



Lyric Emotion Analysis for Mood-Based Music Recommendation



Problem Statement

Our research project is driven by the question of how Natural Language Processing (NLP) can be harnessed to amplify the personalization and emotional relevance of music recommendations. Large music companies like Spotify and Apple Music have invested heavily into providing their users with accurate recommendations. As such, our projects sits at the crux of these ideas, motivated by a desire to provide a means for constructing an emotion-based song curation system.

Datasets

For this project, we employed two different public datasets, both found on Kaggle.com. The first dataset is an “Emotions for NLP” dataset, which was used for training our models on the identification of emotional content. Our application dataset, which allows us to make emotion-based recommendations, is the “Spotify Million Songs Dataset,” which contains information (including lyrics, artist, and title) for thousands of popular Spotify songs.

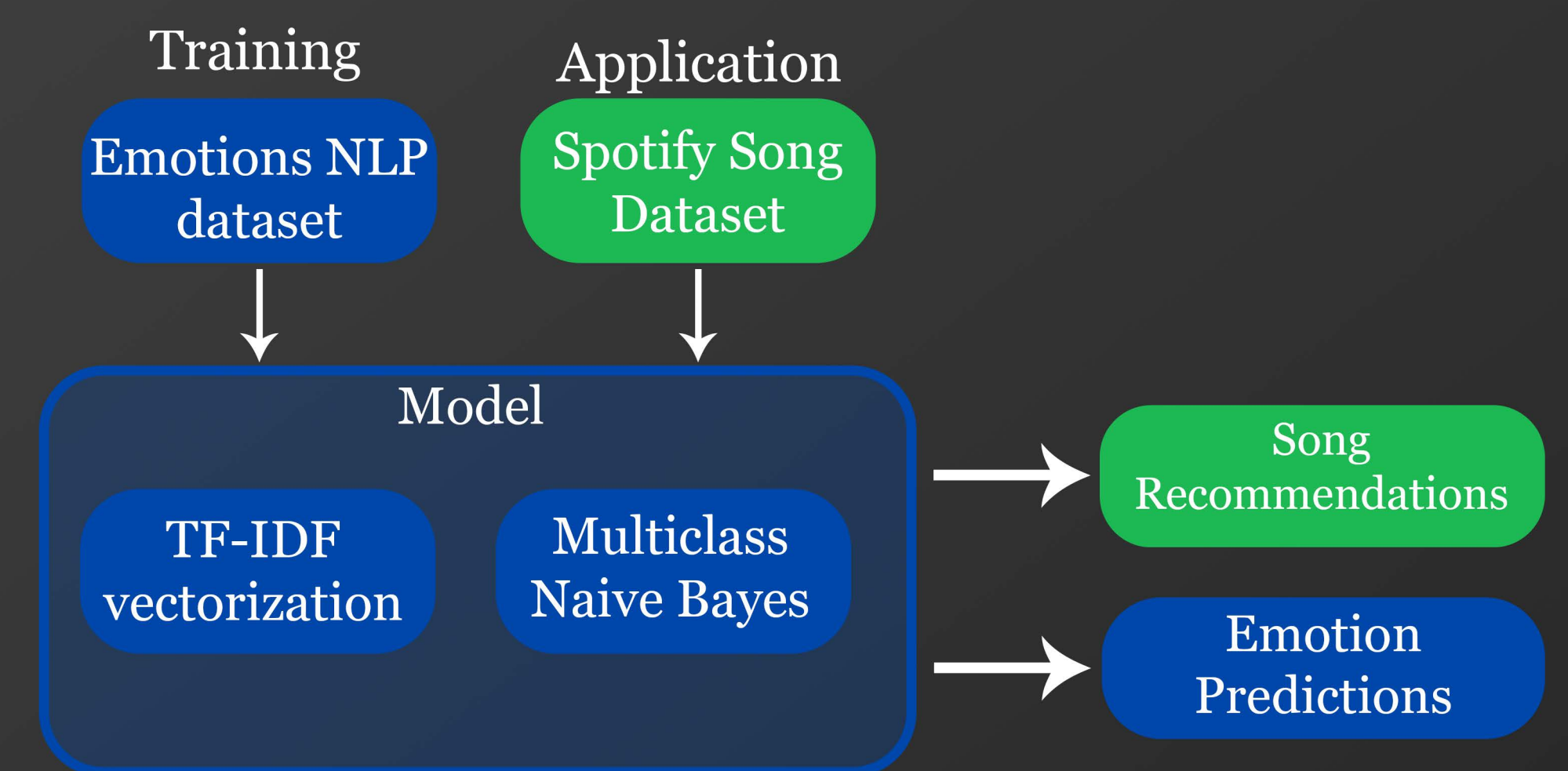
Methods

Our approach to solving this problem involves the creation of two distinct models; one baseline model and one large, fine-tuned model. Our baseline model is a Multiclass Naive Bayes architecture built on a TF-IDF feature representation. The final model will be a fine-tuned BERT model for sequence classification. Both the fine-tuned and baseline models were trained on the “Emotions for NLP” dataset, using the Spotify Songs dataset for application.

