



e-ISSN: 2319-8753 | p-ISSN: 2347-6710

IJRSET

International Journal of Innovative Research in
SCIENCE | ENGINEERING | TECHNOLOGY



INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

Volume 13, Issue 5, May 2024

ISSN INTERNATIONAL
STANDARD
SERIAL
NUMBER
INDIA

Impact Factor: 8.423

 9940 572 462

 6381 907 438

 ijirset@gmail.com

 www.ijirset.com

Restaurant Review Sentiment Analysis Using NLP Techniques

Samyak Anand, Aditya Padgelwar, Rohan Nagrale, Tejas Dhamange, Hirendra Hajare

B. Tech Scholar, Department of Computer Science & Engineering, Ballarpur Institute of Technology, Ballarpur, India

B. Tech Scholar, Department of Computer Science & Engineering, Ballarpur Institute of Technology, Ballarpur, India

B. Tech Scholar, Department of Computer Science & Engineering, Ballarpur Institute of Technology, Ballarpur, India

B. Tech Scholar, Department of Computer Science & Engineering, Ballarpur Institute of Technology, Ballarpur, India

M. Tech Scholar, Department of Computer Science & Engineering, Ballarpur Institute of Technology, Ballarpur, India

ABSTRACT: How Difficult it is to Start a Business Like Restaurant. It makes it hard for the restaurant owner to go over all those evaluations and stack its input against other restaurants. This is a very important aspect to take account of when you are picking up your place to dine. In this paper, we proposed an effective model of restaurant review prediction based on some set of client reviews and predict a review for that restaurant. Restaurant reviews has binary output: 0 for negative and 1 for positive. These are results that could be used as a marketing strategy on a long term basis for review website creators to essentially allow the consumer to do their own sorting and filtering of the information for the most useful reviews. We also found out that most frequency of positive attitudes stated in restaurant reviews were about the food quality on the other hand, and most common expression for which travellers reveal their negative sentiment is poor service or hygiene. This is an important research which can assist the restaurant business to get insights about customer preference and their behaviour. Restaurant owners and managers can analyze this data to optimize their services and products, leading to greater customer satisfaction and loyalty.

KEYWORDS: Restaurant reviews, Sentiment analysis, Natural language Processing(NLP), Opinion Mining, Customer satisfaction, Machine Learning.

I. INTRODUCTION

When visiting a new restaurant, customers want to know what to expect. Who better to inform them than a prior client? The more people who hear about your restaurant, the more likely they are to visit. In this day of globalisation, we are constantly on the lookout for new ideas that will save us time, simplify tasks, and eliminate the need for manual processing. Customers at restaurants rate and leave reviews based on their level of satisfaction. Other customers can use these ratings and reviews to assist them decide whether or not to visit those eateries. These ratings can also help restaurant owners make changes based on customer feedback in order to improve their business. Textual information can be found in restaurant reviews. Machine learning is one of the subset of artificial intelligence (AI).

ML allows systems to learn without having to be explicitly designed, and this learning can be used to solve issues. Machine learning takes data as input and learns essential relationships from it in order to make judgments that meet the needs of the user. The learning process begins with observations such as samples and direct experience, and then looks for patterns in the data to help make better judgements about how to forecast or categorise new things in the future. Natural language processing (NLP) skills are provided by machine learning for text processing. Using NLP approaches, we can simply analyse our textual datasets. Data analysts can use NLP to apply machine learning and deep learning algorithms to their textual datasets. For classifying reviews, we employ machine learning algorithms

AIMS & OBJECTIVES

1. Develop a comprehensive understanding of the principles and methodologies underlying NLP techniques for sentiment analysis.
2. Collect a diverse dataset of restaurant reviews from various sources, including online review platforms, social media networks, and specialized review datasets.
3. Preprocess the raw textual data, including tasks such as text cleaning, tokenization, stemming, and removing stop words, to prepare it for sentiment analysis

