

PEMBANGUNAN *KNOWLEDGE GRAPH* PENGADUAN LAYANAN KELISTRIKAN SEBAGAI *KNOWLEDGE BASE* UNTUK ANALISIS SENTIMEN ULASAN PELANGGAN

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ABSTRAK

Ulasan pelanggan PLN Mobile pada Google Play Store memuat informasi mengenai pengalaman pengguna, gangguan aplikasi, fitur, dan layanan kelistrikan, tetapi sebagian besar disajikan dalam bentuk teks tidak terstruktur sehingga keterkaitan antar informasi sulit dianalisis secara sistematis. Penelitian ini bertujuan merancang ontologi dan membangun Domain *Knowledge Graph* pengaduan layanan kelistrikan sebagai *Knowledge Base*, serta memanfaatkannya untuk memberikan konteks pada analisis sentimen ulasan pelanggan PLN Mobile. Data penelitian berupa 202.532 ulasan berbahasa Indonesia periode Januari 2020-Desember 2024 yang merupakan data sekunder dari penelitian Fauzan Fuadi Pasaribu (2025). Menggunakan pendekatan kuantitatif dengan metode Cross Industry Standard Process for Data Mining (CRISP-DM) melalui tahapan *text preprocessing*, *Ontology Modeling*, *Entity Extraction* berbasis kamus, *Rule-Based Relation Extraction*, *RDF Triple Construction*, implementasi *Knowledge Graph* menggunakan Neo4j, evaluasi ekstraksi, dan analisis sentimen berbasis konteks. *Ontology* dibangun atas empat kelas utama, yaitu Aplikasi, Gangguan_Aplikasi, Fitur_Aplikasi, dan Layanan_Kelistrikan. Evaluasi *Entity Extraction* menghasilkan *precision* 88,00%, *recall* 85,44%, dan *F1-score* 86,70%, sedangkan *Relation Extraction* memperoleh *precision* 84,00%, *recall* 87,50%, dan *F1-score* 85,71%. Pada analisis sentimen, *Multinomial Naive Bayes* memperoleh *accuracy* 92,40% dan *macro F1-score* 57,43%, sedangkan *Random Forest* memperoleh *accuracy* 87,84% dan *macro F1-score* 61,20%; berdasarkan *macro F1-score*, *Random Forest* dipilih sebagai model yang lebih seimbang terhadap ketiga kelas sentimen. Integrasi sentimen dengan ontologi menunjukkan proporsi sentimen negatif tertinggi pada Gangguan_Aplikasi sebesar 59,83% dan Fitur_Aplikasi sebesar 55,77%, dibandingkan Layanan_Kelistrikan sebesar 17,55% dan Aplikasi sebesar 9,00%. Hasil penelitian menunjukkan bahwa *Knowledge Graph* berbasis ontologi mampu mengubah ulasan tidak terstruktur menjadi representasi pengetahuan semantik dan memberikan konteks yang lebih terarah terhadap hasil analisis sentimen pelanggan PLN Mobile.

Kata Kunci: Analisis Sentimen, *Knowledge Base*, *Knowledge Graph*, *Ontology*, PLN Mobile.

DEVELOPMENT OF A KNOWLEDGE GRAPH FOR ELECTRICITY SERVICE COMPLAINTS AS A KNOWLEDGE BASE FOR SENTIMENT ANALYSIS OF CUSTOMER REVIEWS

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ABSTRACT

Customer reviews of PLN Mobile on the Google Play Store contain information on user experiences, application disruptions, application features, and electricity services; however, most of these reviews are unstructured, making relationships among the information difficult to analyze systematically. This study aims to design an ontology and construct a Domain Knowledge Graph of electricity service complaints as a Knowledge Base, and to use it to provide contextual information for sentiment analysis of PLN Mobile customer reviews. The dataset consists of 202,532 Indonesian-language reviews from January 2020 to December 2024 and constitutes secondary data obtained from the study by Fauzan Fuadi Pasaribu (2025). Using a quantitative approach with the Cross-Industry Standard Process for Data Mining (CRISP-DM) method approach comprising text preprocessing, Ontology Modeling, dictionary-based Entity Extraction, Rule-Based Relation Extraction, RDF Triple Construction, Knowledge Graph implementation in Neo4j, extraction evaluation, and context-based sentiment analysis. The ontology comprises four main classes: Application, Application_Disruption, Application_Feature, and Electricity_Service. Entity Extraction achieved a precision of 88.00%, recall of 85.44%, and F1-score of 86.70%, while Relation Extraction achieved a precision of 84.00%, recall of 87.50%, and F1-score of 85.71%. For sentiment classification, Multinomial Naïve Bayes achieved 92.40% accuracy and a 57.43% macro F1-score, whereas Random Forest achieved 87.84% accuracy and a 61.20% macro F1-score; based on the macro F1-score, Random Forest was selected as the more balanced model across the three sentiment classes. Integrating sentiment results with the ontology showed that Application_Disruption had the highest proportion of negative sentiment at 59.83%, followed by Application_Feature at 55.77%, Electricity_Service at 17.55%, and Application at 9.00%. These findings demonstrate that an ontology-based Knowledge Graph can transform unstructured reviews into a semantic knowledge representation and provide more structured contextual information for sentiment analysis of PLN Mobile customers.

Keywords: Knowledge Base, Knowledge Graph, Ontology, PLN Mobile, Sentiment Analysis.