

Sentiment Analysis of Beauty and Skincare Product Reviews: Enhancing Consumer Decision-Making through Machine Learning and Decision Support Systems

Nurul Atikah Mansor

Faculty of Information Science and Technology, Universiti Kebangsaan Malaysia, 43650 Bangi UKM, Selangor, Malaysia

Zalinda Othman *

Faculty of Information Science and Technology, Universiti Kebangsaan Malaysia, 43650 Bangi UKM, Selangor, Malaysia

Yazrina Yahya

Faculty of Information Science and Technology, Universiti Kebangsaan Malaysia, 43650 Bangi UKM, Selangor, Malaysia

Abstract

Facial skincare is essential to daily life, particularly for individuals seeking healthy, smooth skin. Beauty and skincare products have become indispensable, particularly among women. However, not all products meet consumer expectations, so reviews are crucial for guiding purchasing decisions. This study aims to analyse user reviews of beauty and skincare products from Sephora.com using sentiment analysis to help consumers make informed decisions. The process involves collecting a large dataset of product reviews, followed by data preprocessing, feature extraction, and sentiment classification. Machine learning models such as decision trees, random forests, support vector machines, logistic regression, k-nearest neighbours, and naive Bayes were evaluated using accuracy, precision, recall, and F1-score metrics. The results indicate that the support vector machine model performed the best, with high values in accuracy (0.9263), precision (0.9272), recall (0.9263), and F1-score (0.9256), particularly excelling in precision and recall in the context of imbalanced data. By categorizing the reviews, this analysis provides valuable insights into customer satisfaction and preferences, which help brands understand customer opinions and improve their products. Additionally, sentiment analysis can guide potential buyers by highlighting the trends and influencing purchasing decisions. To further enhance consumer decision-making, this study incorporates a Decision Support System (DSS) that integrates sentiment analysis results with an interactive Streamlit-based dashboard. The DSS aggregates and visualizes sentiment trends, enabling users to compare products based on overall sentiment scores and key review insights. By providing data-driven recommendations, the system assists consumers in identifying products that best align with their preferences and needs. This research highlights the practical application of sentiment analysis and DSS in the beauty and skincare industry, demonstrating how artificial intelligent, driven insights can enhance consumer confidence, brand strategies and overall transparency in product selection.

Keywords

Data-driven decision support system, machine learning, product review, sentiment analysis.