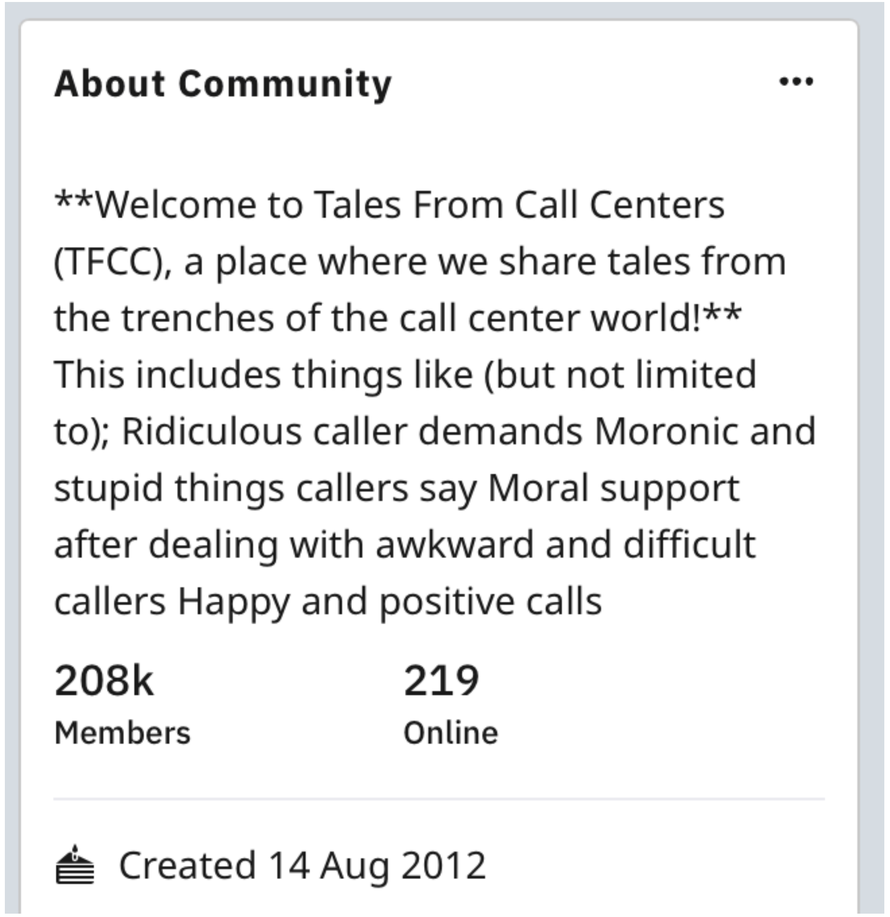
SAHAJ CHAWLA - DECEMBER 2020

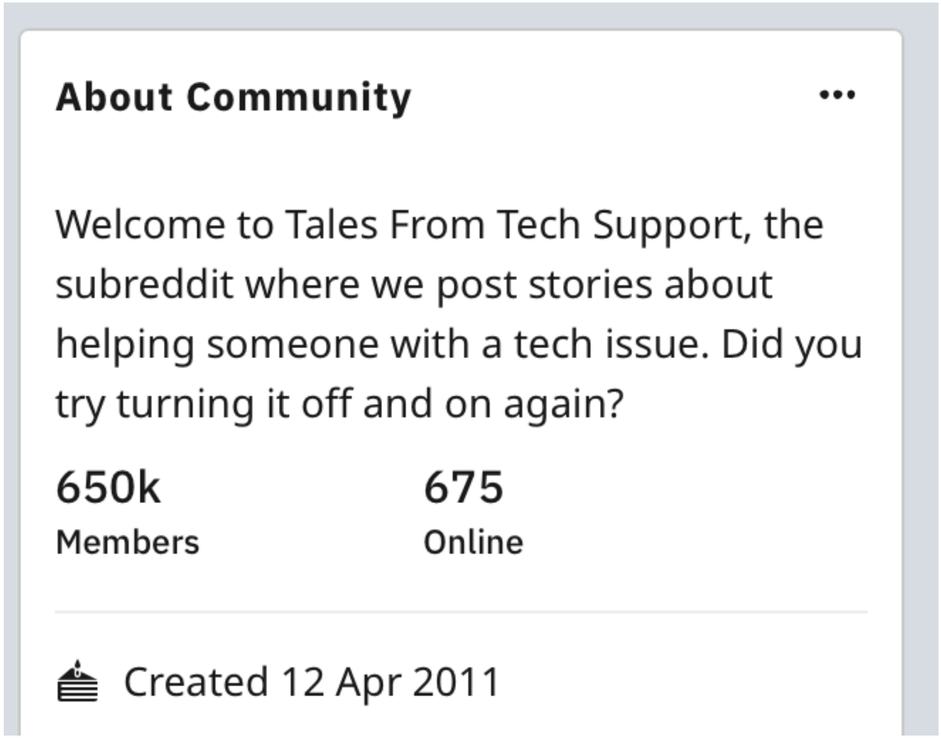
SUBREDDIT CLASSIFICATION

DSI-18 Project 3

WHAT ARE THE INDICATIVE KEYWORDS THAT HELP TO EFFECTIVELY TARGET ADVERTISING TO A NICHE USER GROUP?

WHICH SUBREDDITS WILL I LOOK INTO AND WHY?



