Yelp Reviews: Sentiment Analysis and Food Recommendation

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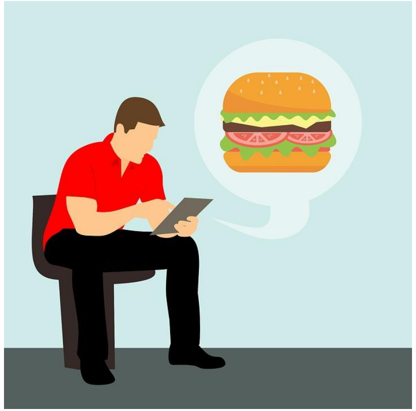
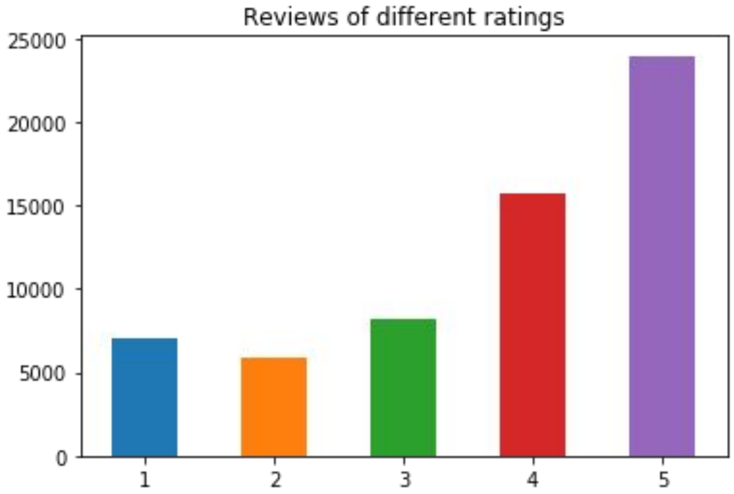
Problem Statement



- People don’t know what to order.
- A “popular dishes” feature will help customers with orders.
- Restaurants can promote their popular dishes and improve disliked ones.

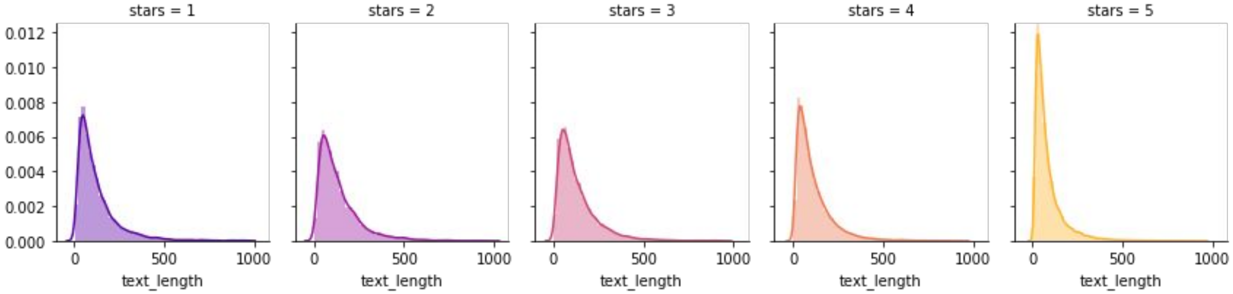
Data Source: Yelp Open Dataset https://www.yelp.com/dataset

Exploratory Data Analysis



The 5 star reviews have the most counts, followed by 4, 3, 1 and 2.

Review Lengths



People who tend to review a business as good (4 or 5 stars) have shorter reviews (86 or 113 words), and the reviews that have poorer ratings tend to be longer words.

Text Mining

Word Cloud of Reviews of 5 Stars

Word Cloud of Reviews of 4 Stars

Text Mining

Word Cloud of Reviews of 1 Star

- The 5 star reviews use positive words like “good”, “great”, “love”, “delicious”, and “amazing”.
- The 4 star reviews have similar words as 5 stars, but not as many “love”, “amazing”, or “best” as in 5 star reviews.
- The most request words in 1 star reviews are neutral words such as “food”, “place”, “time”, “said”, “total”, “table”, “order”, “service”, “never”.

