Phase4 Project - Natural Language Processing

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Natural language processing

What is Natural Language Processing?

- NLP refers to the branch of computer science concerned with giving computers the ability to understand text and spoken words in much the same way human beings can.

- NLP combines computational linguistics—with statistical, machine learning, and deep learning models. Together, these technologies enable computers to process human language in the form of text or voice data and to 'understand' its full meaning, complete with the speaker or writer's intent and sentiment.

source: NLP definition

Sentiment Analysis – Acme Online

Business Objective

1. Analyze tweets to check what customers are talking about.

2. Analyze tweets to identify the most popular product - pts 1&2 can be used to tweak Acme Online's inventory accordingly.

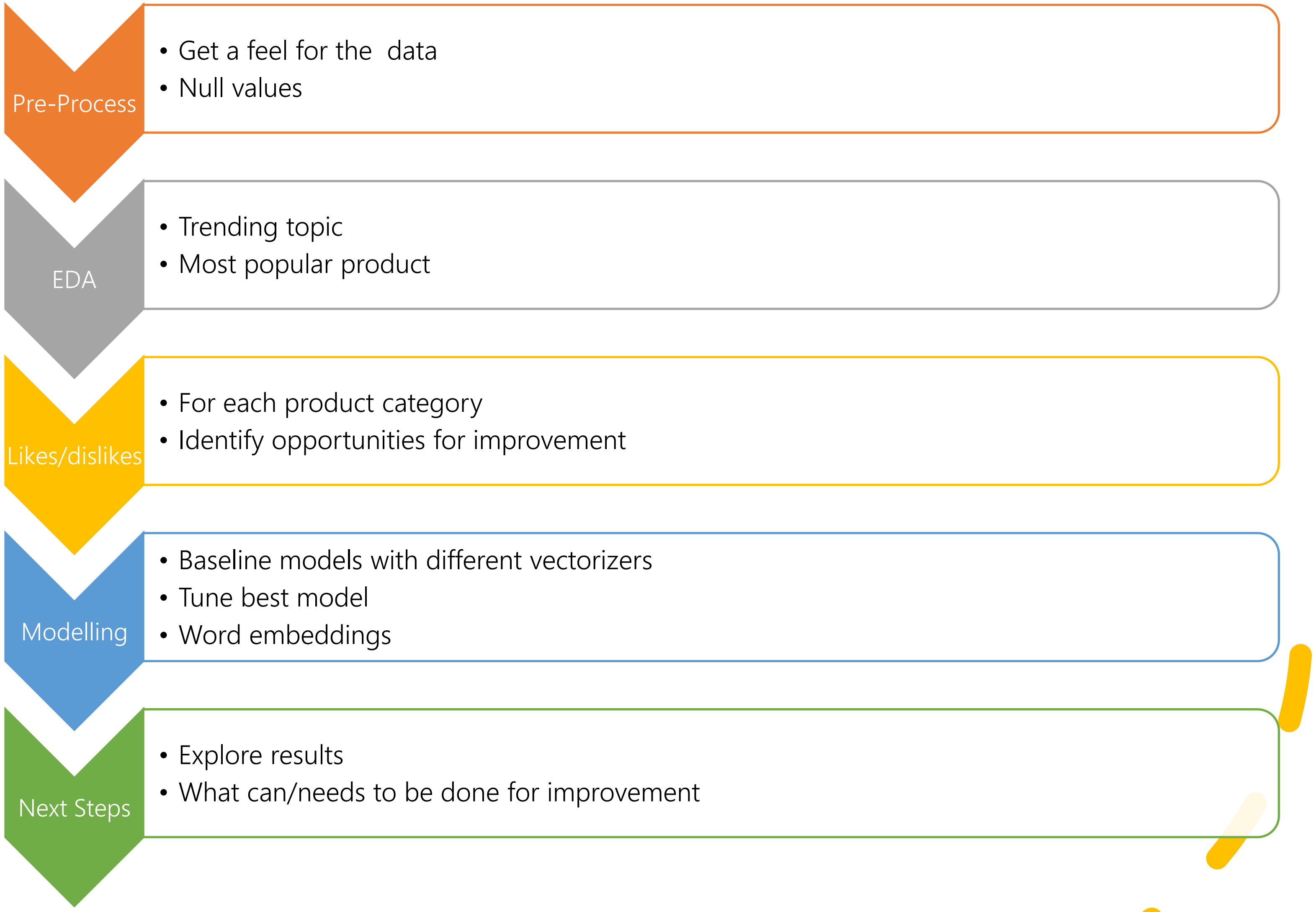
3. For each product, we will look to see what customers like/dislike to identify opportunities for improvement, if applicable.