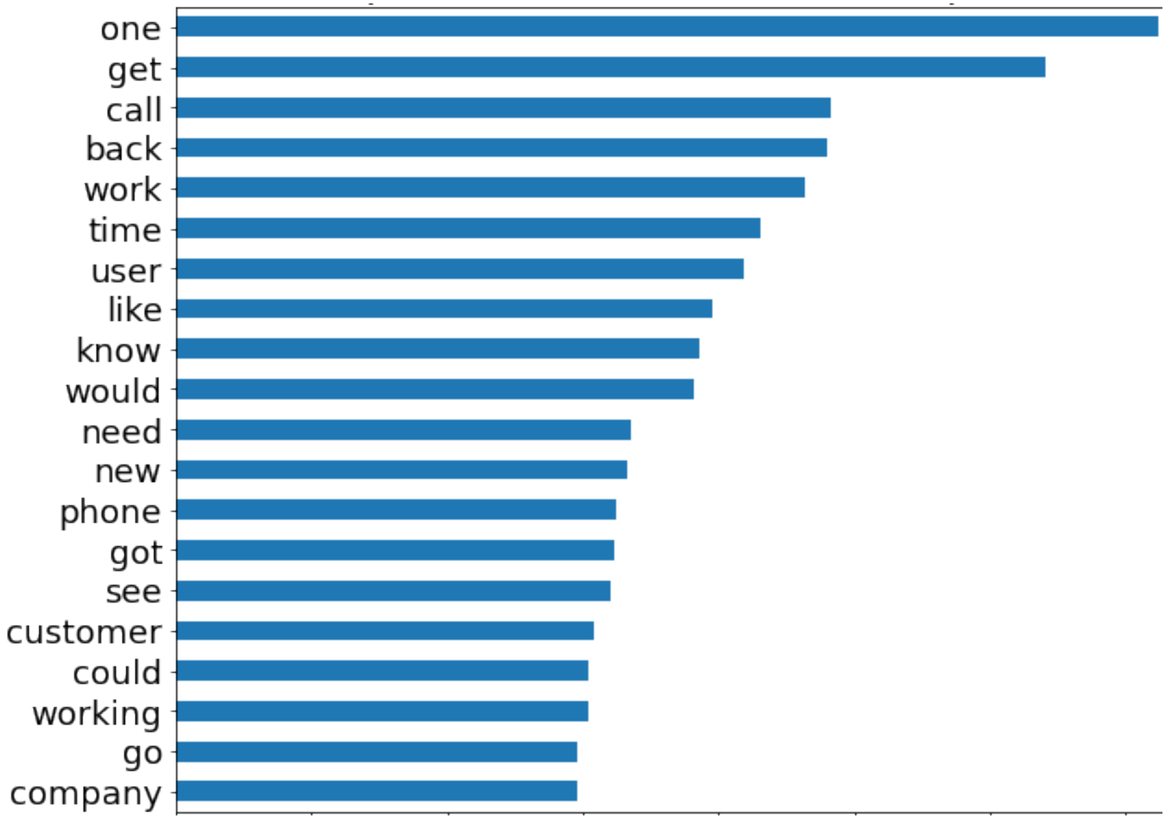


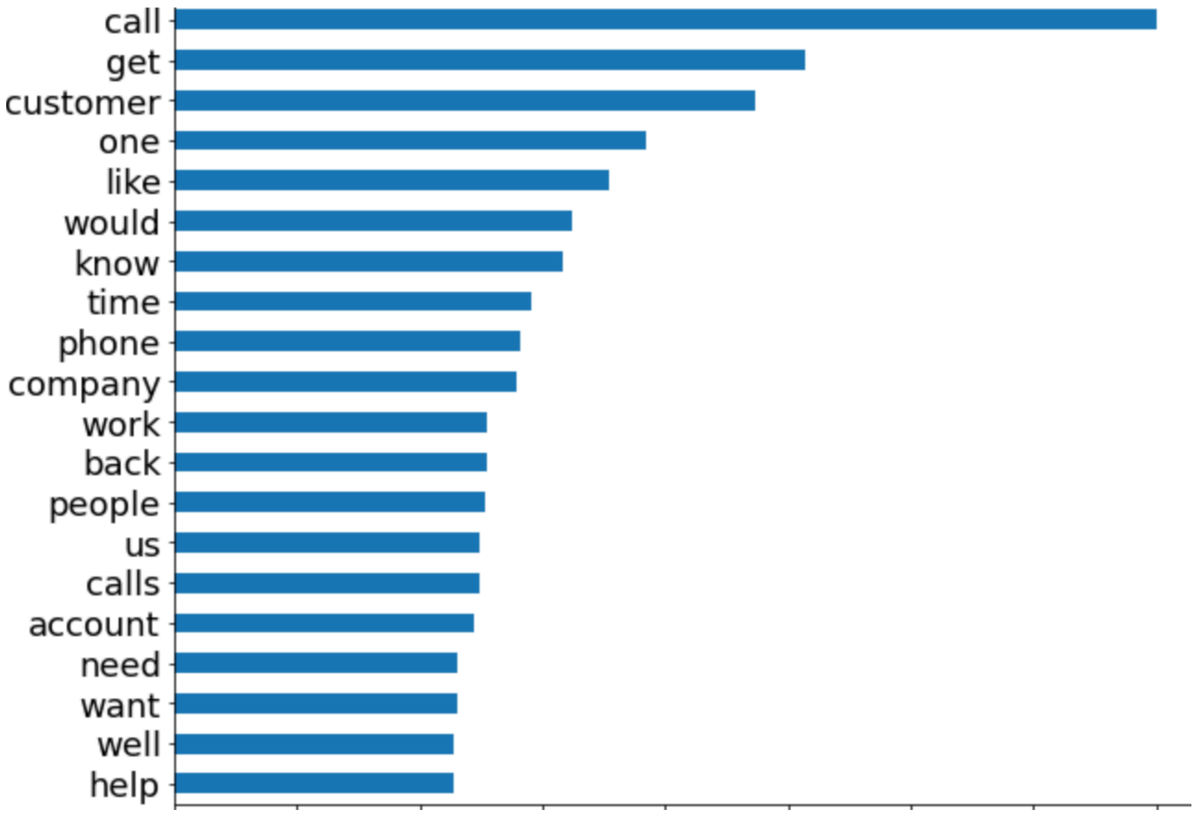
WHAT DID I DO?

1. Scraping the data from Reddit
2. Exploratory Data Analysis
3. Natural Language Processing
4. (A lot of) Classification Modeling
5. Scraping the data from Reddit (again)
6. Model Evaluation

EXPLORATORY DATA ANALYSIS

FREQUENCY OF TOP WORDS IN BOTH SUBREDDITS - CAN YOU GUESS WHICH ONE BELONGS TO R/TALESFROMTECHSUPPORT?



