Chapter 7
Leveraging Sentiment Analysis for Enhanced Customer Experience:
AI-Driven Personalization in Online Retail

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ABSTRACT

This research investigates the potential of sentiment analysis as an artificial Intelligence (AI)-driven technique for enhancing customer experience within the online retail sector. The study explores the application of machine learning algorithms to analyze customer feedback from product reviews, aiming to extract granular sentiment expressed toward specific product features and aspects of the purchasing processes. By comparing the performance of algorithms including Native Bayes, Support Vector Machines (SVM), and Neural Networks under different resampling methods, this research establishes a robust approach to classifying customer sentiments into positive and negative categories. These findings demonstrate the efficacy

DOI: 10.4018/979-8-3373-0918-7.ch007

of these analytical techniques in identifying customer pain points and preferences, which can be strategically used to personalize service delivery and improve overall customer satisfaction in online retail.

INTRODUCTION

Today, sentiment analysis is a key strategic tool for companies. This requirement has been further amplified by the rise of "phygital" business strategies, where the transparent integration of online and offline experiences shapes customer perceptions and brand loyalty (Boudri et al., 2024). The explosion of user-generated content on e-commerce hubs further highlights this trend (Zhu et al., 2022). Consumer opinion and comments are now a primary source of information for purchasing decisions. However, despite the great potential of sentiment analytics, a significant research gap persists: the efficient and accurate extraction of nuanced sentiments. While existing literature has explored various machine learning models and techniques for sentiment classification, many studies fall short in addressing the challenges of implicit aspect extraction, sarcasm and irony detection, and adaptation to domain-specific language, particularly for new products in evolving markets. Furthermore, the lack of robust comparative analysis across different modeling techniques and data preprocessing methods hinders the identification of optimal strategies for specific application domains.

This study is necessary because it aims to address this critical gap by providing a comprehensive comparative analysis of different machine learning algorithms (Naïve Bayes, Logistic Regression, SVM and Neural Network) and resampling methods (simple validation and cross validation) for sentiment classification of product reviews. By empirically evaluating their performance on real-world e-commerce data, we seek to identify the strengths and weaknesses of each approach and provide practical guidance for businesses seeking to implement effective sentiment analysis systems. The research addresses the challenges previously mentioned, making it helpful for firms that have limited resources or time to deploy sentiment analysis frameworks.

To achieve this objective, this document is structured around four points. First, a conceptual framework that will present a thorough review of the relevant literature, exploring the theoretical underpinnings of sentiment analysis and discussing key challenges and limitations. Next, the research methodology describes the data acquisition process, pre-processing steps and machine learning models used in the study. Also, the results and discussion are presented with empirical results, performance comparison of different models and resampling techniques for various measures. Finally, the conclusion will discuss the implications of the results, highlighting the limitations of the study and suggesting directions for future research.