Analyzing McDonald's Customer Feedback: Insights from Natural Language Processing

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***Abstract*—Analyzing what customers say helps us figure out how well restaurants are doing. This study focuses on seeing which McDonald's branches are doing a great job and which ones need to do better. We used Natural Language Processing (NLP) to look through 33,000 reviews of McDonald's stores across the United States. By checking out what customers are saying, we can learn a lot about their experiences. This information can then be used to make specific branches of McDonald's even better. Our goal is to use what customers are telling us be it positive or negative to make sure McDonald's keeps on improving and meets the needs of its customers everywhere not just in the United States.**

I. Introduction

Customer feedback plays a crucial role in understanding service quality and improving customer satisfaction in the restaurant industry.In this paper, we focus on analyzing McDonald's Store Reviews using Natural Language Processing (NLP) techniques.

The McDonald's Store Reviews dataset comprises over 33,000 anonymized reviews scraped from Google reviews across various McDonald's locations in the United States. Using this dataset we would be able to uncover sentiments and see how each McDonald's Store is rated based on the opinions of the consumers.

In this paper, we present our methodology for preprocessing the dataset and applying NLP techniques such as sentiment analysis. The results based on customer feedback will then be presented using graphs generated through the use of said techniques.

II. Dataset Description

A. McDonald's Dataset Overview

The dataset serves as the basis for the analysis of customer reviews. This sections provides a comprehensive overview of the dataset as well as its content, structure, and source.

The file used is called McdoReview.csv inside the file it contains the following information:

- reviewer id.
- store name.
- category
- store address
- latitude
- longitude
- rating count
- review time
- review
- rating

For this study I have opted to use the following columns:

- store name.
- store address
- review

I have done so since I am only after the reviews themselves in order to figure out how people think when they rate stores. The rating information is not used since it would only create a bias towards the information presented in the reviews, there are people who rate highly but leave reviews that reflect negatively or are seen as neutral reviews. I acquired this dataset through a website called kaggle which is known to house numerous other datasets that are legitimate.

III. Methodology

This section covers the methods used to analyze the McDonald's Store Reviews dataset, we employ a series of Natural Language Processing (NLP) techniques, including sentiment analysis and topic modeling. The following steps outline our methodology:

A. Data Preprocessing

Before performing any analysis, we preprocess the raw text data to ensure consistency and remove noise. The preprocess-

ing steps include:

- Removing missing data: Removing missing data from the dataset.
- Removing duplicates: Removing duplicate data from the dataset.

B. Sentiment Analysis

For sentiment analysis, we utilize the VADER (Valence Aware Dictionary and sEntiment Reasoner) lexicon implemented in the Natural Language Toolkit (NLTK). VADER is a rule-based sentiment analysis tool specifically designed for analyzing sentiments expressed in social media texts.

We apply the SentimentIntensityAnalyzer class from the NLTK's vader module to assign sentiment scores to each review. The SentimentIntensityAnalyzer calculates the polarity scores for each review, including positive, negative, neutral, and compound scores.

C. Visualization

In order to effectively communicate the results of my analysis, We used a combination of graphical and textual techniques for visualization. Matplotlib, a versatile plotting library in Python, served as the primary tool for creating graphical representations.

Additionally, to offer a more nuanced understanding of the sentiments expressed within the reviews, We utilized WordCloud, a powerful library for generating word clouds. This approach enabled the creation of visualizations that highlight the words most commonly associated with in positive and negative reviews .By visually highlighting these words, readers of this study would be able to easily understand the sentiments associated with the data.

D. Implementation

We implement our methodology using Python programming language along with the following libraries:

- **NLTK (Natural Language Toolkit)**: NLTK provides essential tools and resources for text processing and sentiment analysis.
- **Pandas**: Pandas is a versatile and intuitive data manipulation library in Python, extensively employed throughout the implementation phase of our methodology. With Pandas, we efficiently handle and preprocess the dataset. Pandas facilitates seamless integration with other libraries, enabling smooth transitions between data manipulation, analysis, and visualization tasks.
- **Matplotlib**: Matplotlib stands as a fundamental component of our visualization strategy, offering a diverse range of plotting functions and styles to create insightful visualizations. In particular, we utilize Matplotlib to create graphs. These visualizations are created to simplify the viewing experience.
- **WordCloud**: Similarly to MatPlotlib we used WordCloud to highlight certain words that are associated to the positive and negative reviews of customers.

These libraries offer robust functionalities for text processing, sentiment analysis, data manipulation, and visualization, facilitating the implementation of our methodology. Using these libraries we ensure a thorough analysis of the dataset.

IV. Results

In this section, we present the findings of our analysis of McDonald's Store Reviews using Natural Language Processing (NLP) techniques.

A. Sentiment Analysis

We analyze the sentiment expressed in McDonald's Store Reviews using the VADER lexicon from NLTK. The following figures depict the distribution of sentiment categories (positive, negative, neutral) across the dataset. The visualizations provided offer valuable insights into customer sentiments and topics discussed in McDonald's Store Reviews, facilitating a deeper understanding of customer experiences and preferences.