4. Train and evaluate machine learning models, such as Support Vector Machines (SVM), Naive Bayes, and deep learning models (e.g., recurrent neural networks, transformer models like BERT), for sentiment analysis of restaurant reviews..
5. Assess the performance of the sentiment analysis models using appropriate evaluation metrics, including accuracy, precision, recall, and F1-score, through cross-validation techniques to ensure generalizability

II. RELATED WORK

There is a discussion on classification performance. There are several articles on related issues, such as recommendation systems (Adomaviius, G and et al., 2005), informative peer-prediction approach (Nolan Miller and et al., 2005), and rating prediction (Adomaviius, G and et al., 2005). G. Adomaviius and colleagues (2005) provide an overview of preferred systems. It also outlines the current version of recommendation systems, which are classified into three categories: content-based, collaborative, and hybrid approaches. These approaches, however, have limits. This paper covers a number of potential improvements that can improve recommendation capabilities and make recommendation systems applicable to a wider variety of applications. Michael J and et al., (2007) offer us with a basic content-based recommendation system that suggests an item based on its description and the user's interest profile. The ultimate recommendation is determined by the combination of these two elements. Although the specifics of an item may differ throughout recommendation systems, there are certain commonalities. For instance, the ability to compare item characteristics .A more similar example can be found in Gayatree Ganu and et al., (2009). Computers have a hard time analysing, understanding, and aggregating free-text reviews. This research introduces new ad-hoc and regression-based recommendation algorithms that take into account the textual component of user reviews in order to identify the information in the text reviews. There are three types of sentiment classification approaches that have been utilised previously. Machine learning algorithms, link analysis methods, and score-based methodologies are examples of these. Pang et al., 2002 conducted groundbreaking research on the efficiency of machine learning approaches when used to sentiment classification tasks .Zhang, Ziqiong , et al., (2011) employed naive machine learning approaches. Bayes and SVM are used to automatically identify user reviews as good or negative in the realm of online Cantonese-written restaurant reviews. The consequences of different feature displays and sizes.

III. METHODOLOGY

This exploration's study is divided into two stages. The first part involves sentiment analysis, and the second phase involves categorizing reviews based on their rank. Three approaches have been employed in NLP: verbal evaluation, semantic evaluation, and syntactic evaluation. Then, for sentiment evaluation and order bracketing, we used the four supervised machine understanding algorithms. Figure 2 displays the overall structure of the exploratory process. The algorithm for the suggested model is as follows:

- STEP 1. Load and pre-process the restaurant review dataset.
- STEP 2. Extract features from the pre-processed reviews (e.g., using bag-of-words or word embeddings).
- STEP 3. Divide the dataset into two parts: training and testing.
- STEP 4. Choose a machine learning algorithm suitable for sentiment analysis (Naive Bayes, SVM).
- STEP 5. Train the selected model using the training dataset.
- STEP 6. Evaluate the model's performance using the testing dataset (e.g., calculate accuracy, precision, recall, F1 score)
- STEP 7. Fine-tune the model's hyperparameters.
- STEP 8. Use the trained model to predict sentiment for new, unseen restaurant reviews.
- STEP 9. Deploy the sentiment analysis model in an application or system.
- STEP 10. Provide an interface for users to input reviews and receive sentiment predictions.

3.1 Dataset

The initial stage in this research was to acquire a dataset of restaurant reviews. We used the dataset available on "Kaggle" for this. The dataset contains roughly 4,000 the English language consumer posts about different eateries. Reviews have been categorised as positive or unfavourable based on their content. The feedback was separated into four main categories: food flavour, services, the value of cash and environment.

3.2 Data Pre-Processing

The gathered data was then pre-processed in the following phase. Data pre-processing is a critical first step in sentiment analysis since customers submit comments or sentiments via natural speech syntax. Additional letters, the alphabet,

phrases, and uncommon symbols are used to express their emotions. Before classification, data must be cleaned of these excesses. As a result, we used natural language processing (NLP) methodologies for sentiment evaluation and for preparing the data for categorization. In the subsequent phase, the collected data was preprocessed. We utilised the following pre-processing techniques to clean and prepare the data for future analysis:

- Removed special characters and punctuation from the reviews.
- To ensure consistency, all text was converted to lowercase.
- Removed stop words such as 'a', 'the', 'and', and so on because they have no sentimental meaning.
- Tokenized the reviews, which means breaking down the text into individual words so we can examine the sentiment of each word separately.

