

Sentiment Analysis on Social Media X regarding Education Sector Budget Efficiency Issues using Long Short Term Memory (LSTM) Method

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ABSTRACT

The budget efficiency policy in the education sector has sparked various public responses on X social media, ranging from concerns about cuts to school operational funds to support for budget transparency. This study aims to classify public sentiment (positive, negative, and neutral) and identify the main topics dominating the discourse using the Latent Dirichlet Allocation (LDA) algorithm. The proposed method employs Deep Learning with a Long Short-Term Memory (LSTM) architecture, combined with a Keras Embedding Layer to handle unstructured characteristics of social media text. A data corpus of 1,500 tweets was collected through a crawling process on the X platform, followed by preprocessing and manual labeling stages. Based on the evaluation using 5 experimental scenarios, the LSTM model demonstrated stable performance with an average accuracy of $81.23\% \pm 2.20\%$. At its peak performance, the model achieved an accuracy of 84.33%, with a macro-average precision of 85.68%, recall of 83.93%, and F1-score of 84.63%. The LDA analysis results revealed that negative sentiment dominated public opinion (43.4%), with main topics related to concerns over the impact of budget cuts on the KIP Kuliah scholarship quota, the increase in Single Tuition Fees (UKT), and teacher welfare. Meanwhile, neutral sentiment (31.9%) focused on disseminating factual information, and positive sentiment (24.7%) contained hopes that budget efficiency could eradicate the misuse of funds for reallocation to educational infrastructure. This research also produced a web-based visual analytics dashboard system that stakeholders can use to monitor public opinion dynamics in real-time.

Keywords: *Sentiment Analysis, Deep Learning, LSTM, X (Twitter), Education Budget Efficiency, Latent Dirichlet Allocation, Dashboard.*