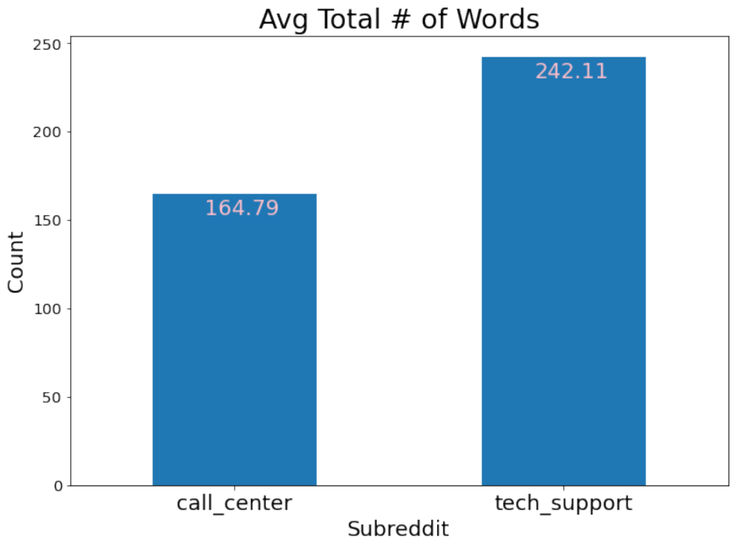


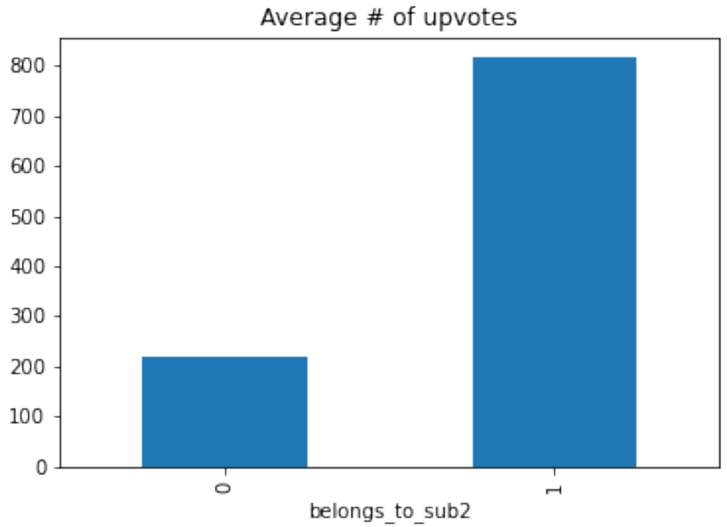
Voting options: Scan the QR code OR https://www.menti.com/ehm3if9iyb OR go to menti.com and use the code 77 36 08 0

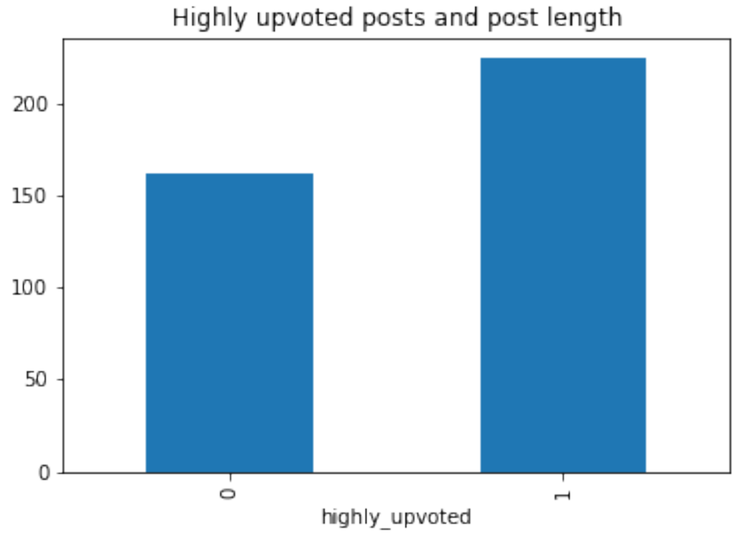
CONTENT OF THE 2 SUBREDDITS SEEMS TO FOLLOW A SIMILAR THEME, BUT THERE ARE CLEAR DIFFERENCES IN NUANCES

EXPLORING THE RELATIONSHIP BETWEEN POST LENGTH AND UPVOTES

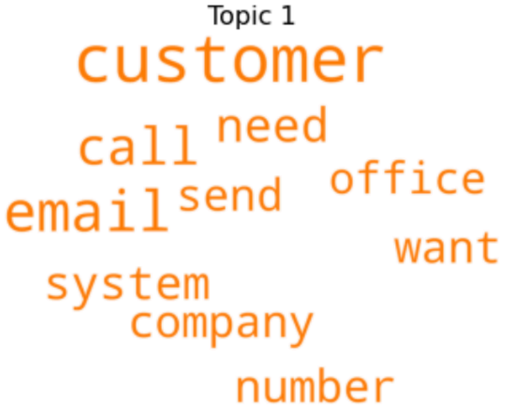
- Post length and average number of upvotes is different across the 2 subs
- Highly upvoted (more than 100) posts tend to have a greater effort put into them (higher word count)

