

Temporal Sentiment Analysis of Politician XYZ on Social Media X Using FastText Word Embedding and Graph Neural Network Model

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Abstract— Social media has become a primary platform for the public to express their opinions. Since 2023, politician XYZ has been one of the most widely discussed figures, particularly on Social Media X. Several political events between 2023 and 2024 make the public sentiment toward this figure interesting to analyze. This study conducts a temporal sentiment analysis of public opinion on politician XYZ from August 2023 to March 2024, using FastText word embeddings and a Graph Neural Network (GNN) model. The approach involves data collection, text processing, and sentiment classification, utilizing FastText to capture the semantic relationships between words and a Graph Neural Network (GNN) to model sentiment dynamics over time. The focus of this study is to explore the temporal aspect of sentiment shifts, providing insights into how public opinion evolves over time in response to political events, in contrast to static sentiment. The temporal sentiment analysis reveals that the public's perception of politician XYZ initially began with positive sentiment but shifted to negative sentiment in the following months, influenced by key political events. With an accuracy of 72%, this study highlights the potential of integrating FastText and GNN for capturing complex and evolving political sentiments. The findings offer practical implications for political communication strategies, enabling stakeholders to better understand and anticipate shifts in public opinion during critical political moments.

Keywords—Temporal Sentiment Analysis; Politics; FastText; Graph Neural Network.

I. INTRODUCTION (HEADING 1)

The rapid growth of social media has transformed how people share and access information, fostering a platform for public discussion and self-expression [1][2]. By early 2024, 5.16 billion individuals, or 59.3% of the global population, were active on social media [3]. Among these platforms, X (formerly Twitter) stands out as a leading channel for information exchange and public discourse, with 24.85 million users in Indonesia as of April 2024, positioning the country as the fourth-largest global user base for the platform [4][5]. This makes social media X a valuable resource for analyzing public sentiment, especially during politically significant periods.

Politician XYZ emerged as a central figure in public discourse throughout 2023 and 2024 due to his involvement in pivotal political events crucial to Indonesia's stability. Understanding the dynamics of public sentiment toward him

is essential, as it reflects broader societal and political trends. Temporal analysis serves as a powerful tool for tracking how public opinion shifts in response to specific events, offering insights into the interaction between political developments and public perception. This approach can also identify anomalies within specific timeframes that trigger shifts in public perspectives [6]. Using advanced computational methods, this study examines how sentiment toward politician XYZ evolved from August 2023 to March 2024, addressing gaps in temporal sentiment analysis within political contexts.

The study by Garcia, C.M. et al. [7] highlights the shift in focus of the hashtag #mybodymychoice, from women's rights to vaccination issues in 2021. Similarly, Vivek, M. et al. [8] conducted a spatio-temporal crime analysis in India, using statistical and machine learning techniques to track changes over time. These studies demonstrate the power of temporal analysis in tracking topic evolution. Additionally, Zhao Lin's [6] work on global network properties such as reciprocity and assortative reveals correlations with real-world phenomena, aiding in anomaly detection and refining analysis to more appropriate time granularities. This study similarly applies temporal sentiment analysis to explore how public opinion and perceptions of politician XYZ evolved from August 2023 to March 2024, identifying shifts in sentiment over time.

The focus of this study is on analyzing social media X users' sentiment regarding politician XYZ from August 2023 to March 2024. The analysis utilizes FastText word embedding. MR Ilham and AD Laksito [9] in their study found that FastText outperformed the GloVe method with an accuracy of up to 90%. Additionally, the sentiment analysis model used in this study is the Graph Neural Network (GNN), with research by Yao et al. [10] demonstrating that the GNN model is effective in text classification, particularly in sentiment analysis.

While previous studies, such as those by Garcia, C.M. et al. [7] and Vivek, M. et al. [8], have explored temporal and spatio-temporal dynamics in various contexts, they primarily focus on topic-level or spatial patterns without addressing the evolution of sentiment over time or its implications for public opinion in political scenarios. Furthermore, models such as FastText and GNN, which have individually demonstrated strong performance in text classification and semantic analysis [9], [10] have not been applied in combination to the specific domain of political sentiment analysis over time. This