Yelp Food and Service Aspect-Based Sentiment Analysis

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Summary

Current Yelp practices allow you to see reviews displayed with a 5-star rating. Although, how would you interpret a review says the food is great, but the service is bad then is given a 2 star review? Our project uses aspect-based analysis to predict food and service related sentiments. We experimented and concluded that BERT was able to predict food/service reviews with a 83%/81% accuracy.

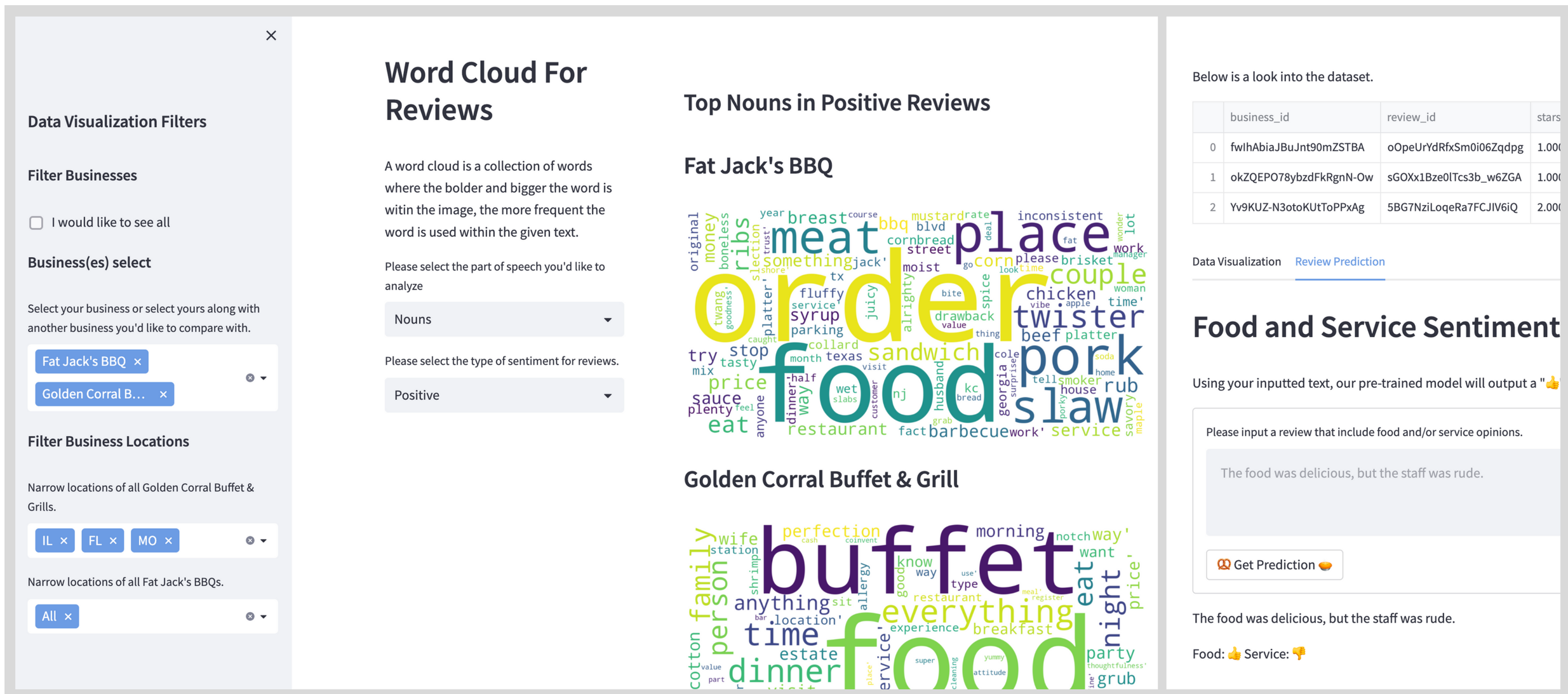
Why Add Food/Service Sentiment?

Consumers have different preferences and could make sacrifices quality of food for quality of service and vice versa. Adding food and service sentiment to reviews benefits consumers, Yelp users, and businesses active on Yelp.

Who Is Impacted by Our Project?

Business owners on Yelp benefit from having target customers seek them out for goods or services and have the ability to compare their data with other businesses. Consumers have another layer to base consumption decisions off of.

Web Application



Yelp Challenge Dataset

The data was downloaded from www.yelp.com/dataset . Only review.json and business.json files were kept.

Number of Rows:	200,000
Sentiment Ratio:	1:1 positive to negative
File size after filtering:	1.2 GB

Methodology

We first used LDA topic modeling to create a word corpus for food and service and filtered the data for relevant reviews. Then we removed 3 star reviews to prevent ambiguity, created labels to represent sentiment, and balanced the dataset. Sentences containing food and service aspects together were POS tagged to get adjective-target word pairs. To pre-process the data, a combined unigram and bigram feature extraction was used for NB, RF, and SVM. Other models tested include BERT, CLSTM, and bidirectional LSTM.

Model Evaluation

Model	Food Accuracy	Service Accuracy
BERT	83%	81%
Naive Bayes	82%	80%
Linear SVM	81%	80%

BERT does well predicting, however, it has a train time of 2 hours given 10,000 rows of data. Naive Bayes has a train time of half a minute and SVM with 10 minutes. Given the trade off of runtime and accuracy, Naive Bayes is the best choice if Yelp were to implement this feature on its old reviews.