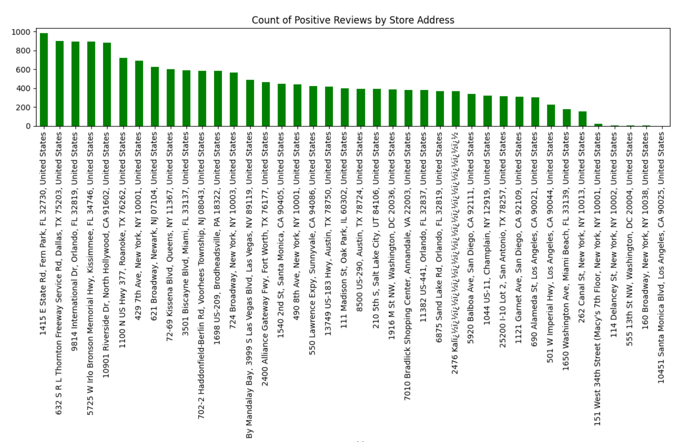

Fig. 1. Count of Positive Reviews by Store Address

V. Conclusion

In conclusion, after analyzing 33,000 anonymized reviews from Google, it was found that the McDonald's store located at 1415 E State Rd., Fem Park received the highest ratings

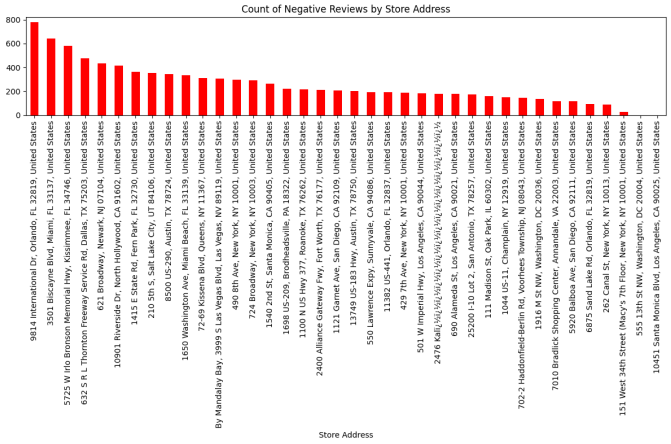

Fig. 2. Count of Negative Reviews by Store Address

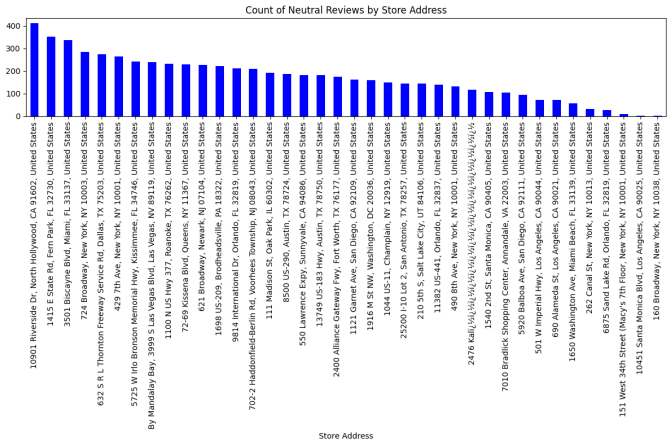

Fig. 3. Count of Neutral Reviews by Store Address

Fig. 4. Positive Word Cloud

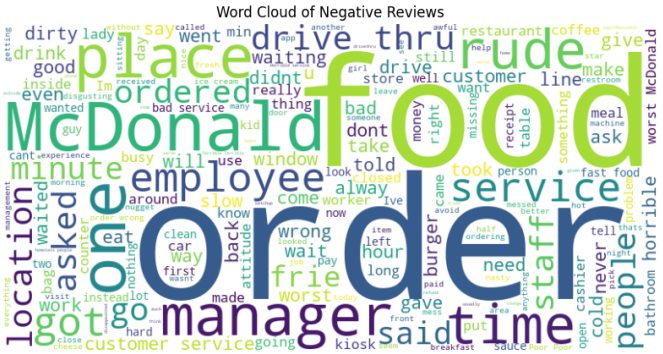

Fig. 5. Negative Word Cloud

among all branches in the United States. On the other end of the spectrum, the branch at 9814 International Dr, Orlando garnered the most negative ratings.

Observing the word clouds, it's evident that positive ratings often highlight excellent service, cleanliness, helpful staff, and quality food as key factors. Words present in both positive and negative reviews imply that maintaining these aspects is crucial for upholding a certain standard across store branches.

This research can still be improved as this was just based on 33,000 anonymized reviews scraped from Google reviews. There may have been other factors overlooked or there may be other data that could tip the reviews of other stores. An improvement to this study could be including the time the review is taken if it's in the morning, afternoon or evening in order to see where the standard of service drops or excels the most at.

VI. Acknowledgement

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References

[1] N. Elgiriyewithana, "McDonald's Store Reviews," Kaggle.com, 2023. https://www.kaggle.com/datasets/nelgiriyewithana/mcdonalds-store-reviews