Subreddit Classification through NLP

Problem Statement

Classifying Spam Agency of Singapore would like to create a filter for financial neophytes that classifies financial posts as potentially helpful or spam, using the following as a yardstick:

r/personalfinance

Tends to be more conservative financial advice

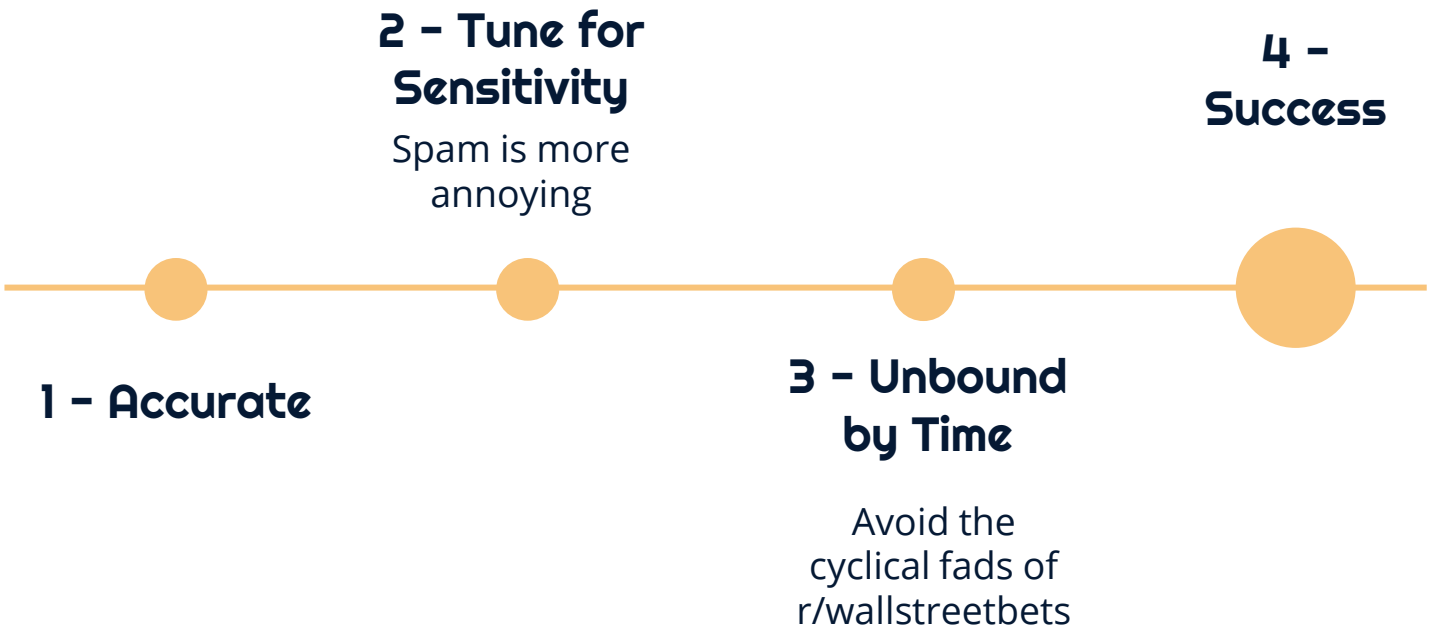
Targeted at financially sustainable living or retirement

r/wallstreetbets

More active investing

Driven by the stock of the month

Accuracy, Sensitivity, Longevity



Models Tested

Classifier	Vectorizer	Words
Multinomial Naïve Bayes	Count Vectorizer	Cleaned
Random Forest	TF - IDF	Lemmatized
Extremely Randomized Trees		Stemmed
ADA Boost		

Model Summary

	Naive Bayes						Random Forest		Extremely Randomized Trees		ADA Boost	
Word Vectorizer	Count Vectorizer			TF-IDF			Count Vectorizer	TF-IDF	Count Vectorizer	TF-IDF	Count Vectorizer	TF-IDF
Word Modifications	Unmodified	Lemmatize	Stemmed	Unmodified	Lemmatize	Stemmed	Stemmed	Stemmed	Stemmed	Stemmed	Stemmed	Stemmed
Train Accuracy Score	0.9502	0.9536	0.9540	0.9234	0.9292	0.9296	0.9430	0.9344	0.9445	0.9445	0.8522	0.8804
Test Accuracy Score	0.9497	0.9483	0.9512	0.9153	0.9282	0.9426	0.9512	0.9368	0.9454	0.9440	0.8522	0.9053

Stemmed Words performed better on the initial Naïve Bayes, so they were used on the other tests

The best models in terms of accuracy on the test set had the same score of 0.9512

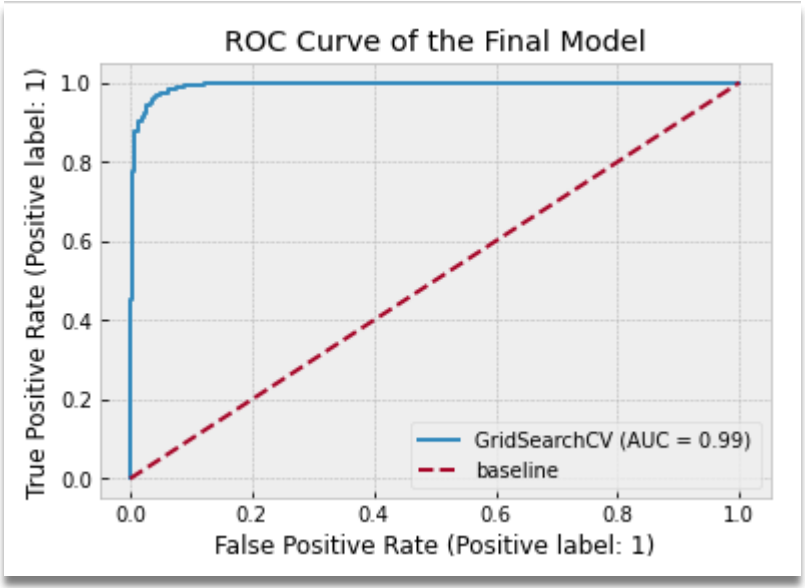
Naïve Bayes, Count Vectorised, Stemmed Words

