

Practical Business Applications of Sarcastic Tweet Detection Using Natural Language Processing and Machine Learning



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The Sarcasm Problem

- Sarcasm implies the opposite of a message's literal meaning
- Speakers show sarcastic intent through body language or tone of voice
- Written communication lacks cues for indicating sarcastic intent

Sentiment Analysis

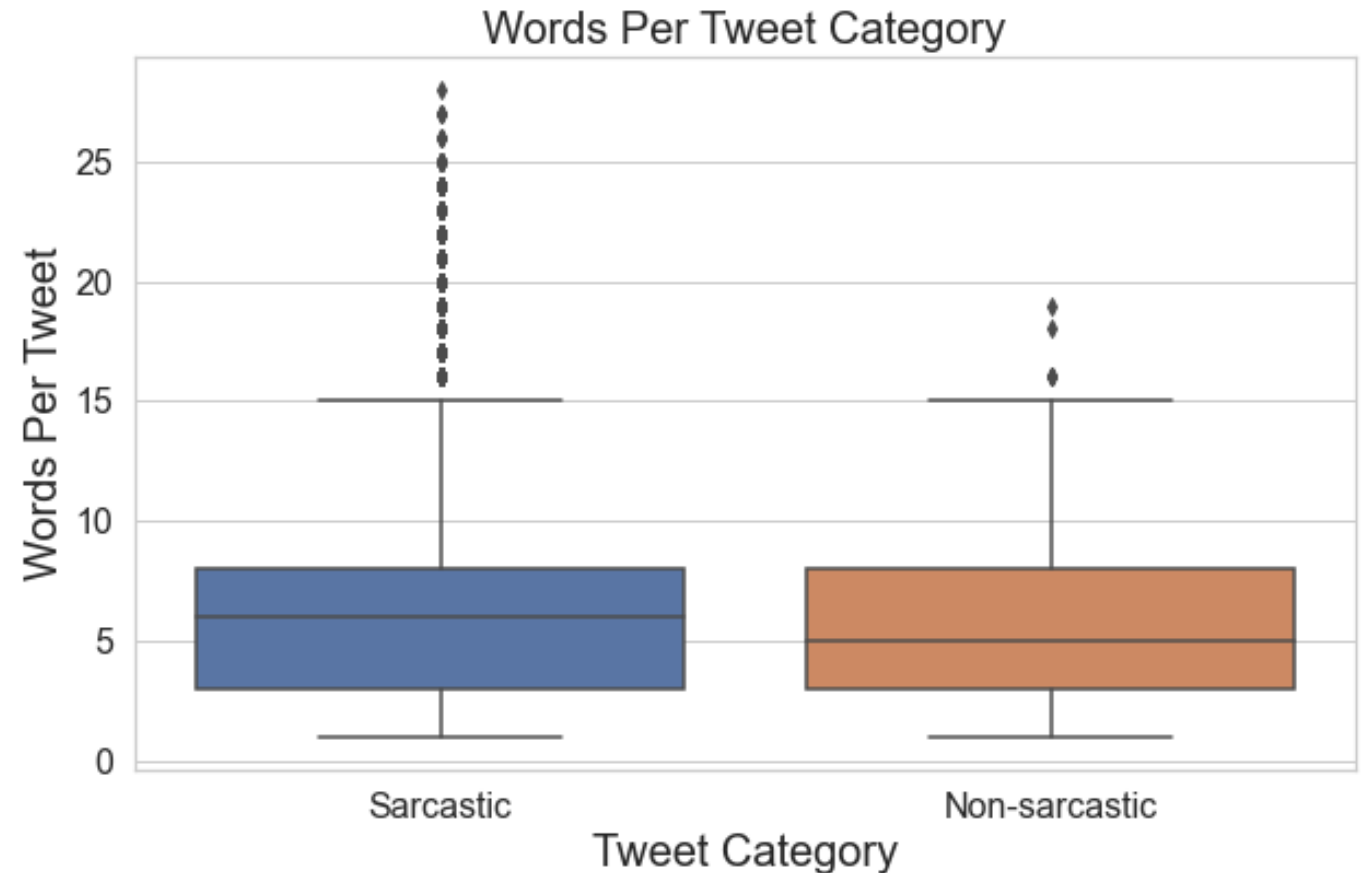
- Gauges public attitudes towards a particular topic
- Important business tool
- Social media often used to measure attitudes towards products
- Sarcastic posts represent potential large source of error