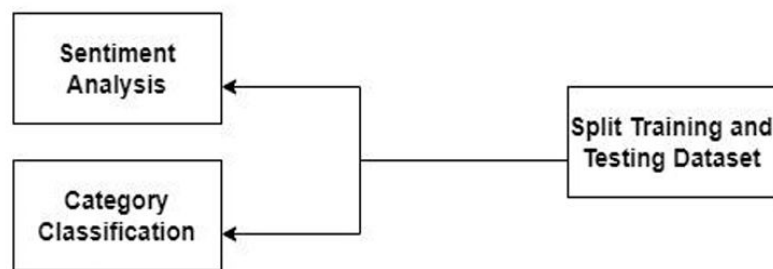


Fig. 1. Architecture diagram of our research framework

3.3 Feature Extraction

The next step involved the extraction of features from the pre-processed data. We employed the Count Vectorizer approach, which turns a set of written materials into a token count matrix. This technique assisted us in converting the pre-processed written information to numerical format, which we could then feed into the machine training model.

3.4 Model Building

In this study, we trained and evaluated various models using machine learning for our analysis of sentiment job. Among the models utilised were the Support Vector Machine (SVM), SVM Pipeline, MultinomialNB, and MultinomialNB Pipeline. We evaluated the performance of each model using criteria such as precision, recall, precision, accuracy, and the F1 score. We used the Multinomial Nave Bayes (Multinomial NB) Pipeline technique to build the machine learning model. MultinomialNB is a popular text categorization technique that uses the joint probabilities of words and classes to calculate the probability of classes assigned to texts. In our scenario, the two classes are 'positive' and 'negative'. The MultinomialNB model was built and trained in Python using the scikit-learn module.

3.5 Model Evaluation

The accuracy metric was utilised to evaluate the efficiency of our model. We separated the dataset into two parts: training and testing. We used 80% of the data for training and 20% for testing. The training set was used to train the model, and the testing set was used to test it. Based on the evaluation results, we selected the MultinomialNB Pipeline model as our final model. We achieved an accuracy of 81.5% on the testing set, which indicates that our model is performing well.

3.6 Data Analysis and Classification Tools

We applied classification models to the training dataset after splitting the data and adjusted the proportions for the training and testing datasets. For classification, we used four supervised learning techniques: Logistic Regression (LR), Support Vector Machine (SVM), SVM Pipeline, MultinomialNB, and MultinomialNB Pipeline. The exponent and log-linear functions of logistic regression differentiate it as a classification algorithm. It operates with discrete numbers and turns the function of any actual value into 0 and 1.



IV. EXPERIMENTAL RESULTS

Restaurant Review Analysis System

Enter Text:

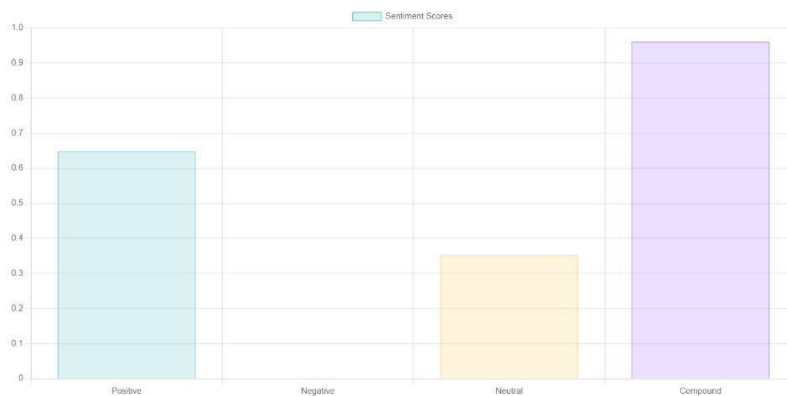
Analyze Sentiment

Upload Reviews File

Customer Reviews

- 2024-05-27 18:03:36
very good
Overall Sentiment: 0.4927
- 2024-05-27 18:07:12
very good restaurant i like it , waiters are so helpful
Overall Sentiment: 0.8616
- 2024-05-27 18:08:09
food is good

The sentiment towards ambiance is neutral.



