**Abstract**

This study delves into the enhancement of sentiment analysis within Amazon product reviews, focusing on the integration of diverse data modalities including textual content, emojis, star ratings, and total votes to enrich the interpretation of consumer sentiment. Leveraging the Bidirectional Encoder Representations from Transformers (BERT) model across three experimental configurations, this research assesses the individual and combined impact of these features on sentiment classification accuracy in selected e-commerce product categories.

The first experiment evaluates the baseline sentiment classification using only review text, setting a foundational understanding of sentiment analysis with BERT. The subsequent experiment introduces emojis, exploring their synergistic effect with textual content on emotion detection accuracy. The final and most comprehensive experiment integrates all data modalities, assessing the multi-feature model's performance in providing a nuanced understanding of consumer feedback.

Results reveal significant enhancements in sentiment classification accuracy with the integration of multimodal data, highlighting the critical role of non-textual features like emojis, star ratings, and total votes in capturing the full spectrum of consumer sentiment. The multi-feature model, incorporating all data modalities, demonstrates superior performance, markedly improving sentiment classification accuracy across various product categories.

This research advances the methodology in natural language processing for sentiment analysis, showcasing the potential of multi-modal features in enhancing the accuracy and contextual depth of sentiment interpretation. The findings offer actionable insights for e-commerce stakeholders, emphasizing the practical applications of advanced sentiment analysis techniques in understanding consumer feedback and improving customer satisfaction. The study not only contributes to the academic discourse on sentiment analysis but also provides a methodological framework for future research in leveraging diverse data modalities for enriched sentiment analysis in e-commerce and beyond.

Top of Form