

ABSTRACT

Hybrid technology that combines an internal combustion engine with an electric motor is gaining attention as an environmentally friendly and fuel-efficient solution. However, diverse public opinions affect the perception and acceptance of hybrid cars in the market. This study aims to analyze public sentiment towards hybrid cars on social media X using Support Vector Machine (SVM) algorithm with TF-IDF weighting. The dataset consists of 1,677 opinion data collected through data crawling techniques and processed through text preprocessing stages, including cleaning, case folding, tokenizing, slangword, stopword removal, and stemming. To overcome data imbalance, the SMOTE (Synthetic Minority Oversampling Technique) method was used. The results showed that the higher the value of parameter C , the better the accuracy obtained, with the best performance at $C = 10$ and $C = 100$. The application of SMOTE is proven to improve accuracy, precision, recall, and F1-score, especially in the 90:10 and 80:20 imbalanced data scenarios. The SVM algorithm with TF-IDF produced the highest accuracy of 84.52%, proving its effectiveness in sentiment analysis of hybrid cars. Positive sentiments are more dominant, reflecting people's appreciation of fuel efficiency and technological innovation, while negative sentiments are mostly related to high prices and taxes. This research can provide insights for the automotive industry and policy makers in designing more effective strategies to increase the adoption of green vehicles.

Keywords: Hybrid car, sentiment analysis, Support Vector Machine, TF-IDF, X social media.

ABSTRAK

Teknologi hybrid yang menggabungkan mesin pembakaran internal dengan motor listrik semakin menarik perhatian sebagai solusi ramah lingkungan dan hemat bahan bakar. Namun, opini masyarakat yang beragam memengaruhi persepsi dan penerimaan mobil hybrid di pasar. Penelitian ini bertujuan untuk menganalisis sentimen masyarakat terhadap mobil hybrid di media sosial X menggunakan algoritma *Support Vector Machine* (SVM) dengan pembobotan TF-IDF. Dataset terdiri dari 1.677 data opini yang dikumpulkan melalui teknik data *crawling* dan diproses melalui tahapan *text preprocessing*, termasuk *cleaning*, *case folding*, *tokenizing*, *slangword*, *stopwords removal*, dan *stemming*. Untuk mengatasi ketidakseimbangan data, digunakan metode SMOTE (*Synthetic Minority Over-sampling Technique*). Hasil penelitian menunjukkan bahwa semakin tinggi nilai parameter C, semakin baik akurasi yang diperoleh, dengan performa terbaik pada $C = 10$ dan $C = 100$. Penerapan SMOTE terbukti meningkatkan akurasi, presisi, *recall*, dan *F1-score*, terutama pada skenario data yang tidak seimbang 90:10 dan 80:20. Algoritma SVM dengan TF-IDF menghasilkan akurasi tertinggi 84,52%, membuktikan efektivitasnya dalam analisis sentimen terhadap mobil *hybrid*. Sentimen positif lebih dominan, mencerminkan apresiasi masyarakat terhadap efisiensi bahan bakar dan inovasi teknologi, sementara sentimen negatif banyak terkait dengan harga tinggi dan pajak. Penelitian ini dapat memberikan wawasan bagi industri otomotif dan pembuat kebijakan dalam merancang strategi yang lebih efektif untuk meningkatkan adopsi kendaraan ramah lingkungan.

Kata Kunci: Mobil *hybrid*, analisis sentimen, *Support Vector Machine*, TF-IDF, media sosial X.