Detecting Sarcasm

- Developed a model to detect sarcastic tweets
- Used NLP and machine learning
- Tuned the model for hypothetical business applications
- Tested the model on a novel sentiment analysis of tweets

Sarcastic Posts Contained More Words

- Collected > 104,000 & non-sarcastic sarcastic tweets
- Processing steps including removing stop words, etc.
- Processed tweets contained 292,000 total words



Sarcasm Probability Scores

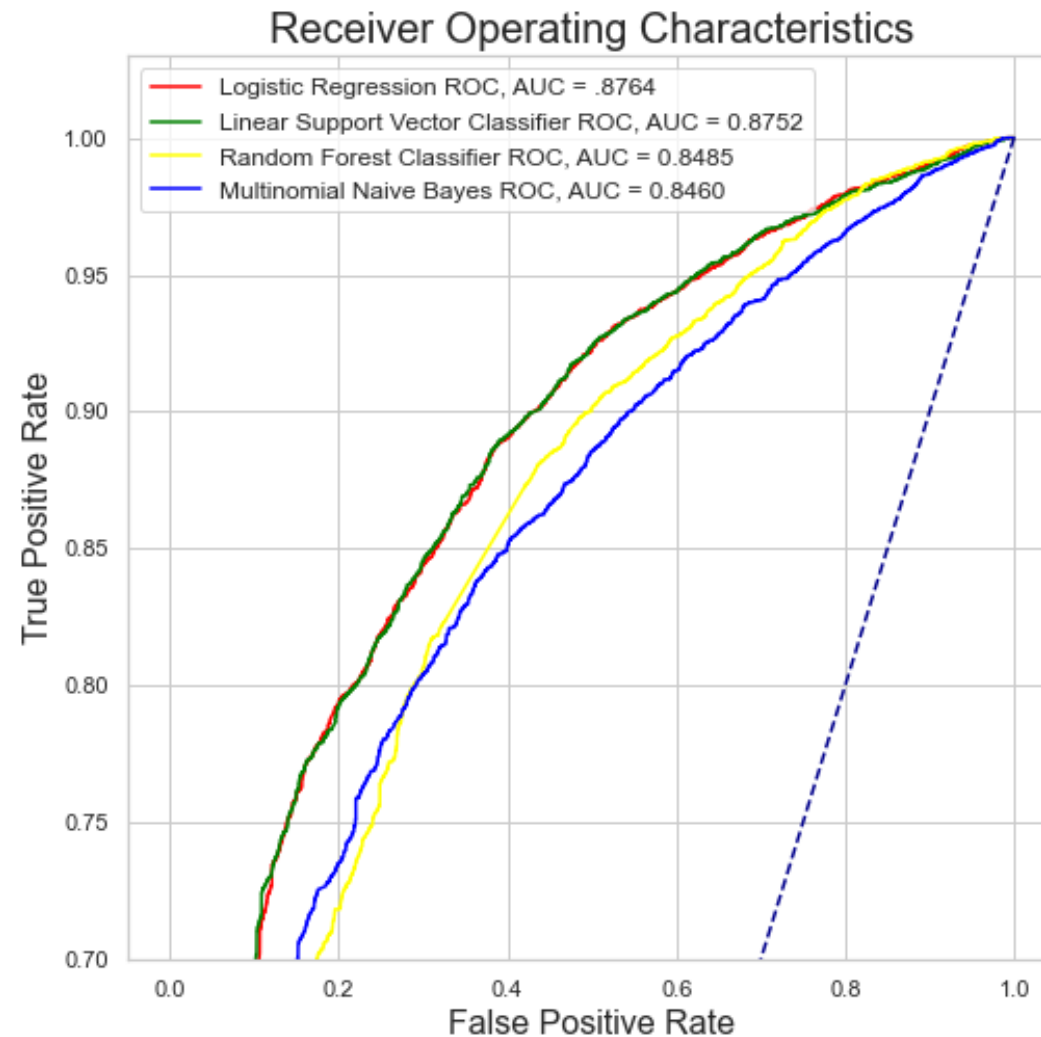
Most sarcastic words

resist	0.9517
belt	0.945
rose	0.933

Least sarcastic words

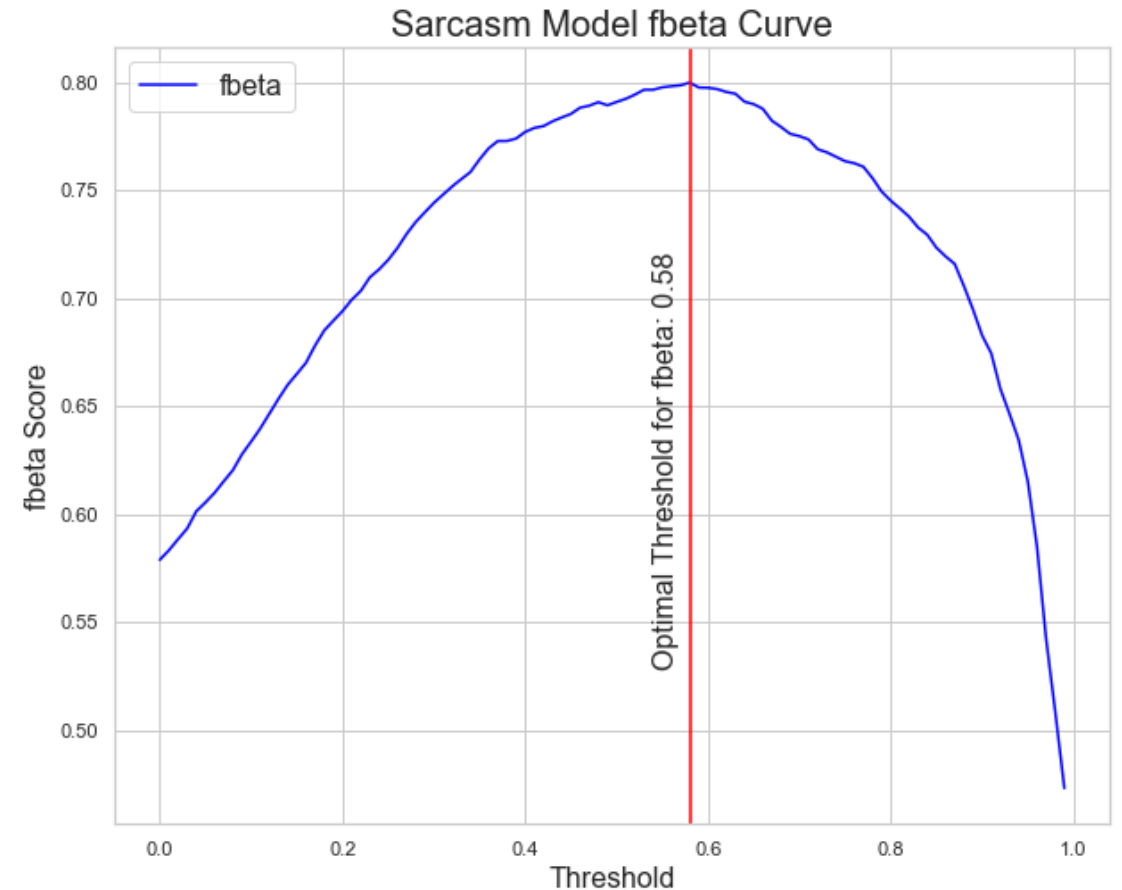
biden	0.0219
prepared	0.0312
coronavirus	0.0346

