

Sentiment Analysis of Google Play Store Reviews using BERT

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Abstract

Sentiment analysis is a critical task in natural language processing (NLP) that offers insights by interpreting subjective information within text data. This project proposal explores the potential of using BERT (Bidirectional Encoder Representations from Transformers) to enhance sentiment classification. The project aims to investigate how BERT's contextualized embeddings, capturing deep semantic relationships, could improve the accuracy and robustness of sentiment analysis compared to traditional approaches. This proposal outlines the approach for evaluating BERT's performance in sentiment analysis, with the goal of establishing a foundation for its practical applications across various real-world text classification tasks.

Keywords: Sentiment Analysis, Natural Language Processing, BERT Transformer, Classification

1. Introduction

Sentiment analysis plays a crucial role in applications where understanding user feedback is essential, such as in Google Play Store reviews [4]. Analyzing the sentiment in these reviews provides developers and stakeholders with insights into user satisfaction and app performance, helping to guide improvements based on user feedback. Traditional methods for sentiment analysis, such as Support Vector Machines (SVM) and Naive Bayes, have proven effective to an extent; however, they struggle to handle the complex, nuanced language often present in user-generated content [5]. These earlier models generally rely on bag-of-words or word embeddings techniques that lack deep contextual understanding, making them less effective in capturing sentiment from informal, app-specific language.

Recent advancements in NLP, particularly BERT, address these limitations. BERT's bidirectional training approach allows it to understand context by capturing semantic relationships across an entire sentence rather than processing text in a unidirectional manner [1]. This contextual depth is invaluable for analyzing sentiment in diverse, complex user reviews. By applying BERT to Google Play Store app reviews, this project aims to overcome the limitations of traditional models, enhancing the accuracy of sentiment classification.

2. Methods

The objective of this project is to classify user feedback on Google Play Store accurately by leveraging BERT's deep understanding of language context. Traditional methods, such as Logistic Regression, Naive Bayes, and SVMs, often fall short in capturing the informal and nuanced nature of user reviews. These approaches typically rely on simpler representations like TF-IDF or Word2Vec, which ignore word order and lack the ability to discern context-specific sentiments. Their limitations are evident when dealing with app-specific jargon or variations in language style [2].

In response, our proposed BERT-based framework for sentiment analysis is structured around the following components:

1. **Contextual Embedding with BERT:** BERT's transformer-based architecture enables it to create contextualized embeddings that capture subtle sentiment shifts. This is achieved by its self-attention mechanism, which allows the model to weigh each word's importance relative to others in a sentence, making it ideal for understanding sentiment in reviews with complex expressions [1].
2. **Fine-Tuning for Domain Specificity:** We fine-tune BERT using a curated dataset of Play Store reviews to optimize it for app-related feedback, particularly around satisfaction levels and app performance. This customization enables BERT to handle app-specific terminology and slang more effectively, making the sentiment analysis more relevant to this domain.
3. **Self-Attention Mechanism:** The self-attention mechanism in BERT assigns varying degrees of importance to each word within a context, a feature that enhances its ability to capture the meaning and sentiment within sentences accurately. This component is particularly valuable in sentiment analysis, where word relationships are crucial for accurate interpretation of sentiment [3].

Through this structured approach, our framework aims to deliver precise and actionable sentiment predictions for app developers and stakeholders, enhancing their ability to understand and improve user experience.

Evaluation: To assess the effectiveness of our BERT-based sentiment analysis framework, key metrics include **Accuracy** - which measures the proportion of correctly classified reviews, and **Precision, Recall and F1-score** - which provide insights into the model's performance in accurately identifying positive and negative sentiments, especially subtle negative cases.

Dataset: We will utilize a dataset of Google Play Store reviews, which contains user feedback across a variety of app categories which is classified as positive, negative or neutral sentiment [4]. This dataset provides diverse and unfiltered language patterns, making it ideal for testing the robustness of our BERT-based model.

References

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