Recommending 2nd Degree Twitter Users with NLP and Topic Modeling

Abstract

The goal of this project was to build a recommendation model that recommends 2nd degree Twitter users to follow based on the each users collective tweets, retweets and likes. I scraped approximately 19,700 from 106 different Twitter accounts using Twitters Tweepy API, and I used nature language processing, topic modeling, and distance calculations to determine the top 10 most similar accounts based on my Twitter preferences.

Design

I began the project by first collecting up to 100 tweets / retweets and 100 likes per user using Twitter's Tweepy API v2. I compiled the data into a data frame and cleaned the data by stripping punctuation, removing html links, converting characters to lower case (using regular expression), and removed certain parts of speech (used NLTK's pos_tag to identify unnecessary words for topic modeling). I also created a function to extract crypto-specific terms as the topic modeling algorithms were having issues categorizing these terms. I finally consolidated all 200 tweets per user into one document, resulting in 106 final documents for topic modeling.

I then used SciKit Learn's CountVectorizer and TF-IDF Vectorizers to convert each term in the document to a numerical value. I then applied Latent Semantic Analysis (LSA) and Non-Negative Matrix Factorization (also from SciKit Learn), along with Latent Dirichlet Allocation (from Gensm) to compile all terms into 3-5 main topics. This greatly simplified the document-term matrix and reduced dimensionality. I chose the NMF (using the TF-IDF vectorizer) model because was the only model that correctly categorized the two most relevant topics of interest — crypto and sneakers.

With terms in the NMF model reduced to 3 main topics (General, Sneakers, and Crypto) I implemented the cosine-similarity function to compare my personal account's topic with values with all other 105 documents to determine the top most similar accounts based on my accounts tweets and likes.

Data

Using Twitter's Tweepy API, I scraped 19,759 tweets from 106 different Twitter accounts, consisting of tweets, retweets, and likes. These Twitter accounts are all second degree Twitter followers. For each user I follow, I identified five accounts that that user follows, totaling 958 accounts. I randomly chose 106 of these accounts and extracted 200 tweets each. I would have gathered tweets from more second degree users; however, the scraping process was too long for this project.