Sentiment Analysis Results:

VADER Sentiment Scores:

- Positive: 0.648
- Negative: 0.0
- Neutral: 0.352
- Compound: 0.9606

TextBlob Sentiment Analysis:

- Polarity: 0.8366666666666666
- Subjectivity: 0.8933333333333334

Aspect-Based Sentiment Analysis:

Service:

- Positive: 0.648
- Negative: 0.0
- Neutral: 0.352
- Compound: 0.9606

The sentiment towards service is generally positive.

Food:

- Positive: 1.296
- Negative: 0.0
- Neutral: 0.704
- Compound: 1.9212

V. CONCLUSION

Proposing an automated restaurant review sentiment analysis systems that employs NLP techniques benefits both restaurant owners and customers. With the review data collected systematically as well as logically preprocessed and analyzed, the system is able to ascertain the sentiment which the customers have posted about a particular product or service. Using binary, multiclass, and sequence classification models like Logistic Regression, SVM, RNN, LSTM, and transformer-based models like BERT, it can support contextual analysis for recognizing the positive and negative feelings of customers, thereby helping customers to have better services about certain products or brands.

This part of the work outlines and provides the details on what was discovered from the study having reviewed the data collected and analyzed. This section will give a broad concept concerning the efficacy of the bestowed machine learning model used for sentimental analysis and its findings.

REFERENCES

- [1] Sharif, O., Hoque, M. M., & Hossain, E. (2019, May). Sentiment analysis of Bengali texts on online restaurant reviews using multinomial Naïve Bayes. In 2019 1st International Conference on Advances in Science, Engineering and Robotics Technology (ICASERT) (pp. 1-6). IEEE.A.
- [2] Ravikumar, D. and MJ, M., 2019. Sentiment Analysis of Customer Feedback on Restaurant Reviews.
- [3] Waikul, V., Ravgan, O. and Pavate, A., Restaurant Review Analysis and Classification Using SVM. optimization, 2, p.7.
- [4] Wright, L., 2018. Classifying textual fast food restaurant reviews quantitatively using text mining and supervised machine learning algorithms
- [5] Adnan, M., Sarno, R. and Sungkono, K.R., 2019, September. Sentiment Analysis of Restaurant Review with Classification Approach in the Decision Tree-J48 Algorithm. In 2019 International Seminar on Application for Technology of Information and Communication (iSemantic) (pp. 121-126). IEEE.
- [6] Kang, H., Yoo, S.J. and Han, D., 2012. Senti-lexicon and improved Naïve Bayes algorithms for sentiment analysis of restaurant reviews. Expert Systems with Applications, 39(5), pp.6000-6010.
- [7] Gan, Q., Ferns, B.H., Yu, Y. and Jin, L., 2017. A text mining and multidimensional sentiment analysis of online restaurant reviews. Journal of Quality Assurance in Hospitality & Tourism, 18(4), pp.465-492.
- [8] TAMA, B.A., 2015. DATA MINING FOR PREDICTING CUSTOMER SATISFACTION IN FAST-FOOD RESTAURANT. Journal of Theoretical & Applied Information Technology, 75(1).
- [9] Ganu, G., Kakodkar, Y. and Marian, A., 2013. Improving the quality of predictions using textual information in online user reviews. Information Systems, 38(1), pp.1-15.
- [10] Titz, K., Lanza-Abbott, J.A. and Cruz, G.C.Y., 2004. The anatomy of restaurant reviews: An exploratory study. International Journal of Hospitality & Tourism Administration, 5(1), pp.49-65.



INTERNATIONAL
STANDARD
SERIAL
NUMBER
INDIA



INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

 9940 572 462  6381 907 438  ijirset@gmail.com



www.ijirset.com

Scan to save the contact details