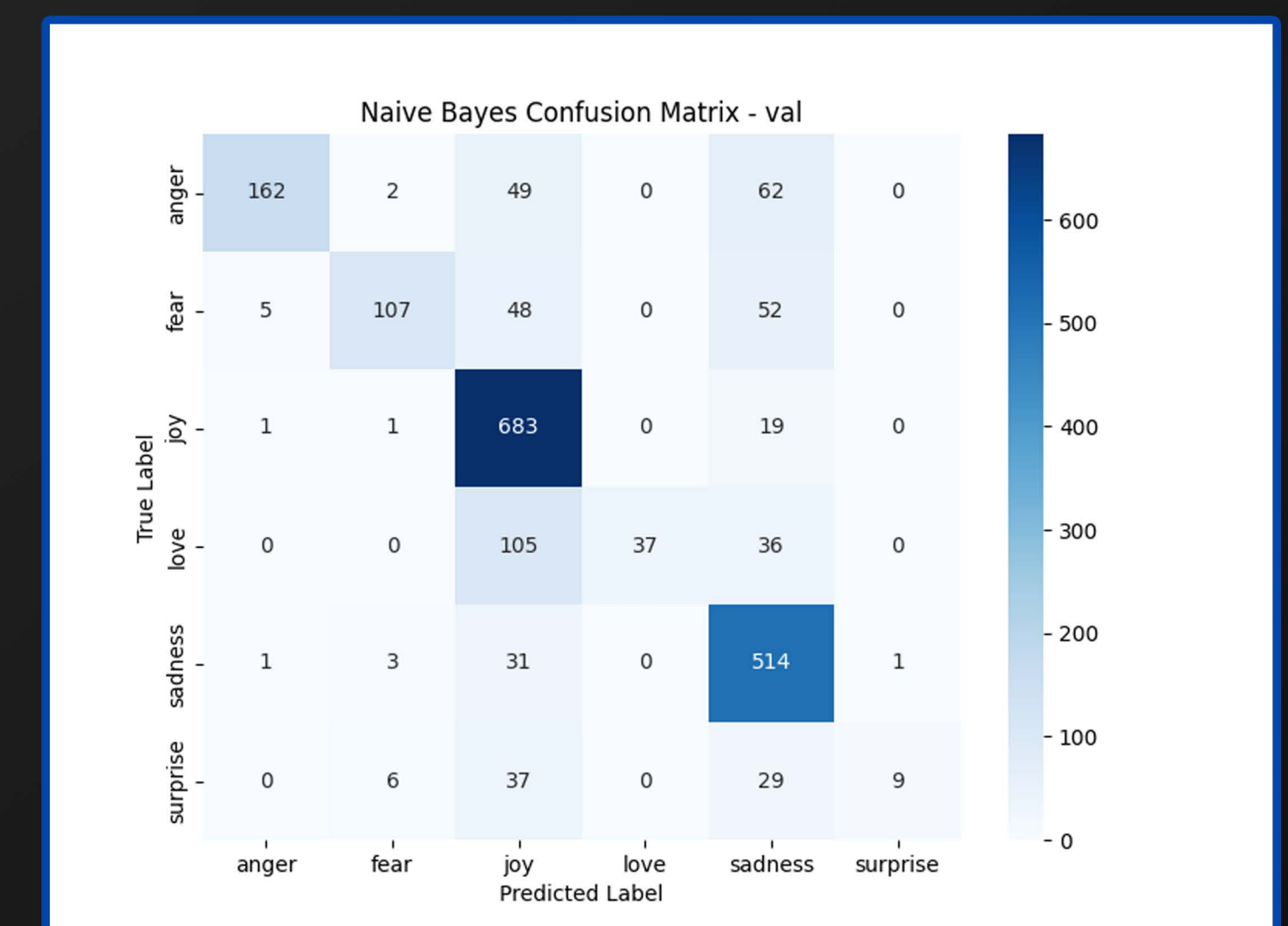