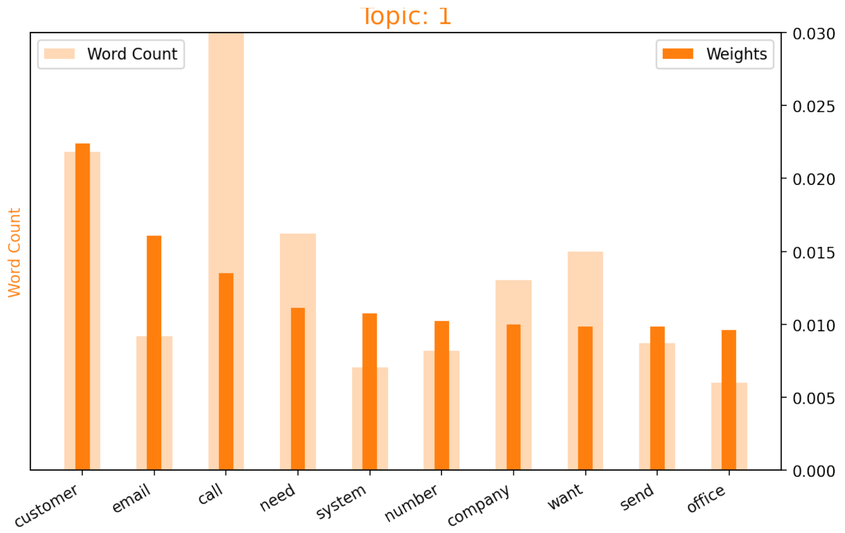


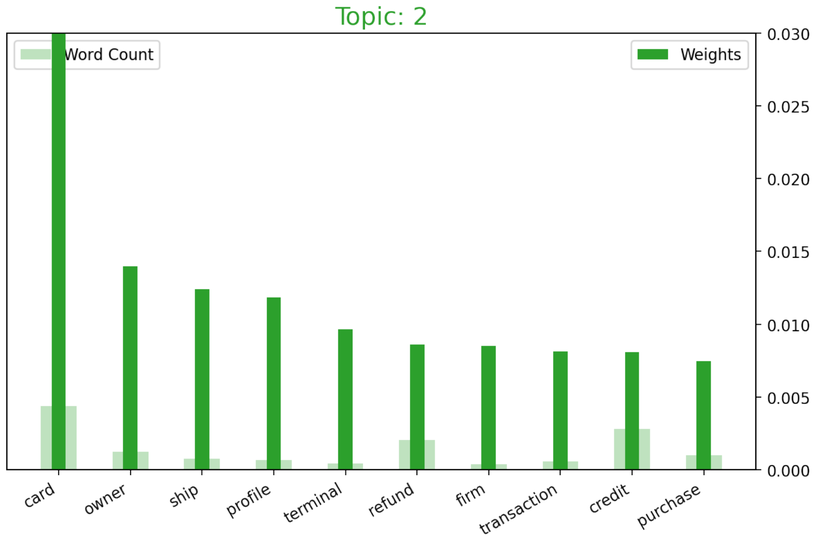


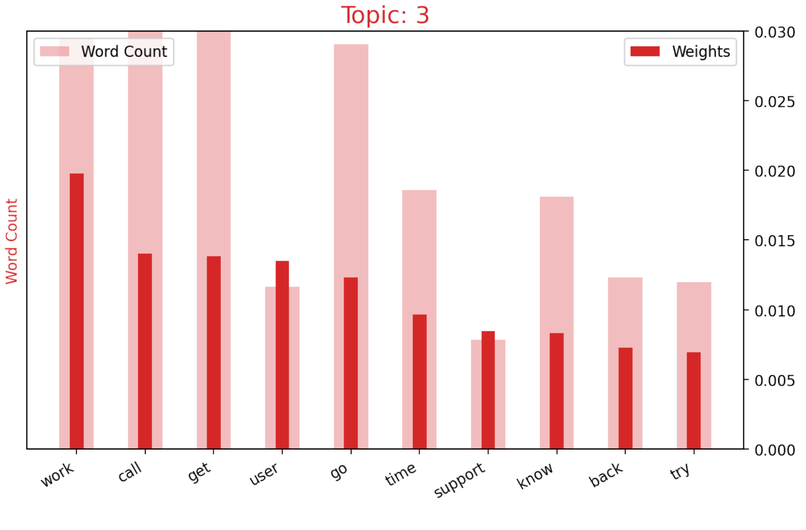


BONUS: LATENT DIRICHLET ALLOCATION FOR TOPIC MODELLING VISUALISATION



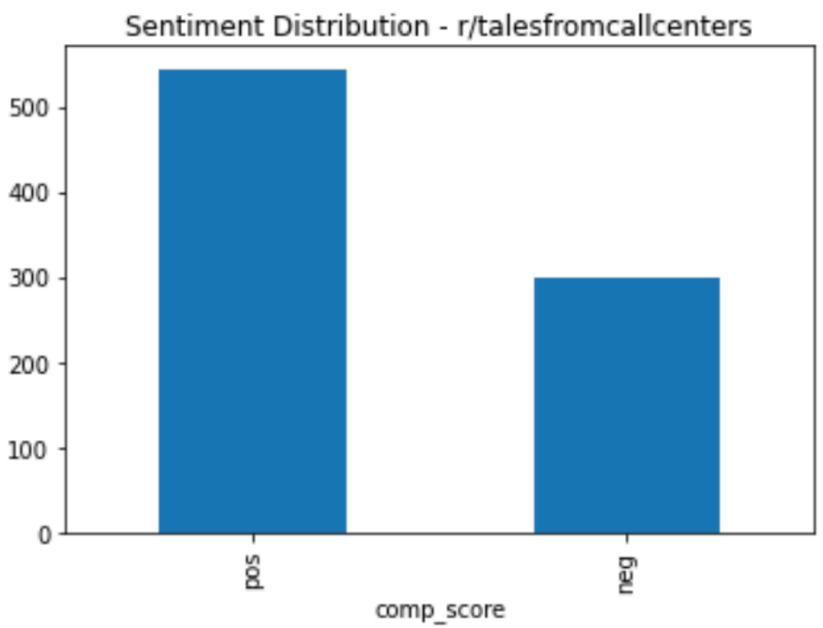