Prediction of Review Stars

Vectorizer	Supervised Learning Algorithm	Training Accuracy	Test Accuracy
CountVectorizer	MultinomialNB	0.677	0.596
TfidfVectorizer	MultinomialNB	0.611	0.549
2-gram CountVectorizer	MultinomialNB	0.727	0.609
CountVectorizer	Random Forest	0.999	0.560
CountVectorizer	Gradient Boosting Machine	0.611	0.558

Strongly Predictive Features

Unigram: “Disrespectful”, “flawless”, “insulting”, “locked”, “magnificent”, “manny”, “prakash”, “redeeming”, “remembers”, and “sublime”.

Bigram: “best italian”, “give zero”, “instead 5”, “manager told", "notch service", "place rocks", "recommend everyone", "took great", "worst customer", and "worst place".

Trigram: "give zero", "give zero stars", "great care us", "instead 5", "notch service", "reason didn"t give", "took great", "top notch service", "worst customer service", and "worst place".

Good Words and Bad Words

polenta delish flavorless poisoning
unique perfection unprofessional aok
beautifully gem worst tasteless
delightful hearty terrible lacked
perfect pumpkin unacceptable luke

Food Recommendation for a Restaurant

- Test the function to recommend 10 most recommended food for a random restaurant:

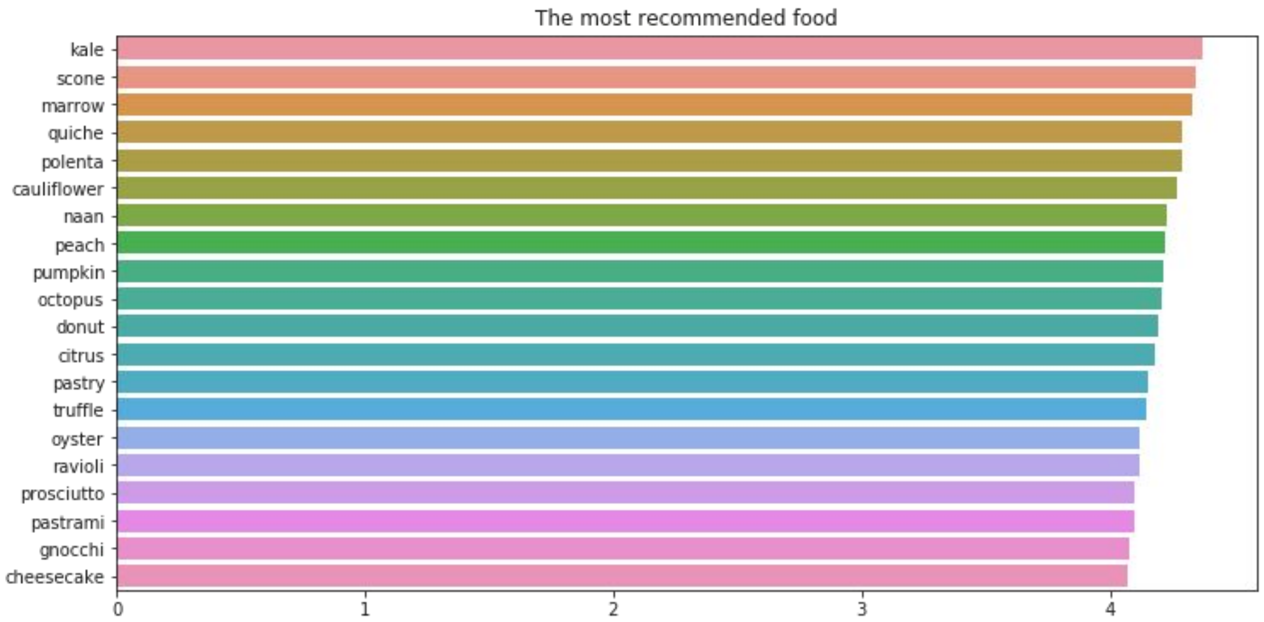
['macaroni', 'pork', 'mango', 'avocado', 'plate', 'date', 'noodle', 'tuna', 'orange', 'guava']