Logistic Regression Performed Best for Predicting Sarcastic Tweets



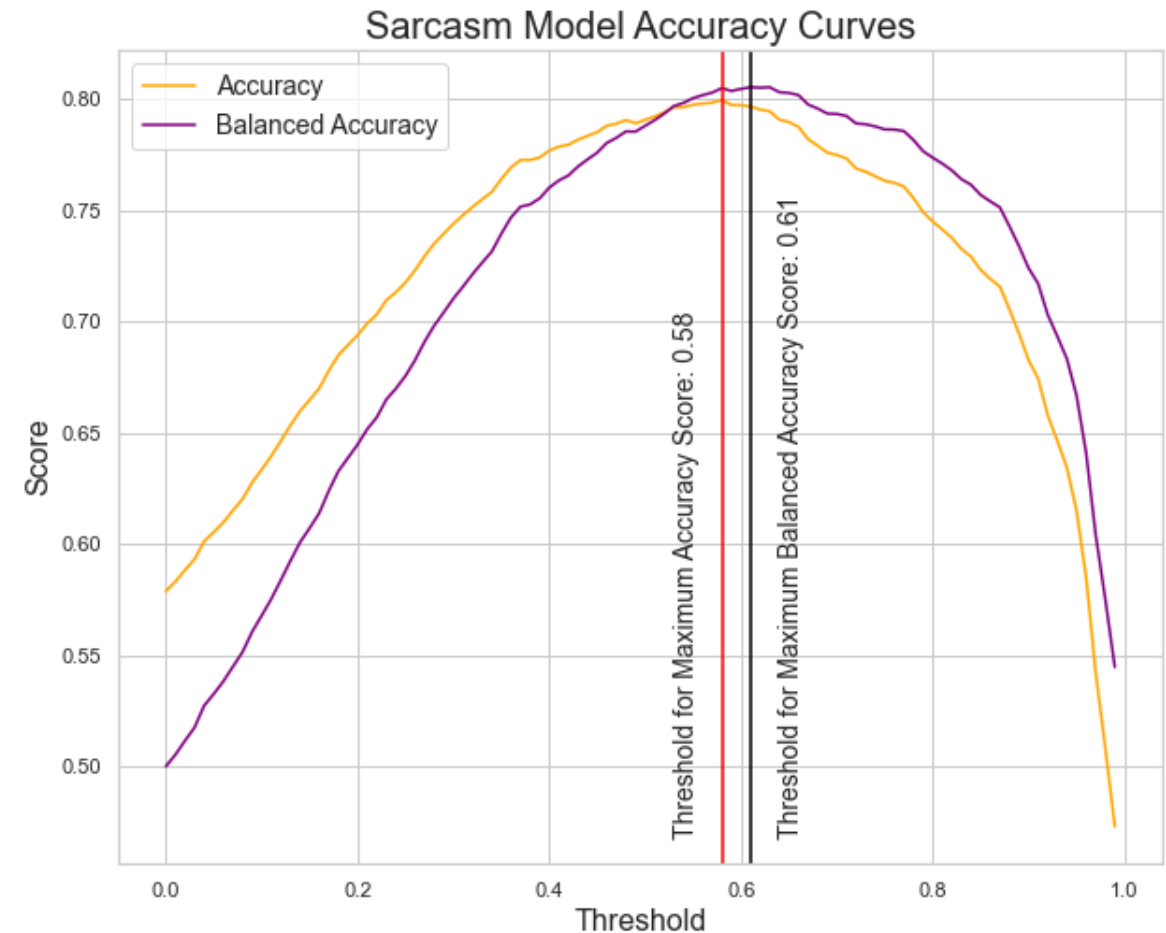
Business Scenario One: Minimize Overlooking Sarcastic Tweets

- Adjusted fbeta parameter to emphasize recall
- Determined the threshold maximizing fbeta
- Reduced false negatives by 432