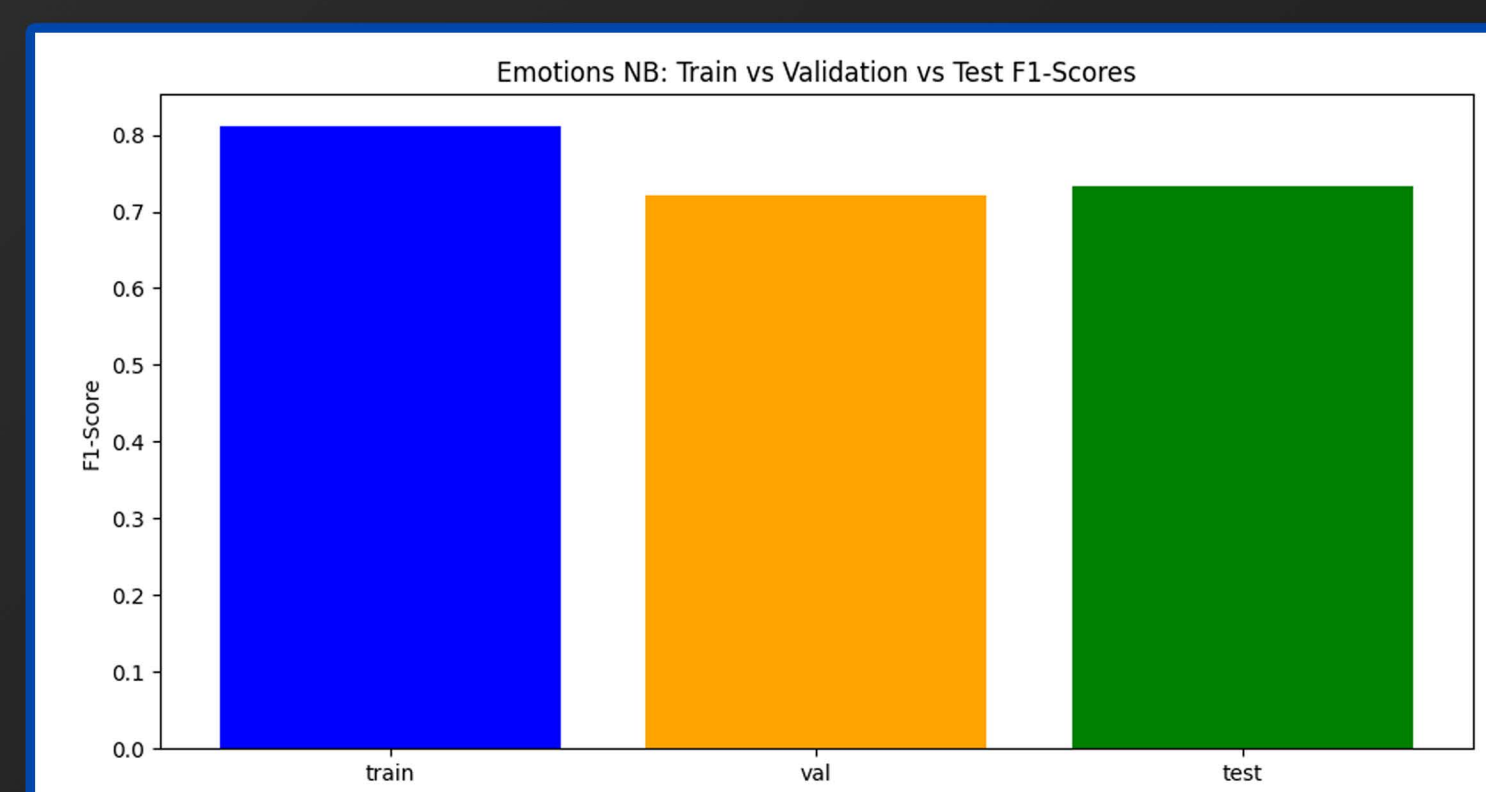
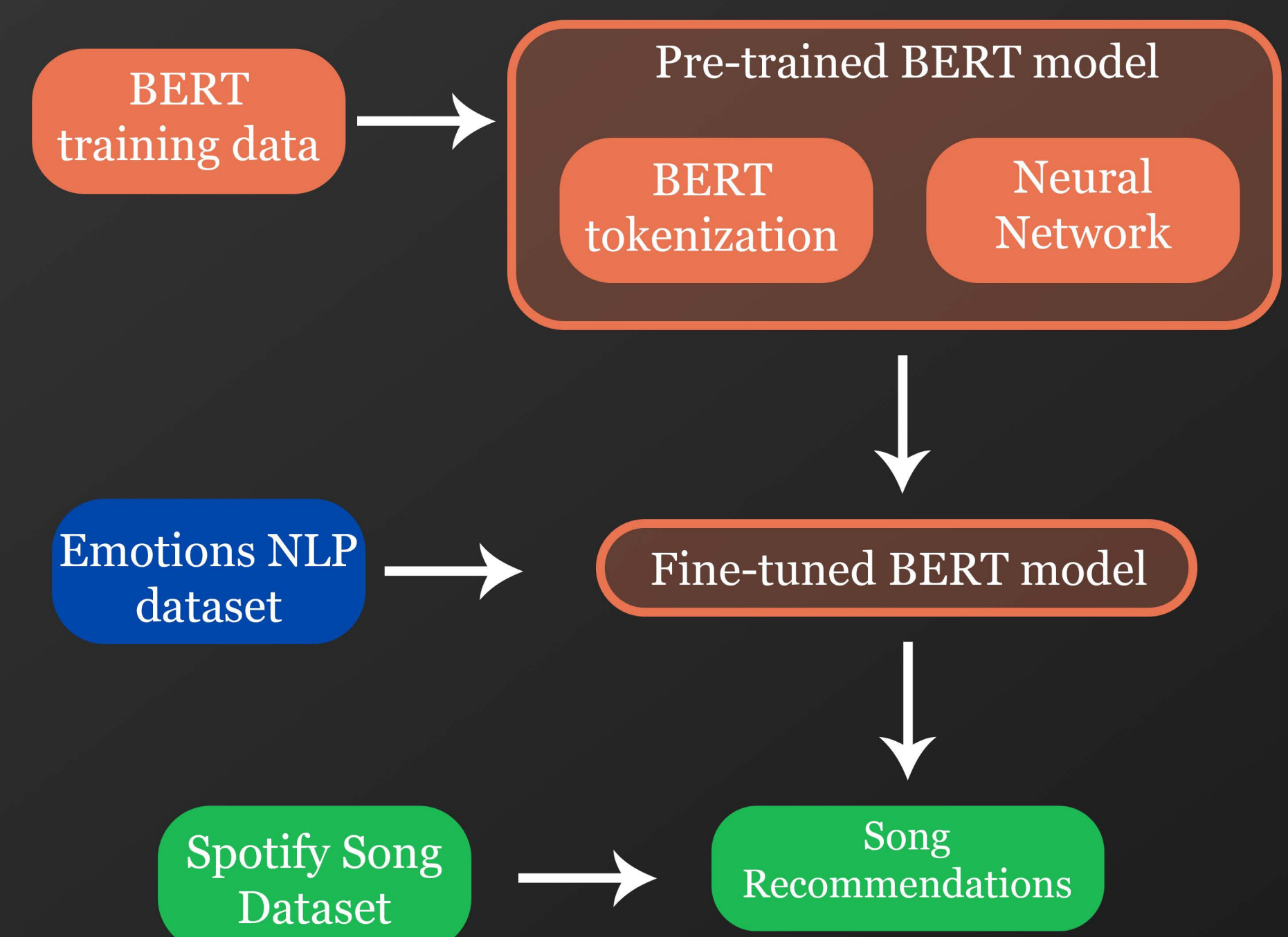
Experimental Evaluation and Findings