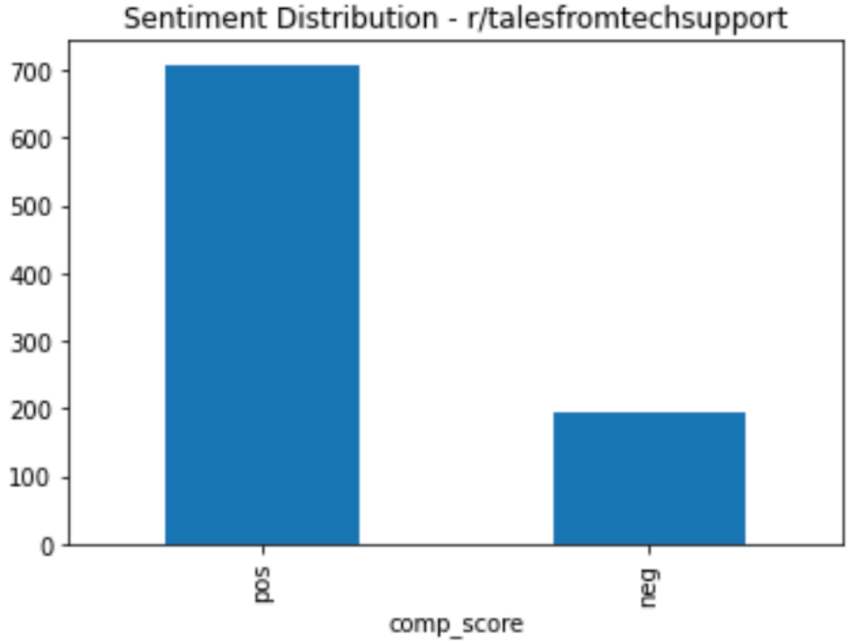




DOUBLE BONUS: SENTIMENT ANALYSIS WITH VADER LIBRARY

- Not much difference in sentiment between the two
- No discernible relationship between sentiment and upvotes





