

ABSTRAK

Permasalahan sampah plastik di Bali menjadi salah satu isu lingkungan yang mendapat perhatian luas dari masyarakat dan memunculkan berbagai opini di media sosial. Opini tersebut tersebar pada berbagai platform, seperti Twitter/X dan Google Maps, yang memiliki karakteristik data serta distribusi sentimen yang berbeda. Perbedaan karakteristik platform, pemilihan metode analisis sentimen, dan ketidakseimbangan distribusi kelas (*imbalanced data*) menjadi tantangan dalam menghasilkan model klasifikasi yang mampu merepresentasikan opini publik secara akurat. Oleh karena itu, penelitian ini bertujuan membandingkan kinerja metode *Lexicon-Based*, *Naive Bayes*, dan *IndoBERT* dalam analisis sentimen terhadap pengelolaan sampah plastik di Bali pada data Twitter/X dan Google Maps, serta menganalisis pengaruh penerapan *class weighting* terhadap performa masing-masing model. Penelitian ini menggunakan pendekatan kuantitatif dengan metode eksperimen. Dataset terdiri atas 2.020 tweet dari Twitter/X dan 208 ulasan Google Maps mengenai pengelolaan sampah plastik di Bali. Data diproses melalui tahapan *case folding*, *cleansing*, *tokenization*, *stopword removal*, dan *stemming*. Pelabelan pada dataset Twitter/X dilakukan menggunakan pendekatan *Lexicon-Based* sebagai *weak supervision*, sedangkan dataset Google Maps diberi label secara manual oleh dua annotator independen dan diuji menggunakan Cohen's Kappa untuk memastikan konsistensi anotasi. Evaluasi model dilakukan menggunakan metrik *accuracy*, *precision*, *recall*, *F1-score*, dan *Macro-F1 Score*, dengan *Macro-F1 Score* sebagai metrik utama karena lebih representatif dalam mengevaluasi performa model pada kondisi *imbalanced data*. Hasil penelitian menunjukkan bahwa penerapan *class weighting* meningkatkan kemampuan model dalam mengenali kelas minoritas, terutama pada metode *Naive Bayes* yang mengalami peningkatan nilai *Macro-F1 Score* meskipun *accuracy* menurun. Selain itu, *IndoBERT* dengan *class weighting* menunjukkan kinerja terbaik pada dataset gabungan dengan *accuracy* sebesar 98,21% dan *Macro-F1 Score* sebesar 0,91, serta memberikan performa yang lebih konsisten dibandingkan metode lainnya dalam menangani karakteristik data dari dua platform media sosial. Temuan ini menunjukkan bahwa penerapan *class weighting* efektif meningkatkan kemampuan model dalam mengatasi ketidakseimbangan distribusi kelas, sedangkan *IndoBERT* menjadi metode yang paling unggul untuk analisis sentimen pengelolaan sampah plastik di Bali.

Kata kunci: Analisis Sentimen, *Lexicon-Based*, *Naive Bayes*, *IndoBERT*, *Class Weighting*, *Imbalanced Data*, *Macro-F1 Score*, Pengelolaan Sampah Plastik.

ABSTRACT

The problem of plastic waste in Bali has become one of the environmental issues receiving widespread public attention and sparking a variety of opinions on social media. These opinions are spread across various platforms, such as Twitter/X and Google Maps, each of which has distinct data characteristics and sentiment distributions. Differences in platform characteristics, the choice of sentiment analysis methods, and class distribution imbalance (imbalanced data) pose challenges in developing a classification model capable of accurately representing public opinion. Therefore, this study aims to compare the performance of the Lexicon-Based, Naïve Bayes, and IndoBERT methods in sentiment analysis regarding plastic waste management in Bali using data from Twitter/X and Google Maps, as well as to analyze the impact of applying class weighting on the performance of each model. This study employs a quantitative approach using an experimental method. The dataset consists of 2,020 tweets from Twitter/X and 208 Google Maps reviews regarding plastic waste management in Bali. The data was processed through the stages of case folding, cleansing, tokenization, stopword removal, and stemming. Labeling of the Twitter/X dataset was performed using a lexicon-based approach as weak supervision, while the Google Maps dataset was manually labeled by two independent annotators and tested using Cohen's Kappa to ensure annotation consistency. Model evaluation was conducted using the metrics of accuracy, precision, recall, F1-score, and Macro-F1 Score, with the Macro-F1 Score serving as the primary metric because it is more representative in evaluating model performance under imbalanced data conditions. The results of the study show that the application of class weighting improves the model's ability to recognize minority classes, particularly in the Naïve Bayes method, which experienced an increase in the Macro-F1 Score despite a decrease in accuracy. Furthermore, IndoBERT with class weighting demonstrated the best performance on the combined dataset, achieving an accuracy of 98.21% and a Macro-F1 Score of 0.91, while also delivering more consistent performance compared to other methods in handling the data characteristics from the two social media platforms. These findings indicate that the application of class weighting effectively improves the model's ability to address class distribution imbalances, while IndoBERT emerges as the most superior method for sentiment analysis regarding plastic waste management in Bali.

Keywords: Sentiment Analysis, Lexicon-Based, Naïve Bayes, IndoBERT, Class Weighting, Imbalanced Data, Macro-F1 Score, Plastic Waste Management.