Best Model had the following parameters:

- Multinomial Naïve Bayes
- Count Vectorised
- Stemmed Words
- Max Features = 5000
- nGram Range = 1, 1

To tune for sensitivity, the threshold of the probability of the post to be classified as r/wallstreetbets was shifted from 0.5 to 0.1

- Sensitivity increased from **0.9256** to **0.9473**
- Specificity loss from **0.9732** to **0.9679**



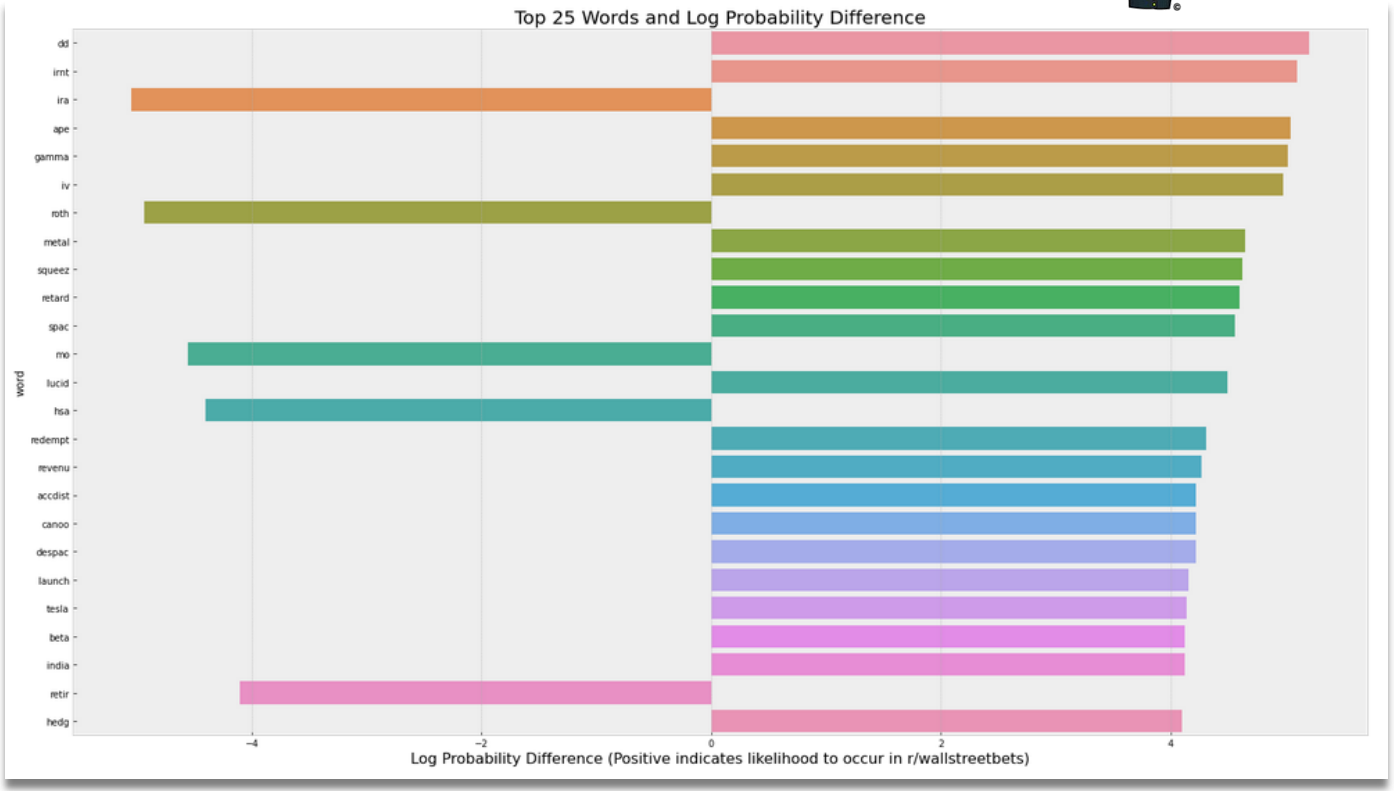
AUC Score = 0.9937

Best Indicators Came From r/wallstreetbets

The best indications came from r/wallstreetbets

r/wallstreetbets tends to have its own “lingo” of inside jokes and shorthand, e.g. dd – due diligence

r/personalfinance showed a clearer bent towards slow wealth accumulation:
ira, roth, hsa



Takeaways

Accuracy - 95.8%

1

2

Sensitivity - 94.7%

Longevity
Popular stock tickers removed in stop words

3

4

Success?

Mostly successful, however, 4 posts that were false negative slipped through should have been caught and the model could be further improved

Improving The Model

Titles

Words in the titles could be weighted heavier than the body

Metadata

Post length might be an additional indicator as posts giving advice tend to be longer

Context

Model assumes words are independent of each other, adding a dimension for context would help increase accuracy

THANKS!

CREDITS: This presentation template was created by **Slidesgo**, including icons by **Flaticon**, and infographics & images by **Freepik**.