PRE-PROCESSING AND DATA MODELLING

NATURAL LANGUAGE PROCESSING

- Dropped duplicate posts
- Joined title and post to create one string
- Converted all to lowercase
- Removed punctuation
- Lemmatized words
- Removed stopwords

	title	post	upvotes	gilded	belongs_to_sub2	title_x_post	token	joined_text	highly_upvoted	word_count	char_count	cleaned_text
0	Just need to vent...	I get that tempers are shorter these days, but...	230	0	0	Just need to vent... I get that tempers are sh...	['need', 'vent', 'get', 'tempers', 'shorter', ...	Just need to vent... I get that tempers are sh...	1	48	579	need vent get tempers shorter days hard time l...
1	Reverse call center post	On mobile so I hope I do this right. \n\nI ha...	39	0	0	Reverse call center post On mobile so I hope I...	['reverse', 'call', 'center', 'post', 'mobile'...	Reverse call center post On mobile so I hope I...	0	84	1017	reverse call center post mobile hope right cal...
2	"So you're willing to lose a customer for $3 d...	I work for a car rental company as a specialis...	763	0	0	"So you're willing to lose a customer for $3 d...	['willing', 'lose', 'customer', 'dollars', 'wo...	"So you're willing to lose a customer for $3 d...	1	585	6757	willing lose customer dollars work car rental ...
3	Free Talk Friday - Nov 27	Welcome to Free Talk Friday! We are suspending...	0	0	0	Free Talk Friday - Nov 27 Welcome to Free Talk...	['free', 'talk', 'friday', 'nov', 'welcome', '...	Free Talk Friday - Nov 27 Welcome to Free Talk...	0	38	368	free talk friday nov welcome free talk friday ...
4	Accidentally Exposed a Family Fraud	I work for a small local ISP. One of the thin...	958	0	0	Accidentally Exposed a Family Fraud I work for...	['accidentally', 'exposed', 'family', 'fraud',...	Accidentally Exposed a Family Fraud I work for...	1	366	3608	accidentally exposed family fraud work small l...

MODELLING PIPELINE AND RESULTS OVERVIEW - VALIDATION SET

- Vector transforming the data with CountVectorizer/TF-IDF
- Use GridsearchCV to optimise over a range of models and hyperparameters

Best Models	Accuracy Score	Estimator	Hyperparameters
LogReg	92.8%	TF-IDF	tf__max_features': 10000, 'tf__ngram_range': (1, 2)
Naive Bayes	93.4%	CVEC	cvec__max_df': 0.9, 'cvec__max_features': 10000, 'cvec__min_df': 3, ' cvec__ngram_range': (1, 2)
Random Forest	93.1%	TF-IDF	tf__max_features': 10000, 'tf__ngram_range': (1, 2)
Extra Trees	93.4%	TF-IDF	tf__max_features': 10000, 'tf__ngram_range': (1, 2)
SVM	93.7%	TF-IDF	tf__max_features': 10000, 'tf__ngram_range': (1, 1)

Baseline accuracy: 51%

MODEL EVALUATION WITH ‘TRUE’ TEST DATA

USING A FRESH SCRAPE AND TREATING AS 'TRUE' UNSEEN DATA

Best model with fresh scrape - **Random Forest with TF-IDF Vectorizer**

	Predicted Negative	Predicted Positive
Actual Negative	398	2
Actual Positive	0	401

