

A Study on Customer Sentiment Analysis with the Help of Machine Learning

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Abstract

Online reviews are now crucial for enhancing global customer communications and influencing consumer purchasing decisions. Online retailers like Amazon, Flipkart, and others allow users to discuss their experiences in a forum and provide reliable product reviews for potential buyers. Sorting reviews according to their positive and negative sentiment is essential for extracting pertinent information from a large number of assessments. A thorough review of the literature on machine learning applications for online reviews-based consumer sentiment analysis reveals that these techniques not only increase the accuracy of consumer sentiment analysis but also solve a number of issues related to sentiment analysis, the identification of fake reviews, and market-gap analysis, all of which can lead to improvements in products and services.

Ultimately, The purpose of the study is to utilize machine learning techniques for analysing customer sentiments, aiming to understand and extract valuable insights from their opinions and feedback.

Keywords: *Online evaluations, Consumer behaviour, Sentiment analysis..*

Introduction

In today's dynamic business landscape, understanding and interpreting customer sentiment have become paramount for organizations aiming to stay competitive and meet customer expectations. The surge in

digital platforms and the abundance of customer-generated content across social media, reviews, and forums necessitate advanced tools to extract meaningful insights. Leveraging the capabilities of machine learning, this study focuses on the comprehensive exploration of customer sentiment analysis methods. By employing state-of-the-art algorithms and natural language processing techniques, this research aims to decode customer emotions, opinions, and feedback scattered across diverse online channels. The primary objective is to evaluate the effectiveness of machine learning in deciphering sentiments, offering invaluable insights for businesses to refine strategies, enhance products/services, and fortify customer relationships. Through this investigation, the study endeavours to provide practical guidance on leveraging machine learning to derive actionable insights from customer sentiments for informed decision-making and sustained business growth.

This study aims to explore and evaluate various machine learning techniques employed in customer sentiment analysis. By employing natural language processing (NLP) methodologies, sentiment classifiers, and deep learning models, this research endeavours to investigate the accuracy, scalability, and adaptability of these techniques in discerning customer sentiment across diverse domains and languages.

Objectives

- Develop and implement machine learning models for sentiment analysis to accurately categorize online reviews into positive and negative sentiments.
- Address challenges associated with sentiment analysis, such as the identification of fake reviews, to ensure the reliability and authenticity of the extracted insights.
- Investigate the potential of machine learning applications in resolving market-gap analysis issues, thereby contributing to improvements in products and services based on customer feedback.

Methodology:

This review paper only uses secondary data, which is gathered and analyzed from research papers that have already been published as articles. These publications are all about using machine learning to analyze client attitudes. The process of assessing the data will involve reviewing each article, summarizing the findings, and picking the important ones.

Scope of Study

While the current machine learning model for sentiment analysis provides reasonable results, future advancements could understand deep learning models like BERT, which have demonstrated significant improvements in NLP tasks. These advanced models can capture complex language patterns, contextual information, and semantic meaning, leading to more accurate sentiment predictions. Additionally, incorporating aspect-based sentiment analysis into the project can extract sentiment polarity for individual aspects of a product (e.g., design, performance, price, etc.), offering businesses more detailed insights into customer feedback.

Review of Literature:

(Kriti Saroha, Mukesh Sehrawat, Vishal Jai 2020)

The abundance of customer data as customer feedback, product reviews, and posts on social media platforms provides an in-depth insight that can navigate strategic decisions and inflate customer

experiences. In this context, the unification of machine learning and sentiment analysis emerges as a potent combination for extracting emotional traces from volumes of unstructured text data. This chapter searches into the sphere of analysis techniques of sentiment analysis for analyzing customer feedback, where the convergence of advanced machine learning techniques with sentiment analysis methods empowers businesses to derive valuable insights from the feedback gathered from various touch points.

(Shanshan Yi & Xiaofang Liu 2020)

This paper is motivated towards applying Machine Learning algorithms for learning, analysing and classifying the product information and the shop information based on the customer experience. The product data with customer reviews is collected from benchmark Unified computing system which is a server for data based computer product lined up for evaluating hardware, support to visualization, software management. The proposed HRS system has higher values of MAPE which is 96% and accuracy is nearly 98% when compared to other existing techniques.

(Neha Nandal, Rohit Tanwar & Jyoti Pruthi 2020)

The field of sentiment analysis is widely utilized for analyzing the text data and then extracting the sentiment component out of that. Aspect level analysis of this data provides a great help to retailers in better understanding of customer's expectations and then shaping their policies accordingly. In this paper, a novel approach has been presented that utilize aspect level sentiment detection, which focuses on the features of the item.