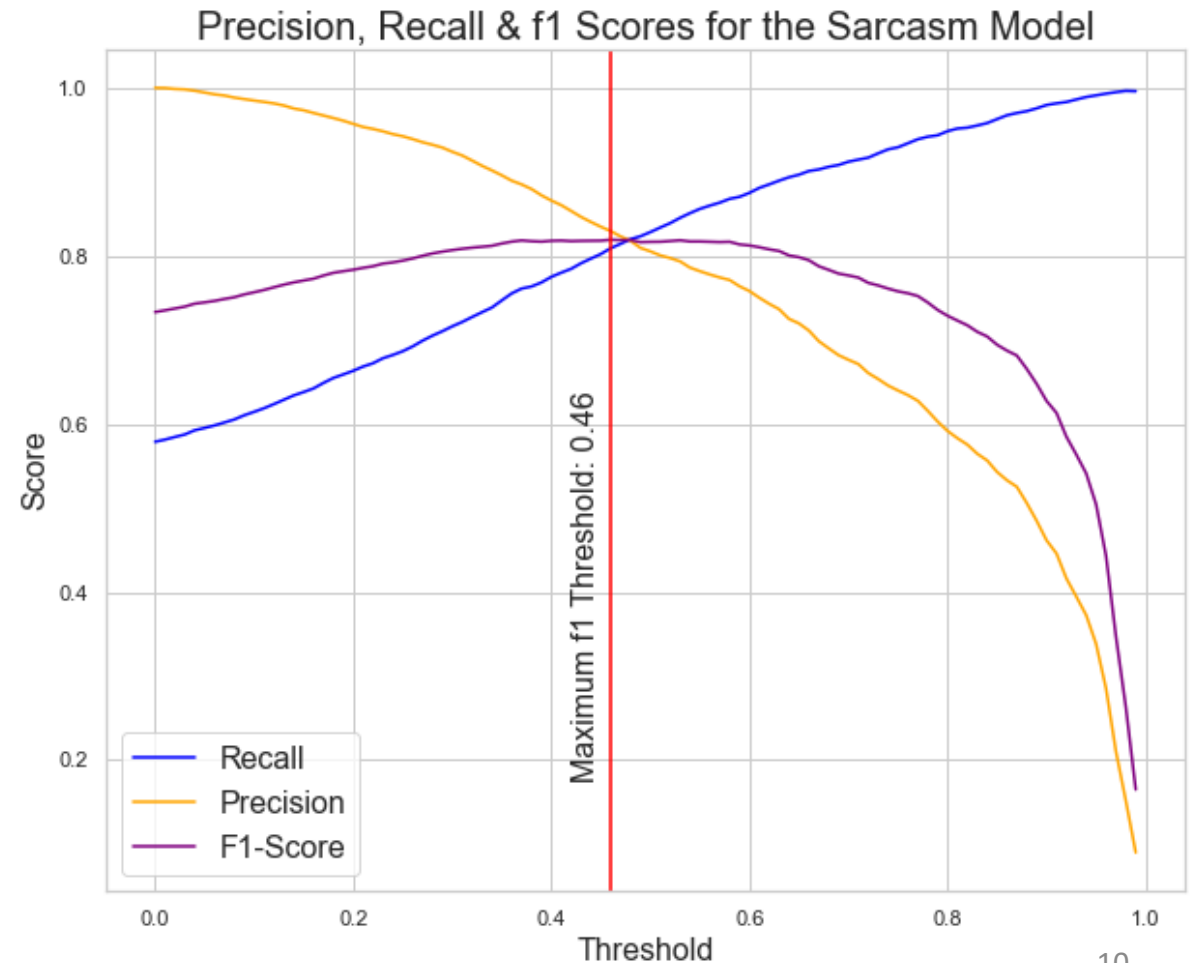
Business Scenario Two: Capture an Accurate Product Sentiment

- Calculated accuracy and balanced accuracy scores for a range of threshold values
- Determined thresholds that maximized both scores