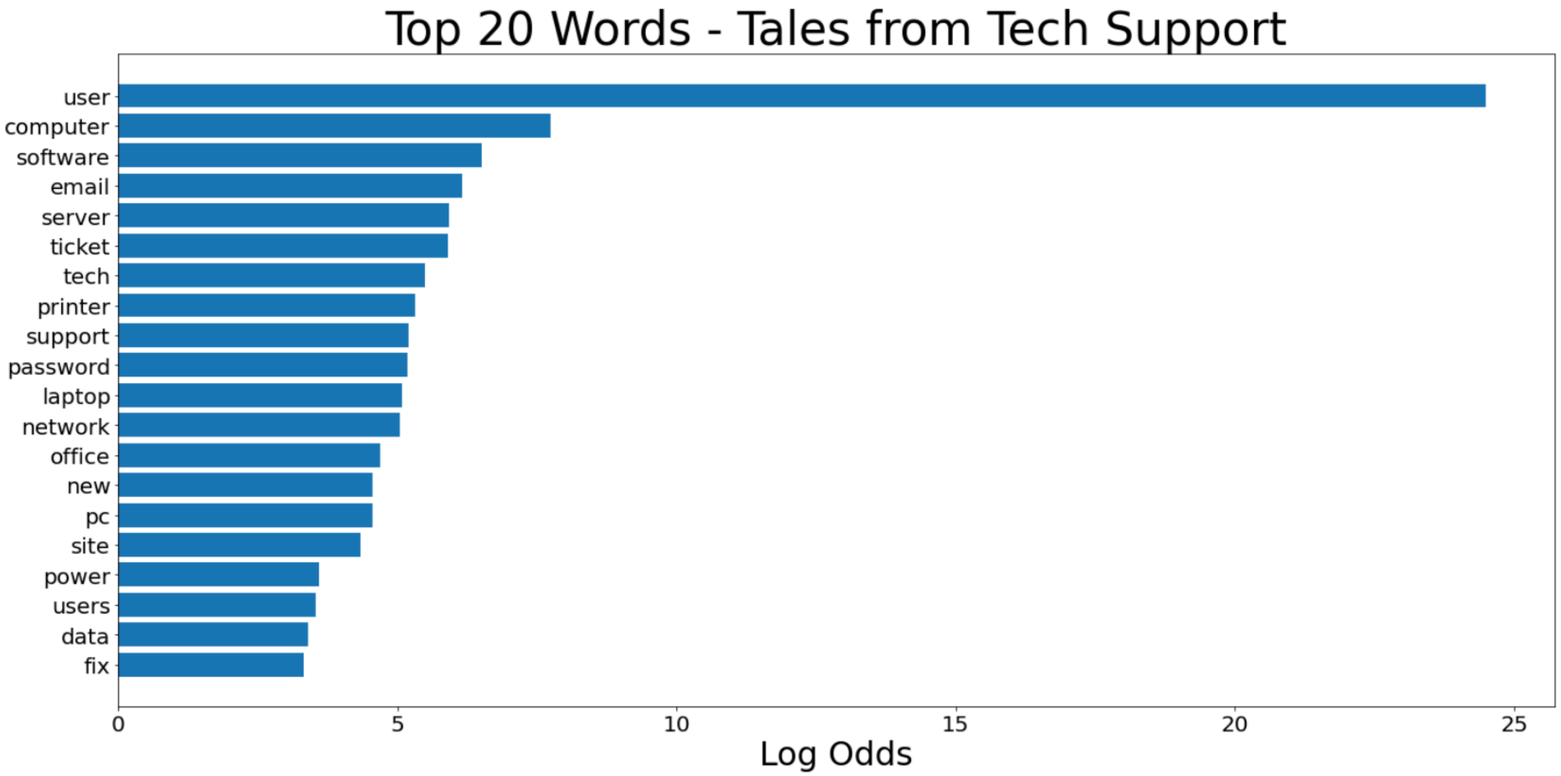
- **This is close to 99% accuracy, the increase is due to not enough time between the 2 scrapes.**
- **Ideal scenario will be to scrape more data and 2 'dips' over a longer gap for a better real-life accuracy**

BUT DOES THE ‘BEST’ PERFORMING MODEL ANSWER THE BUSINESS QUESTION?

AN INTERPRETABLE MODEL ANSWERS THE BUSINESS QUESTION BETTER

- With the highest accuracy score on 'true' unseen data, Random Forest is theoretically the best model to answer the data science challenge.

- However, Logistic Regression is a better way to answer the business problem, as the model is interpretable and provides relevant keywords for better classification.



APPENDIX

LIMITATIONS AND SCOPE FOR IMPROVEMENT

- Longer time period between scrape dips to avoid duplicity
- Better data cleaning to remove more stop words
- Better hyper parameter tuning
- More grid searching to optimise hyper parameters

NAIVE BAYES COEFFICIENTS