4. Since human intervention was used identify products based on tweets, we will attempt to build a model using **NLP (Natural Language Processing)** to automate this. We will use the f1-score for model evaluations since minimizing False Positive and False Negatives is desirable.

Dataset

Dataset sourced from CrowdFlower via data.world: https://data.world/crowdflower/brands-and-product-emotions

Processes of NLP



Pre-Process

- Get a feel for the data
- Null values

EDA

- Trending topic
- Most popular product

Likes/dislikes

- For each product category
- Identify opportunities for improvement

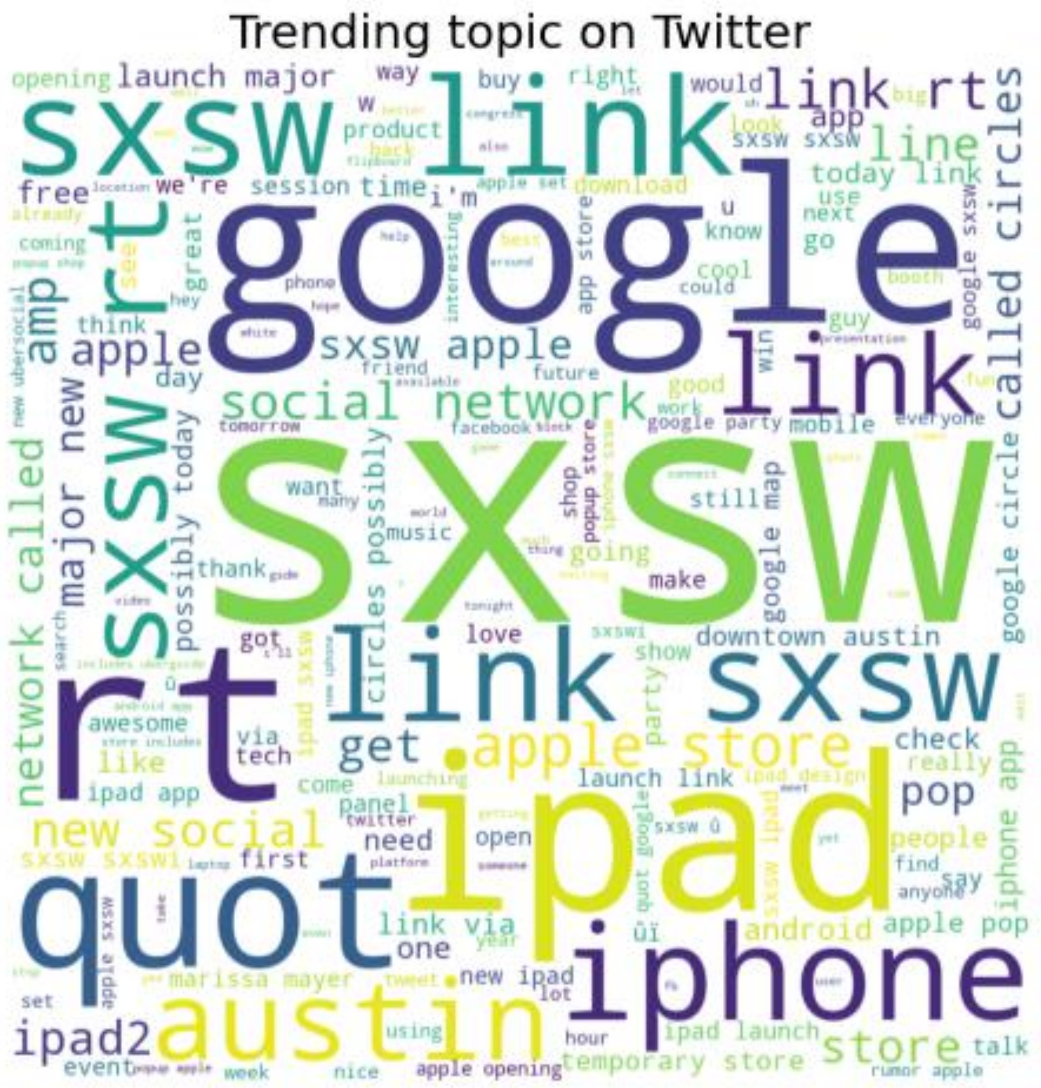
Modelling

- Baseline models with different vectorizers
- Tune best model
- Word embeddings

Next Steps

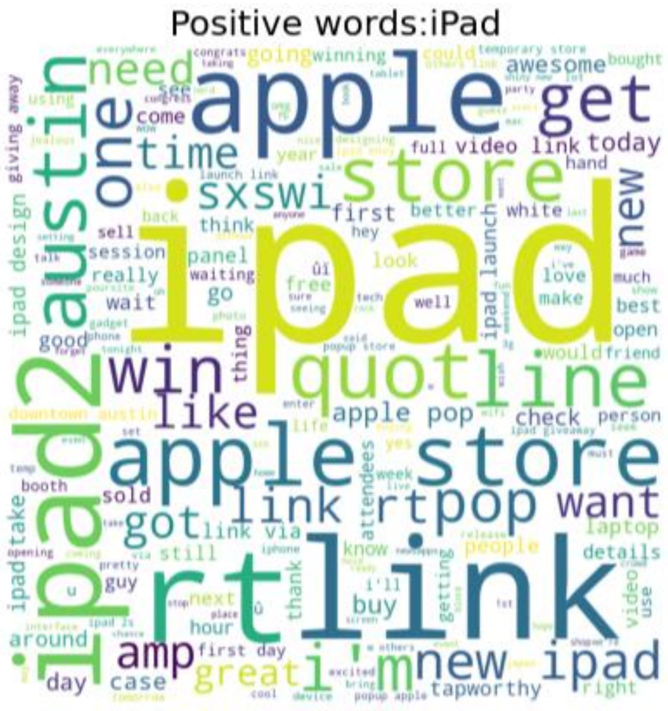
- Explore results
- What can/needs to be done for improvement