(Rajukumar S.Jagdale, Vishal S.Shirsat & Sachin N, Deshmukh 2018)

Home Cognitive Informatics and Soft Computing Conference paper Sentiment Analysis on Product Reviews Using Machine Learning Techniques Rajkumar S. It plays a vital role in enabling the businesses to work actively on improving the business strategy and gain an in-depth insight of the buyer's feedback about their product. This paper concludes that, Machine Learning Techniques gives best results to classify the Products Reviews.

(Paphula Kumar Jain , Rajendra Pamula , Gautam Srivastava 2021)

This paper presents a study to determine the usefulness, scope, and applicability of this alliance of ML techniques for consumer sentiment analysis for online reviews in the domain of hospitality and tourism. We show a systematic literature review to compare, analyse, explore, and understand the attempts and directions to find research gaps in illustrating the future scope of this pairing. The primary objective is to read and analyse the use of ML techniques for consumer sentiment analysis on online reviews in the domain of hospitality and tourism.

(Jackie Ayoub, Qianli Xu, X . Jessie Yang 2020)

Among many, customer needs analysis for product ecosystems is one of the most challenging tasks in creating a successful product ecosystem from both the perspectives of marketing research and product development. In this paper, we propose a machine-learning approach to customer needs analysis for product ecosystems by examining a large amount of online user-generated product reviews within a product ecosystem. In addition, we applied a rule-based sentiment analysis method to predict not only the sentiment of the reviews but also their sentiment intensity values.

(Praphula Kumar Jain , Rajendra Pamula , Gautam Srivastava 2021)

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(A. Naresh & P. Venkata Krishna 2021)

Sentimental analysis determines the views of the user from the social media. It is used to classify the content of the text into neutral, negative and positive classes. In this paper an optimization based machine learning algorithm is proposed to classify the twitter data. In the first stage data is collected and preprocessed, in the second stage the data is optimized by extracting necessary features and in the third stage the updated training set is classified into different classes by applying different machine learning algorithms. Sunil Malviya

(Arvind Kumar Tiwari, Rajeev Srivastava, Vipin Tiwari 2021)

With the advancement of informal community and Web 2.0. Because of the multiplication of web-based life, such as Facebook, Twitter, YouTube and others, supposition examination develops quickly. The number of recordings accessible on the web and somewhere else is consistently developing and with this the requirement for viable strategies to process the tremendous measure of multimodal data shared through this media.

(Akshi Kumar, Arunima Jaiswal 2019)

With the array of practical applications in healthcare, finance, media, consumer markets, and government, distilling the voice of public to gain insight to target information and reviews is non-trivial. This work is a study to understand the feasibility, scope and relevance of this alliance of using Soft computing techniques for sentiment analysis on Twitter. We present a systematic literature review to collate, explore, understand and analyze the efforts and trends in a well-structured manner to identify research gaps defining the future prospects of this coupling.

Key Findings

- 1.The study focuses on the significance of sentiment analysis in understanding customer feedback and opinions, particularly in the context of online reviews.
- 2.The document emphasizes the potential of machine learning techniques, such as natural language processing (NLP) and deep learning models like BERT, in accurately deciphering customer sentiments and providing valuable insights for businesses.
- 3.The review of literature highlights the convergence of advanced machine learning techniques with sentiment analysis methods, enabling businesses to derive actionable insights from customer feedback gathered from various touchpoints.
- 4.The study aims to address challenges associated with sentiment analysis, such as identifying fake reviews and resolving market-gap analysis issues, to contribute to improvements in products and services based on customer feedback.
- 5.The document also discusses the application of machine learning algorithms for sentiment analysis in various domains, including healthcare, finance, media, consumer markets, government, hospitality, and tourism.

6.The study aims to develop and implement machine learning models for sentiment analysis to accurately categorize online reviews into positive and negative sentiments.

7.The document underscores the importance of leveraging machine learning to extract emotional traces from unstructured text data and derive valuable insights for informed decision-making and sustained business growth.

Conclusion

While the current machine learning model for sentiment analysis provides reasonable results, future advancements could understand deep learning models like BERT, which have demonstrated significant improvements in NLP tasks. These advanced models can capture complex language patterns, contextual information, and semantic meaning, leading to more accurate sentiment predictions. Additionally, incorporating aspect-based sentiment analysis into the project can extract sentiment polarity for individual aspects of a product (e.g., design, performance, price, etc.), offering businesses more detailed insights into customer feedback.

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