

UNIVERSITI TEKNOLOGI MARA

**HYB-ABSFAKE: A HYBRID
APPROACH INTEGRATING
IMPLICIT ASPECT-BASED
SENTIMENT ANALYSIS WITH
IMBALANCED DATASET
HANDLING FOR ENHANCING
FAKE REVIEW DETECTION**

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ABSTRACT

Online shopping has gained popularity due to its convenience and vast product selection, leading consumers to share reviews online. However, the rise of fake reviews undermines consumer trust and misleads potential buyers. Existing detection models often analyze full review text but fail to capture subtle cues such as exaggerated sentiment, duplicated review, or lack of specificity. Moreover, the significant class imbalance, where genuine reviews far outnumber fake ones, leads to biased models that struggle to detect deceptive content effectively. To address these limitations, this research introduces a novel hybrid approach, named HYB-ABSFAKE, that integrates Bidirectional Encoder Representations from Transformers (BERT) for Implicit Aspect-Based Sentiment Analysis (ABSA), rule-based indicators of fake reviews and Synthetic Minority Over-sampling Technique (SMOTE) to handle imbalanced data. A Support Vector Machine (SVM) is used for classification, and the model is evaluated using k -fold cross-validation. The dataset, obtained from Kaggle’s Amazon Reviews Dataset, includes 2,582 reviews from four categories, including foods, home care, personal care, and refreshments. This is the first study to combine implicit ABSA, rule-based indicators, and SMOTE for fake review detection. The hybrid approach is compared with two feature approaches, which are SVM baseline model and a BERT + Rule-based + SVM without SMOTE. It achieved 96% accuracy, 60% precision, 100% recall, and a 75% F1 score, demonstrating improved detection performance, particularly in identifying all fake reviews. The study contributes to fake review research by highlighting how implicit aspects and class imbalance influence deceptive patterns, thereby expanding the theoretical understanding of subtle linguistic cues. Methodologically, it presents a novel sequencing strategy and layered detection process that enhance both model interpretability and the detection of rare cases. Practically, the developed hybrid approach is scalable, explainable, and adaptable to real-world review platforms, supporting greater trust and more informed decision-making. Future work will explore larger annotated datasets, advanced resampling techniques such as Edited Nearest Neighbors, and adaptation of the hybrid approach to domain-specific areas like healthcare or education to improve practical relevance.

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CHAPTER 1

INTRODUCTION

This chapter examines the research background, problem statements, objectives, scopes, and significance of the research entitled “HYB-ABSFAKE: A Hybrid Approach Integrating Implicit Aspect-Based Sentiment Analysis with Imbalanced Dataset Handling for Enhancing Fake Review Detection”.

1.1 Research Background

Nowadays, online shopping has become increasingly popular due to its convenience and the wide variety of products available to customers. Additionally, it enabled tremendous growth in business information sharing, allowing customers to share their experiences and feedback on specific products or services online (Duma et al., 2023). The feedback or reviews that are given have become an indispensable tool in determining the success of a product. Not only do they provide valuable feedback to the manufacturer, but they can also influence customer purchasing decisions. Consumers rely heavily on the experiences of others when making purchasing decisions, and compelling reviews are used as a deciding factor in whether a product is added to their cart. Therefore, businesses prioritising customer satisfaction and encouraging customers to leave reviews will likely increase sales and customer loyalty.

Consumer reviews are an essential resource for people since they can lead to significant financial benefits for businesses. In contrast, negative reviews can sometimes have a detrimental effect on the economy (Deshai & Rao, 2022). As a result, reviews posted on online platforms can be subject to various forms of impropriety, including instances of self-promotion or even deliberate fraudulent activity, such as the use of fake reviews, which may be driven by the potential for monetary gain (Jakupov et al., 2022). A study by Duma et al. (2023) revealed that fake reviews are deceptive evaluations made to mislead customers rather than reflect genuine customer experiences. These reviews are often produced by individuals, such as family, friends, bots, or employees who lack first-hand experience with the product or service.

There are many reasons to write fake reviews, such as influencing product