

ABSTRACT

In line with efforts to enhance customer service, PLN has undertaken digital transformation by launching the PLN Mobile application on October 31, 2016. However, to date, no systematic evaluation has been conducted on user reviews available in the Google Play Store, resulting in the absence of a clear mapping of service aspects that receive positive or negative feedback. This study aims to analyze user sentiment based on Google Play Store reviews using the Aspect-Based Sentiment Analysis (ABSA) approach. The research method employs a deep learning model, Gated Recurrent Unit (GRU), combined with BERT word embedding to capture bidirectional contextual meaning. The dataset consists of user comments from 2023–2024, classified into four main aspects: application performance, functionality, user interface, and customer satisfaction. The findings indicate that integrating BERT embeddings with optimized hyperparameters significantly improves sentiment classification accuracy. The model achieved an accuracy of 93.47%, outperforming previous studies that reported 84.47%. The optimal configuration was obtained with a 512-unit GRU, a learning rate of 0.01, batch size of 64, dropout rate of 0.1, and the Adam optimizer, which outperformed RMSProp and SGD. Aspect-level analysis reveals that performance, functionality, and general satisfaction were the most frequently criticized aspects, with a high proportion of negative sentiments. Conversely, the user interface received the highest proportion of positive evaluations. These results suggest that although the application functions adequately, substantial improvements are still required, particularly in performance and overall customer satisfaction. The primary contribution of this study lies in the integration of the BERT–GRU framework with Hyperopt-based optimization, supported by the use of a large-scale automatically labeled dataset validated against a manually labeled gold standard. This approach not only strengthens the methodological reliability of aspect-based sentiment analysis but also provides practically relevant insights for improving digital public services in Indonesia’s electricity sector.

Keywords: *PLN Mobile, Aspect-Based Sentiment Analysis, Deep Learning, Bidirectional Encoder Representations from Transformers, Gated Recurrent Unit.*

ABSTRAK

Seiring upaya meningkatkan pelayanan pelanggan, PLN melakukan transformasi digital dengan meluncurkan aplikasi PLN Mobile sejak 31 Oktober 2016. Namun, hingga kini belum ada evaluasi sistematis terhadap ulasan pengguna di Google Play Store sehingga aspek layanan yang mendapat penilaian positif maupun negatif belum terpetakan jelas. Penelitian ini bertujuan untuk menganalisis sentimen pengguna berdasarkan ulasan di Google Play Store dengan pendekatan *Aspect-Based Sentiment Analysis* (ABSA). Metode penelitian menggunakan model *deep learning Gated Recurrent Unit* (GRU) yang dipadukan dengan *word embedding* BERT untuk memahami konteks kalimat secara dua arah. Dataset berupa komentar pengguna tahun 2023–2024, yang dikategorikan ke dalam empat aspek utama: kinerja aplikasi, fungsionalitas, *user interface*, dan kepuasan pelanggan. Hasil penelitian menunjukkan bahwa penerapan embedding BERT dan pengaturan *hyperparameter* meningkatkan akurasi klasifikasi sentimen secara signifikan. Model mencapai akurasi 93,47%, lebih tinggi dibanding penelitian sebelumnya (84,47%). Konfigurasi optimal diperoleh dengan 512-unit GRU, learning rate 0,01, batch size 64, dropout 0,1, serta optimizer Adam yang lebih unggul dibanding RMSProp dan SGD. Analisis aspek menunjukkan bahwa kinerja, fungsionalitas, dan kepuasan umum menjadi aspek yang paling sering dikeluhkan, dengan sentimen negatif cukup tinggi. Sebaliknya, *user interface* mendapat lebih banyak penilaian positif. Hal ini menegaskan bahwa meskipun aplikasi sudah berjalan dengan baik, peningkatan signifikan masih diperlukan terutama pada performa dan kepuasan pengguna. Kontribusi utama penelitian ini adalah penerapan kombinasi BERT–GRU dengan optimasi *Hyperopt* serta pemanfaatan dataset berlabel otomatis skala besar yang divalidasi dengan dataset manual sebagai gold standard. Pendekatan ini memperkuat keandalan metodologis sekaligus menghasilkan temuan praktis yang relevan untuk peningkatan layanan publik digital di sektor kelistrikan Indonesia.

Kata Kunci: Perusahaan Listrik Negara, PLN Mobile, Analisis Sentimen, *Deep Learning*, *Word Embedding*, *Bidirectional Encoder Representations from Transformers*, *Gated Recurrent Unit*