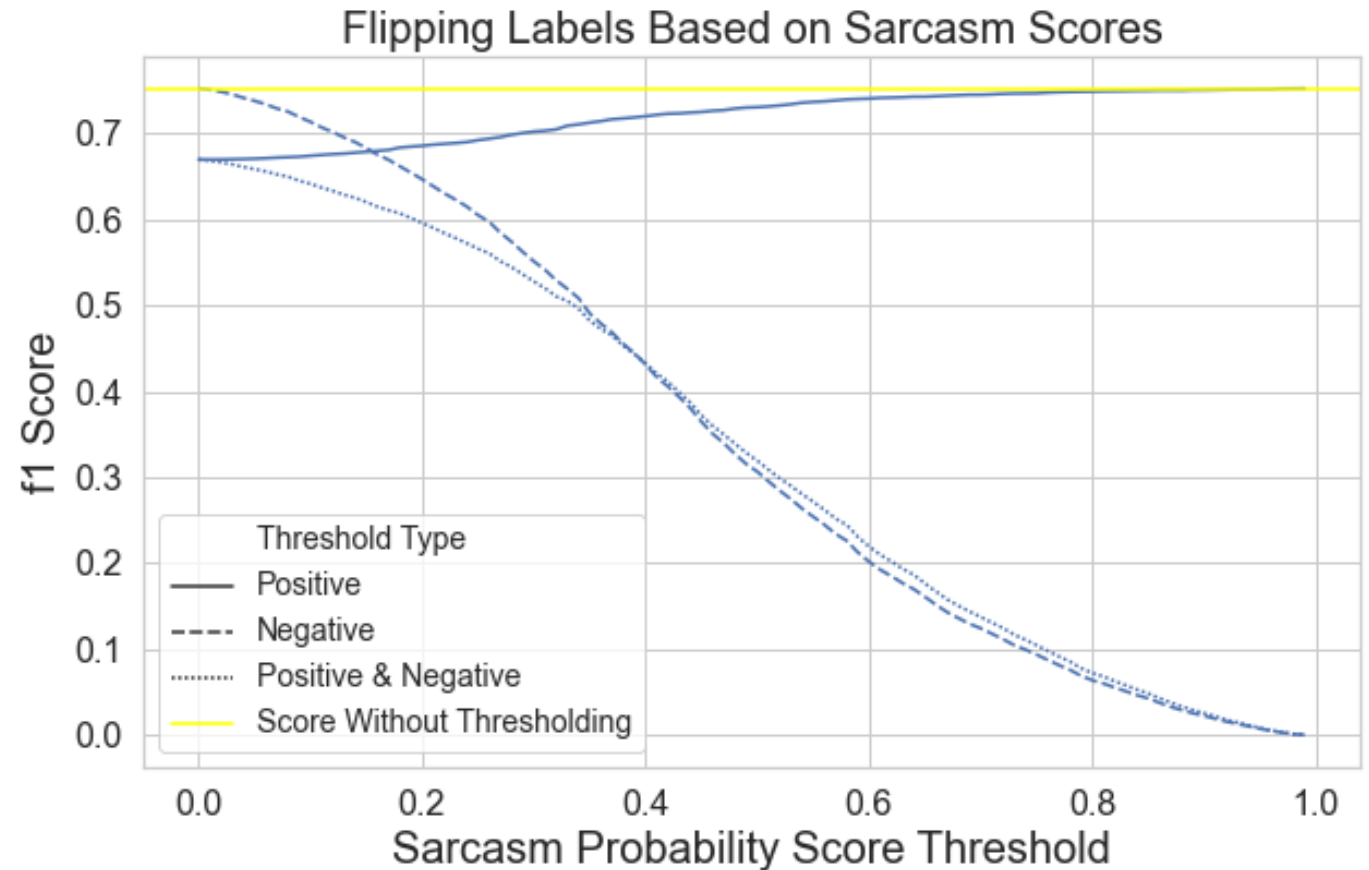
Business Scenario Three: Balance False Negatives & False Positives

- Calculated f1 scores for range of threshold values
- Determined threshold that maximizes f1
- Slight decrease in false negative
- Slight increase in false positives



Business Scenario 4: Improve a Novel Sentiment Analysis

- Use sarcasm model to improve an existing sentiment analysis
- Sentiment140 dataset
- Used naïve Bayes to predict positive or negative tweets
- Changed labels based on sarcasm scores for range of thresholds
- No improvement observed



Web App

- Created a web app
- thesarcometer.com
- Demonstrates sarcasm model
- Compares sarcasm score of a novel username with celebrity Twitter accounts

