

Title: Performance Analysis of LSTM and Bi-LSTM Model with Different Optimizers in Bangla Sentiment Analysis

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Abstract: Sentiment analysis, the computational study of opinions, emotions, and attitudes expressed in text, has become increasingly vital in understanding public perception across various domains. In the context of Bangla, a language rich in cultural nuances and expressions, sentiment analysis poses unique challenges. Unlike English, where sentiment analysis has seen substantial advancements, Bangla sentiment analysis presents a more intricate landscape with its distinct linguistic structures and cultural subtleties. Bangla sentiment analysis confronts the complexity of categorizing text into three primary classes: positive, negative, and neutral sentiments. While this tripartite classification mirrors similar frameworks in other languages, the nuances of sentiment expression in Bangla make the task notably arduous. From colloquial expressions to regional dialects, Bangla embodies a spectrum of linguistic diversity that adds layers of intricacy to sentiment analysis. Moreover, the scarcity of labeled datasets and resources tailored for Bangla sentiment analysis exacerbates the challenge. Unlike English, where abundant resources facilitate sentiment analysis tasks, Bangla lacks comparable repositories, making the development of accurate sentiment analysis models a formidable endeavor. We used LSTM and Bi-LSTM approach to classify the labeled dataset. Our model achieved an overall accuracy of 99% in LSTM, indicating the proportion of correctly classified instances across all classes. The macro-average F1-score, calculated as the average F1-score across all classes, is 98%, while the weighted-average F1-score, which considers class imbalance, is 98%. These metrics collectively assess the model's ability to correctly classify instances across different classes, providing insights into its overall performance.

Keywords: LSTM , Bi-LSTM , Bangla Sentiment analysis , Natural Language Processing , Emotion Recognition , Computational Linguistics

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