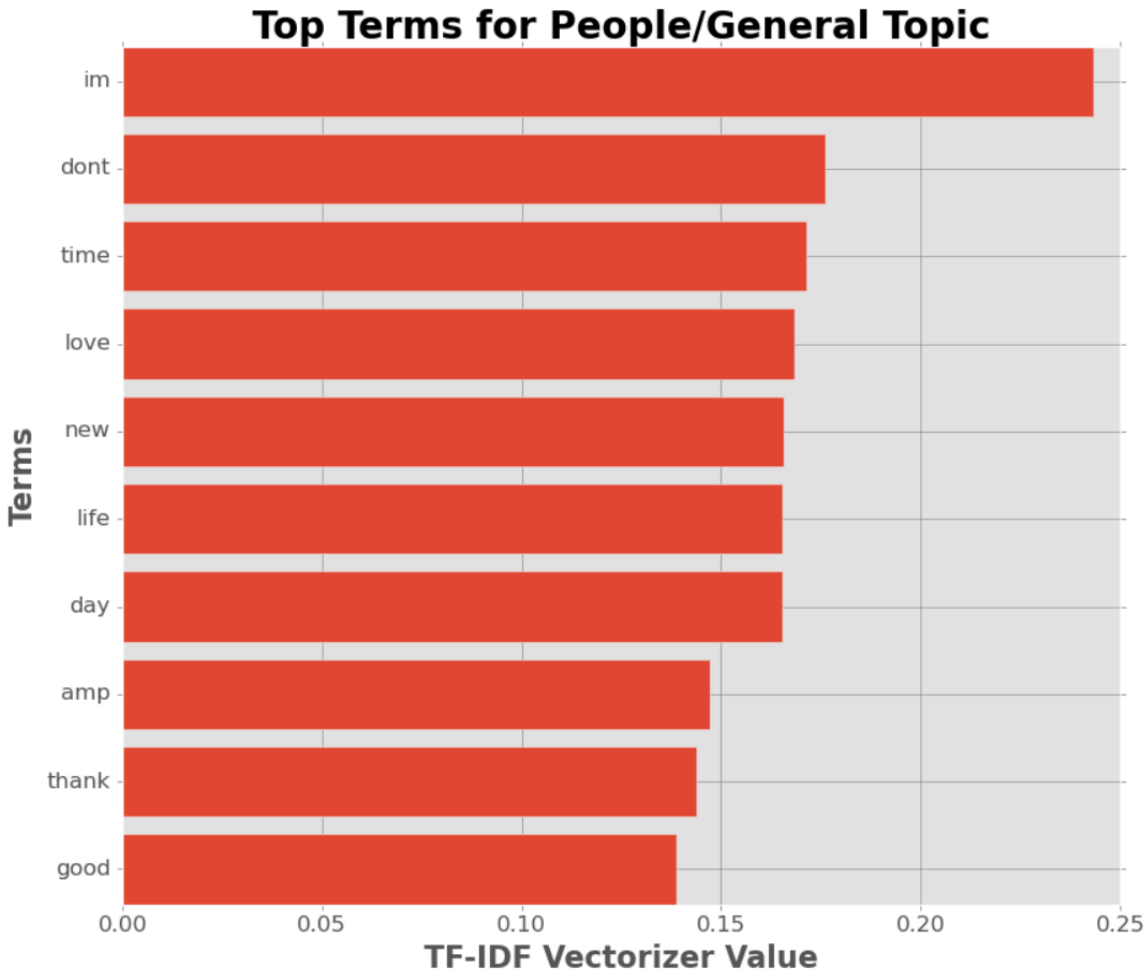
Algorithms

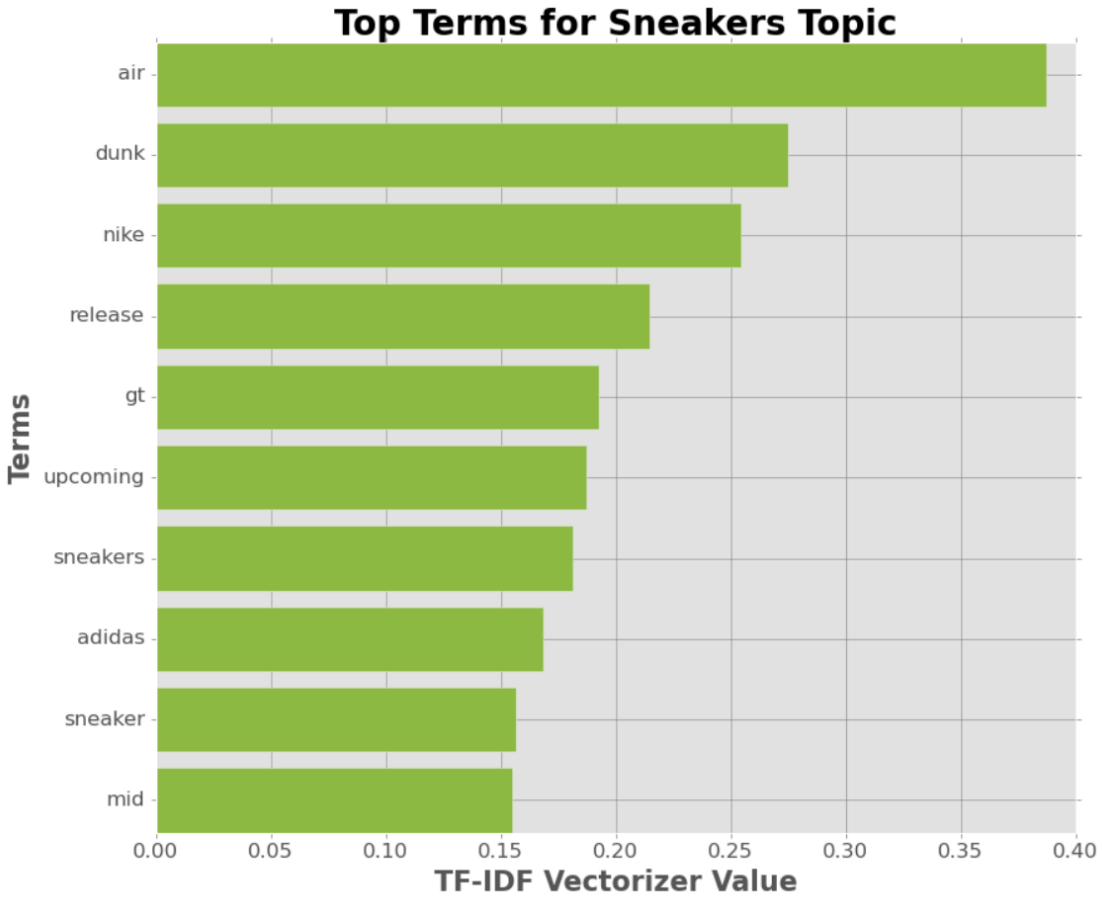
- Scikit Learn
  - Latent Semantic Analysis (LSA)
  - Non-Negative Matrix Factorization (NMF)
  - Cosine Similarity
  - Count Vectorizer
  - TF-IDF Vectorizer
- Gensim
  - Latent Dirichlet Allocation

