

***EVALUATION OF THE EFFECTIVENESS OF DUOLINGO IN ENGLISH
LEARNING THROUGH USER SENTIMENT ANALYSIS USING CNN***

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ABSTRACT

This study aims to analyze user sentiment to better understand perceptions of Duolingo's effectiveness as an English learning tool. The data consists of 21,560 reviews collected through web scraping from the Google Play Store. The dataset was processed through several preprocessing steps, including text cleaning, case folding, normalization, tokenization, filtering, and duplicate removal. After preprocessing, the data was labeled into three sentiment categories: positive, neutral, and negative, and split into training and testing sets with an 80:20 ratio.

Text representation was performed using 300-dimensional FastText embeddings, while classification was carried out using a Convolutional Neural Network (CNN) with a multi-kernel architecture designed to capture different contextual patterns in text. The model was evaluated using accuracy and macro-average F1-score, achieving 85% accuracy and a 0.74 macro F1-score. The results show that most reviews are positive, indicating that Duolingo is generally perceived as an effective English learning tool, although some users reported issues related to advertisements, the energy system, and feature limitations.

Keywords: *Sentiment Analysis, Duolingo, Convolutional Neural Network, FastText.*