

# Sentiment Analysis Report

## Introduction

This project focuses on analyzing customer sentiment in e-commerce product reviews. The main objective is to understand how customers perceive products, identifying both positive and negative feedback trends. By analyzing this sentiment, businesses can improve product quality, enhance customer satisfaction, and tailor marketing strategies effectively.

The analysis uses Natural Language Processing (NLP) techniques to classify customer reviews as positive or negative, providing a comprehensive overview of customer opinions.

## Methodology

The methodology for this sentiment analysis project includes the following steps:

- **Data Collection:** The dataset consists of customer reviews from an e-commerce platform, including text, ratings, and product categories.
- **Data Preprocessing:** Review texts are cleaned and tokenized, followed by vectorization using NLP techniques.
- **Modeling:** A Logistic Regression model is used to predict sentiment based on review text.
- **Evaluation:** Model performance is evaluated using accuracy, precision, recall, and AUC-ROC metrics.
- **Visualization:** Results are visualized through confusion matrix, ROC curve, and rating distribution plots.

## Analysis and Results

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The analysis shows that most customer reviews are positive, with a significant proportion having 4 or 5-star ratings. Negative feedback often highlights issues related to delivery or product quality, which suggests potential areas for improvement.

The logistic regression model achieved good performance with an accuracy of over 80%, making it a reliable tool for predicting sentiment. Below are the visual representations of the results, including the confusion matrix, ROC curve, and distribution of ratings.

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## Conclusions and Recommendations

The sentiment analysis of e-commerce reviews reveals key insights into customer perceptions:

- Most customers have a positive experience, especially regarding product quality and usability.
- Delivery issues and occasional product defects are the main drivers of negative sentiment.

To improve customer satisfaction, businesses should focus on enhancing delivery logistics and addressing common product issues. Additionally, positive feedback should be leveraged in marketing campaigns to boost customer confidence.

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Future improvements could include expanding the dataset, experimenting with more complex models, and developing a real-time sentiment monitoring system.