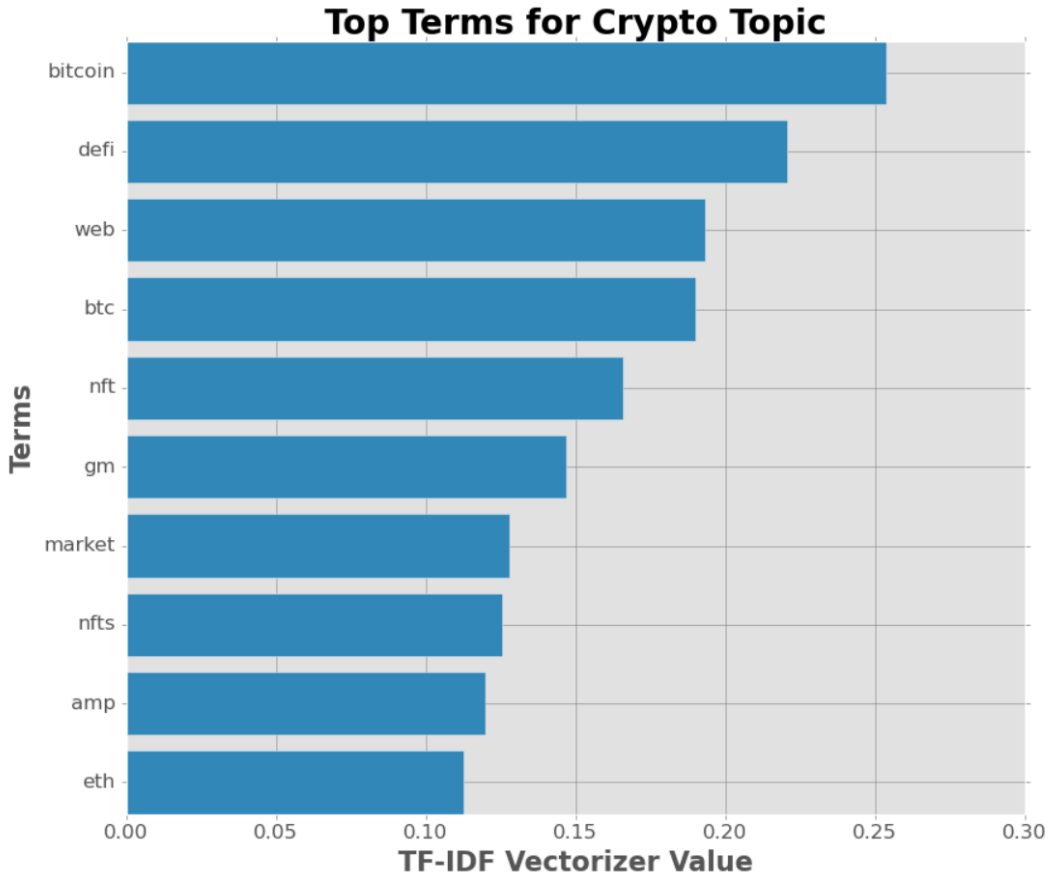
Tools

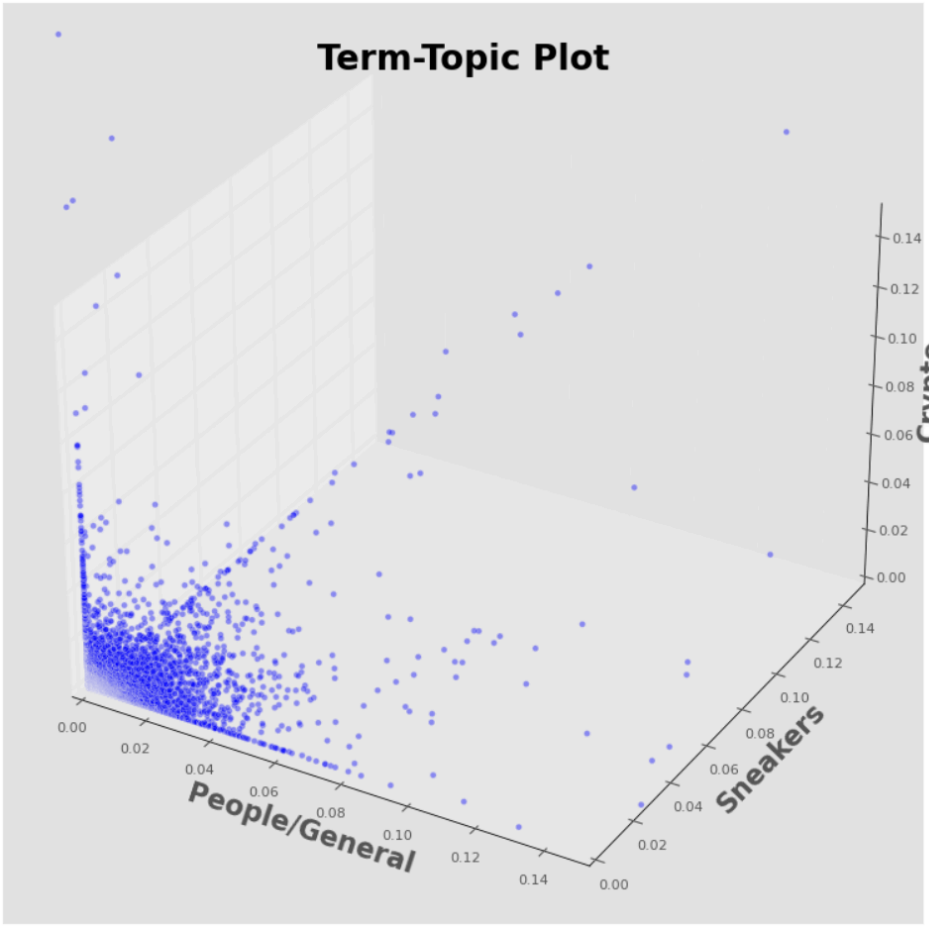
- Numpy and Pandas for data manipulation
- Scikit-learn for modeling
- Matplotlib for visualization
- NLTK for Natural Language Processing / Cleaning

