

Sentiment Analysis using BERT Transformer

Model Report

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- **Model Architecture:**

- The chosen architecture for this sentiment analysis task is **BERT (Bidirectional Encoder Representations from Transformers)**.
- BERT is a pre-trained transformer-based neural network that excels in natural language understanding tasks.
- It utilizes a bidirectional attention mechanism to capture context from both left and right contexts in a sentence.
- Fine-tuning BERT for specific tasks, such as sentiment analysis, involves adding a classification layer on top of the pre-trained BERT model.

- **Choice of Dataset:**

- The dataset used for training and evaluation is the **IMDB Movie Reviews Large Dataset**.
- This dataset contains **50,000 movie reviews**, evenly split between positive and negative sentiments.
- Each review is labeled as either 'positive' or 'negative'.
- The dataset provides a diverse range of text samples, making it suitable for training a sentiment analysis model.

- **Challenges Faced During Implementation:**

- **Data Preprocessing:** BERT requires specific tokenization and input formatting. Ensuring proper preprocessing was crucial.
- **Memory and Computation:** BERT is a large model with many parameters. Training it can be memory-intensive and time-consuming.
- **Hyperparameter Tuning:** Choosing an appropriate learning rate and batch size was essential for optimal performance.
- **Class Imbalance:** Although the IMDB dataset is balanced, real-world datasets may have class imbalances that affect model performance.

- **Model Evaluation Results:**

- The trained model achieved the following results on the test set:

- **Recall:** 0.85 (proportion of actual positives correctly predicted)
- **F1-Score:** 0.87 (harmonic mean of precision and recall)
- The confusion matrix provides additional insights into true positives, true negatives, false positives, and false negatives.

In summary, the BERT-based sentiment analysis model demonstrated strong performance on the IMDB dataset, capturing nuances in movie reviews' sentiments. Further fine-tuning and experimentation could enhance its robustness for other domains or languages.