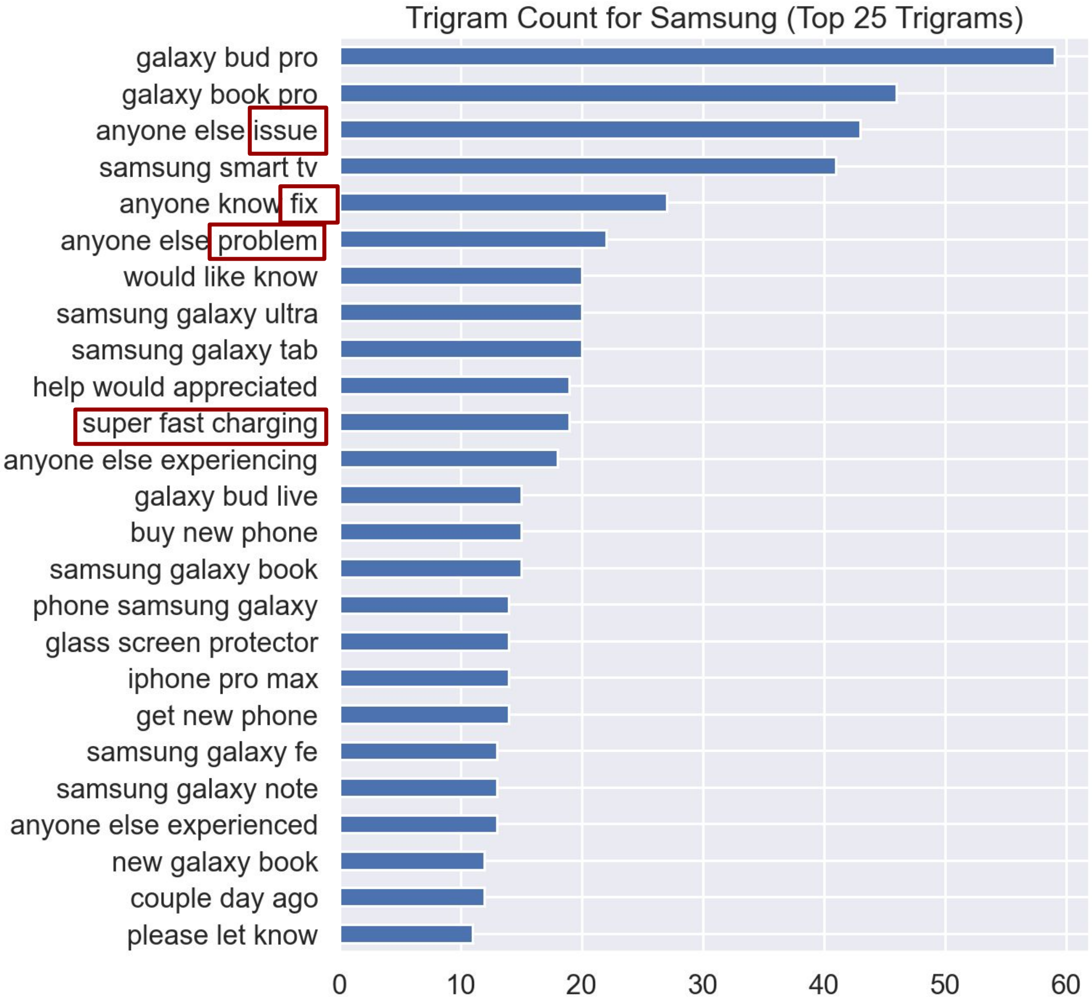
Samsung post classified as Apple post

iPhone 12 Pro Max to S21 Ultra worth the switch? Hello everyone, I've currently got an **iPhone 12 Pro Max** which I've had for about 10 months and have had issues with (battery life, software issues, etc) I can get an S21 Ultra on contract from my carrier for around £56 a month and was wondering if it's worth the switch this late into the year.

Apple post classified as Samsung post

LPT: On safari if you open **tab** view and put your phone into landscape mode, you can long press on any **tab** and sort them by title or sort **tab**s by website. This is quite useful to sort **tab**s if you have around 200-300 open. Also a bonus tip, while in **tab** view, if you scroll all the way to the top and search for a certain **tab** and then long press the cancel button you can close all **tab**s matching your search result.


Trigram Count for Apple (Top 25 Trigrams)
iphone pro max
new macbook pro
apple watch series
please let know
macbook pro inch
app store link
inch macbook pro
let know think
anyone else issue
would like know
new airpods pro
would greatly appreciated
would love hear
iphone apple watch
went apple store
macbook pro retina
new ipad pro
app app store
anyone know fix
air pod pro
got new iphone
bought macbook pro
external hard drive
store gift card
apple id password
0
10
20
30
40
50
60
70


Trigram Count for Samsung (Top 25 Trigrams)
galaxy bud pro
galaxy book pro
anyone else issue
samsung smart tv
anyone know fix
anyone else problem
would like know
samsung galaxy ultra
samsung galaxy tab
help would appreciated
super fast charging
anyone else experiencing
galaxy bud live
buy new phone
samsung galaxy book
phone samsung galaxy
glass screen protector
iphone pro max
get new phone
samsung galaxy fe
samsung galaxy note
anyone else experienced
new galaxy book
couple day ago
please let know
0
10
20
30
40
50
60