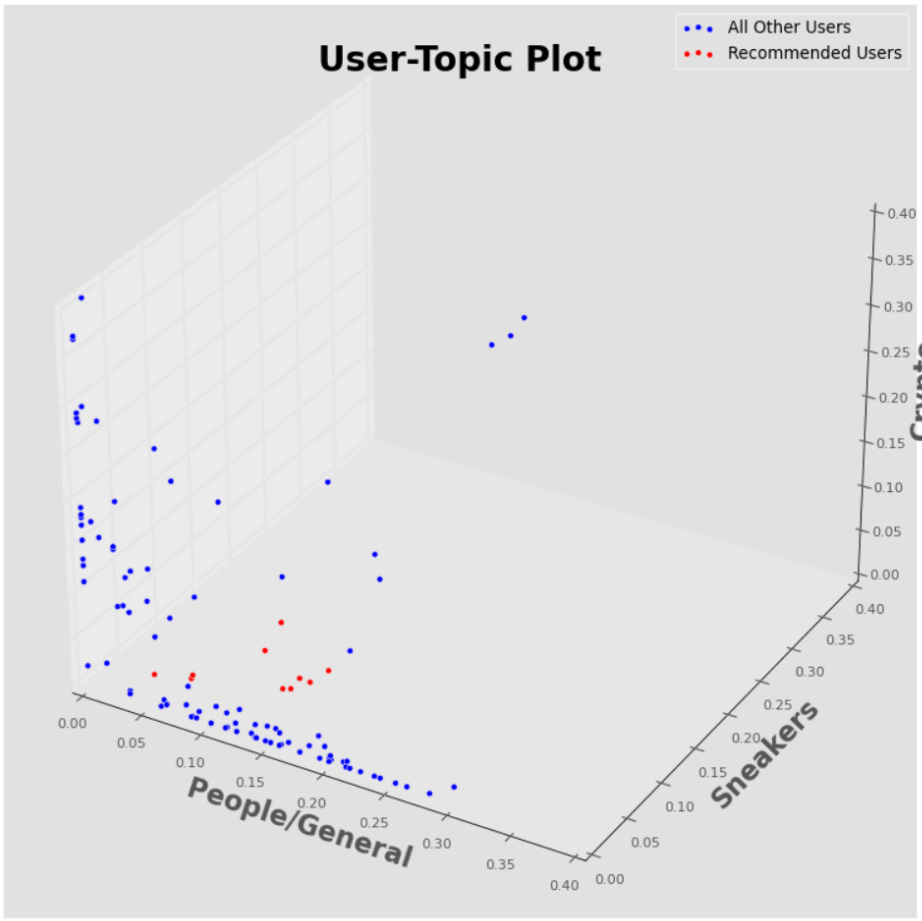
Communication




Top Terms for Sneakers Topic
air
dunk
nike
release
gt
upcoming
sneakers
adidas
sneaker
mid
Terms
0.00
0.05
0.10
0.15
0.20
0.25
0.30
0.35
0.40
TF-IDF Vectorizer Value


Top Terms for Crypto Topic
bitcoin
defi
web
btc
nft
gm
market
nfts
amp
eth
Terms
0.00
0.05
0.10
0.15
0.20
0.25
0.30
TF-IDF Vectorizer Value


Term-Topic Plot
People/General
Sneakers
Crypto
0.00
0.02
0.04
0.06
0.08
0.10
0.12
0.14


User-Topic Plot
All Other Users
Recommended Users
People/General
Sneakers
Crypto
0.00
0.05
0.10
0.15
0.20
0.25
0.30
0.35
0.40