- Test the function to list food items to avoid for five random restaurants:

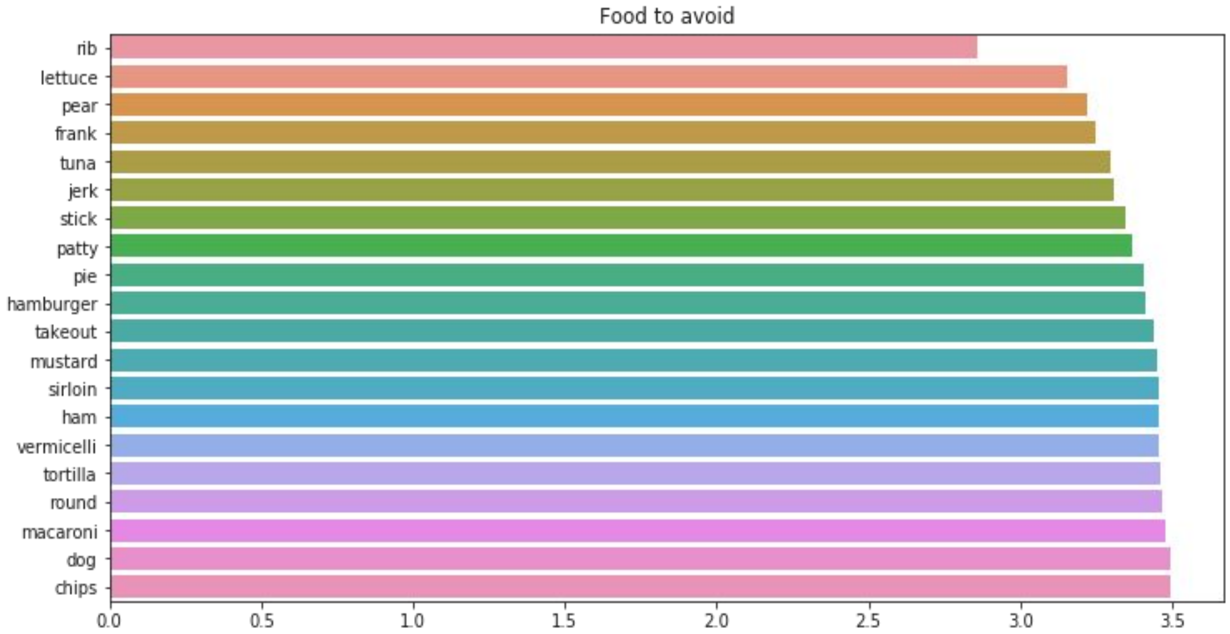
[['eggplant', 'chocolate', 'strawberry', 'green', 'coconut', 'beef', 'bread', 'mango', 'prawn', 'spinach'],
['beef', 'raspberry', 'veau', 'bread', 'spaghetti', 'truffle', 'plate', 'tart', 'pumpkin', 'bacon'],
['onion', 'mushroom', 'pepper', 'meat', 'buffalo', 'pineapple', 'ham', 'leftovers', 'shoulder', 'wiener'], ['chicken', 'bacon', 'fish', 'cheese', 'pie', 'buffalo', 'lettuce', 'heart', 'pepperoni'],
['loaf', 'collards', 'confit', 'beef', 'shoulder', 'pepper', 'butter', 'meatloaf', 'scone', 'gem']]

20 Most Common Food Items in the Sample Set

The Most Recommended Food



Food You Should Avoid



Limitations

- I don't have the menu item names to begin with, so I used the a food list from nltk.corpus wordnet.
- Sometimes, there are several food items in one review. This model treats them as the same rating. More work could be done to analyze the reviews by sentence, and by the predicted score of that sentence in which the food item appears.

Future Work

- Labeling the food items by phrases to create a list that is more similar to the real menu, for example, if "pork" and "rib" are together, the menu item might be "pork rib".
- The sentiment analysis of reviews by sentence, so a more accurate food recommendation model can be built.