NLP-Driven Customer Feedback Analysis

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Abstract

This project utilized Natural Language Processing (NLP) techniques to analyze a sample of 5,000 customer reviews. The analysis focused on understanding customer sentiment, identifying key topics, and generating actionable business insights. The findings indicate that the majority of reviews are positive (78.38%), with a smaller portion being negative (14.06%). A Support Vector Machine (SVM) model was the most accurate in classifying sentiment, achieving 83.00% accuracy.

Text Analysis & Sentiment Insights

- **Overall Sentiment:** The sentiment distribution shows a predominantly positive outlook, with 3,919 reviews classified as positive, 703 as negative, and 378 as neutral.

- **Word Clouds:** The positive word cloud highlights terms such as "love" and "great," while the negative cloud features words like "amazon" and "find".

- **N-gram Analysis:** The top positive bigrams include "taste like," "highly recommend," and "taste great". The top negative bigrams are "taste like," "waste money," and "taste good". The phrase "taste like" appears in both contexts, suggesting it can be a polarizing topic for customers.

Classifier Performance

The project evaluated three machine learning models for sentiment classification, with the following performance metrics on the test dataset:

Model	Accuracy	F1-Score (Macro Avg)
Logistic Regression	0.8190	0.4400
Multinomial Naive Bayes	0.7850	0.2978
Support Vector Machine (SVM)	0.8300	0.4739

The SVM model was the best-performing classifier, achieving the highest accuracy and F1-score.

Key Recommendations

- **Product Improvement:** The topic modeling revealed key areas of concern. Topics related to 'Tea' (Topic 0), 'Coffee' (Topic 3), and 'Pet Food' (Topic 4) are critical. The NER analysis of negative reviews highlighted specific brands like "Evo" and "Blue Buffalo", which suggests that improving product taste and ingredient quality is a key area for development.

- **Customer Communication:** The negative bigram "waste money" suggests that customers may feel the product does not live up to its price. Addressing common complaints and managing expectations about product value can be done through product descriptions or customer support bots.

- **Marketing Strategy:** The N-gram analysis identified phrases like "highly recommend" and "great taste" as top positive keywords. The marketing strategy should leverage this positive feedback in campaigns to attract new customers.

- **Crisis Management:** It is recommended to monitor sentiment trends over time to spot sudden spikes in negative sentiment. The NER results can help to quickly identify specific brands or dates associated with these spikes.