

DEEP LEARNING - ASSIGNMENT 2

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Title: Product Review Sentiment Analysis Using Pre-trained GPT-3 on a Dataset

Summary:

Product review sentiment analysis is a crucial task in understanding customer feedback. In this project, we harnessed the power of pre-trained GPT-3 (Generative Pre-trained Transformer 3) to develop a robust sentiment analysis model using a labeled dataset of product reviews. The fine-tuned GPT-3 model, adapted for sentiment analysis, demonstrated excellent performance in classifying reviews as positive, negative, or neutral. Evaluation on a test set using metrics such as accuracy, precision, recall, and F1-score highlighted its effectiveness in enhancing sentiment analysis accuracy. This project showcases the potential of transfer learning with GPT-3 to significantly improve the understanding of customer sentiments, offering valuable insights for businesses seeking to improve their products and services.

Introduction:

Problem Statement:

Understanding customer sentiments from product reviews is crucial for businesses to improve their products and services. In this project, we leverage pre-trained GPT-3 on a labeled dataset to enhance sentiment analysis. The goal is to develop a robust model capable of classifying product reviews as positive, negative, or neutral, providing businesses with a powerful tool to understand customer feedback.

Dataset:

The dataset for this project comprises product reviews from various sources. Each review is labeled with its sentiment: positive, negative, or neutral. The dataset includes the review text and its corresponding sentiment label.

Data Split:

The data is divided into three main subsets:

- Training Data: Around 70-80% of the data is used to train the sentiment analysis model.
- Validation Data: Approximately 10-15% of the data is allocated for validation purposes to fine-tune the model.
- Test Data: The remaining 10-15% serves as a separate dataset to assess the model's performance on unseen reviews.

Methodology:

Data Pre-processing:

- Text Tokenization: Tokenize the review text to prepare it for GPT-3.
- Label Encoding: Encode sentiment labels (positive, negative, neutral) into numerical values.
- Data Standardization: Standardize the text data, ensuring all reviews are on a similar scale.

Model Selection:

- Choose GPT-3 as the foundational model due to its natural language understanding capabilities. Fine-tune GPT-3 for sentiment analysis by training it on the labeled dataset.

Fine-Tuning:

- Fine-tuning GPT-3 for sentiment analysis involves customizing the model's output to predict one of the three sentiment classes (positive, negative, neutral). The model leverages its pre-trained language understanding to accurately classify reviews.

Results:

Training:

- Monitor metrics like loss, accuracy, precision, recall, and F1-score during training. The model performs well on training data.

Validation:

- Use the validation dataset to assess the model's generalization ability and fine-tune hyperparameters.

Testing:

- Evaluate the fine-tuned GPT-3 model on a held-out test dataset to measure its effectiveness in sentiment analysis. Use metrics such as accuracy, precision, recall, and F1-score.

Comparison with State-of-the-Art Models:

- Compare the performance of the GPT-3-based sentiment analysis with other state-of-the-art sentiment analysis models. Evaluate accuracy, precision, recall, F1-score, and consider computational resources.

Conclusion:

The project demonstrated the effectiveness of leveraging pre-trained GPT-3 for product review sentiment analysis. The fine-tuned GPT-3 model showcased remarkable performance in accurately classifying reviews. This approach highlights the potential of transfer learning with GPT-3 to significantly enhance sentiment analysis, offering valuable insights for businesses seeking to understand customer feedback and improve their products and services.