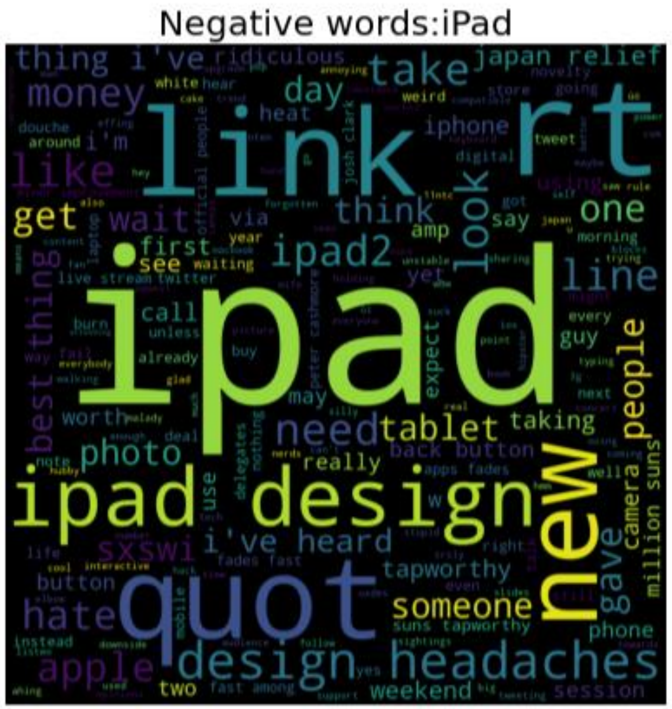
Trending Topic



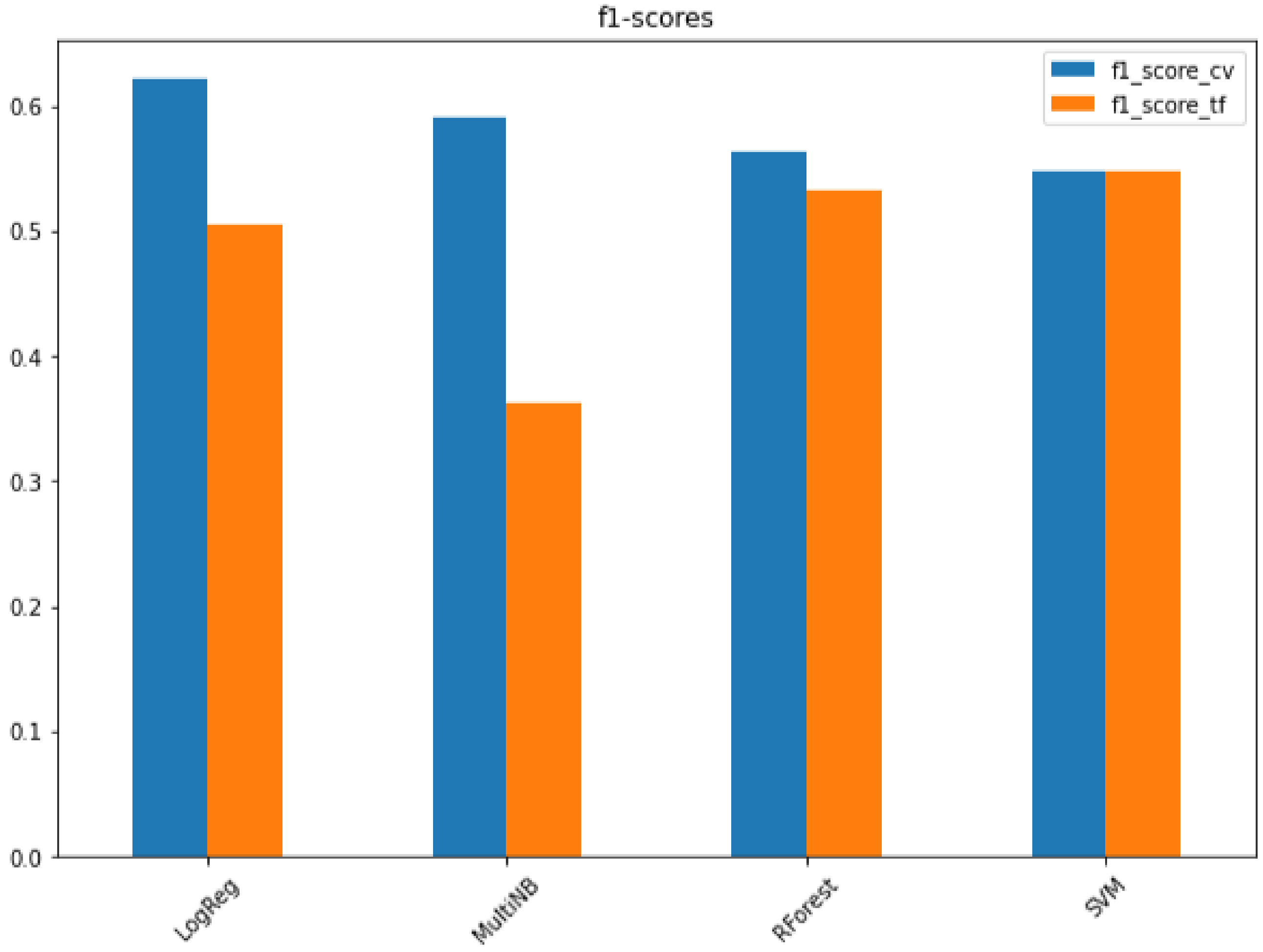
Trending topic on Twitter

Likes/Dislikes



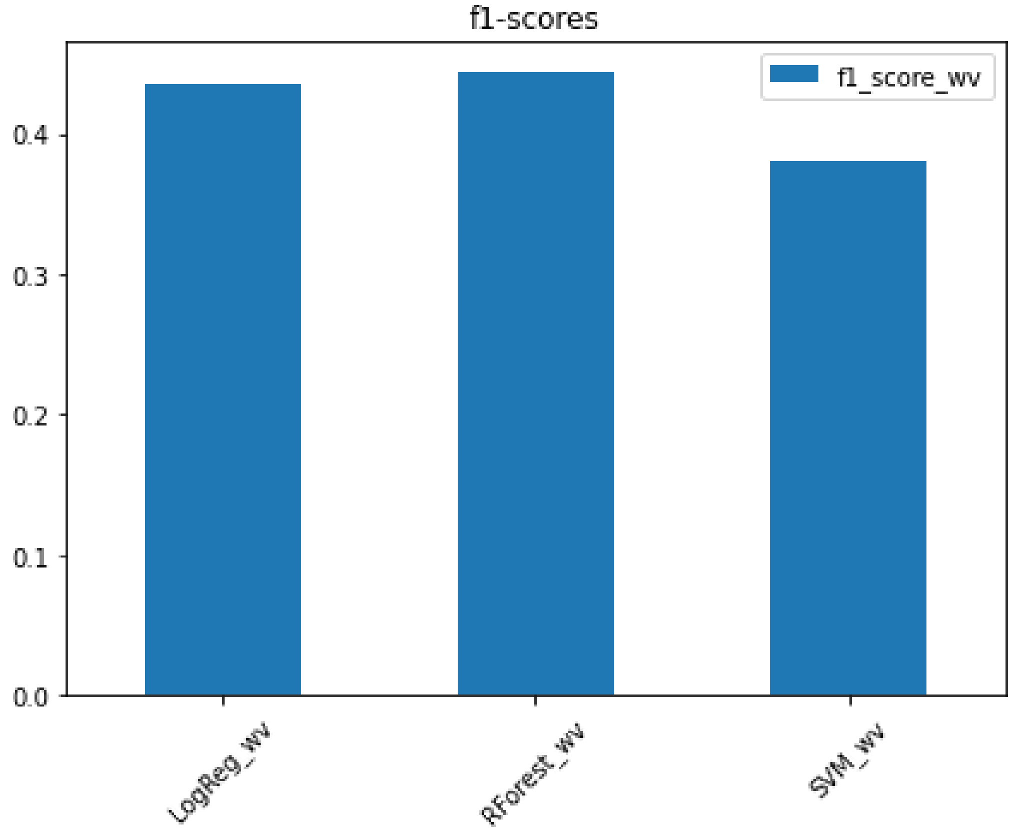


Baseline Models



Word Embeddings

Word2vec



Next Steps

- Since the iPad is the most popular product, Acme Online could look for opportunities to boost sales. Acme Online could also maybe expand their portfolio by offering tablets from other manufacturers to see if they will gain any traction.
- More data is recommended. Current data is very imbalanced impacting model performance.
- The hyperparameters of the Word2Vec vectorizer i.e., number of epochs, size of the vectors etc. can be tuned to see if results improve.
- Part-of-Speech tagging can be used to create more features.
- Ensemble methods like XGBoost and Adaboost can also be trialed for modelling along with other word embedding techniques like fastText and Glove.