As can be seen with the visualizations, we found that the BERT model performs significantly better than the baseline model, highlighting its ability to accurately pick up on emotion in text. From this, we hypothesize that using the BERT model for large-scale song systems will result in accurate emotion-lyric analysis and thus recommendation. We have also been able to create a recommendation system for generating the k-most similar songs based on our Naive Bayes model. An equivalent application of our BERT-based model is being finalized as well.

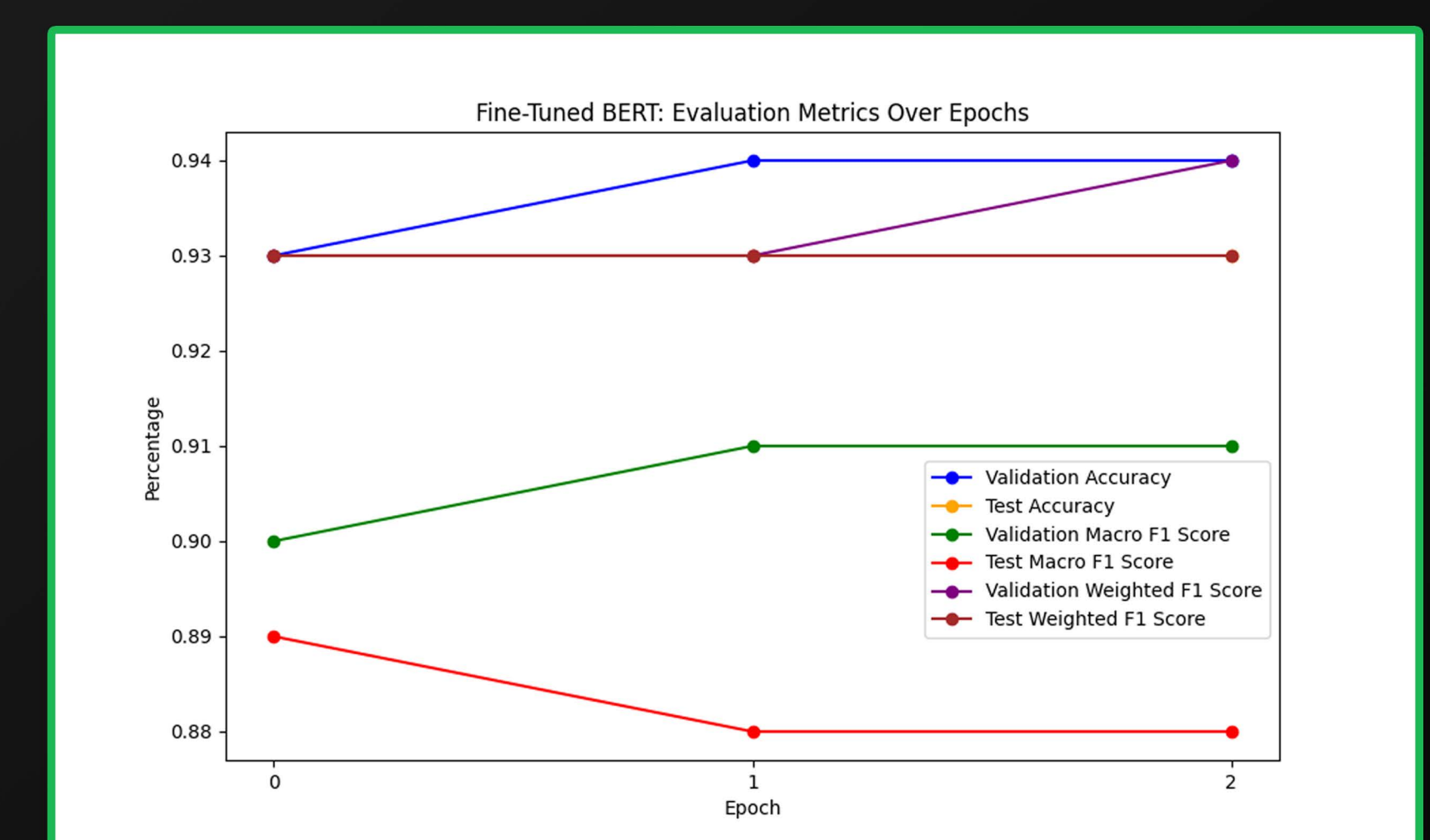
Baseline Model



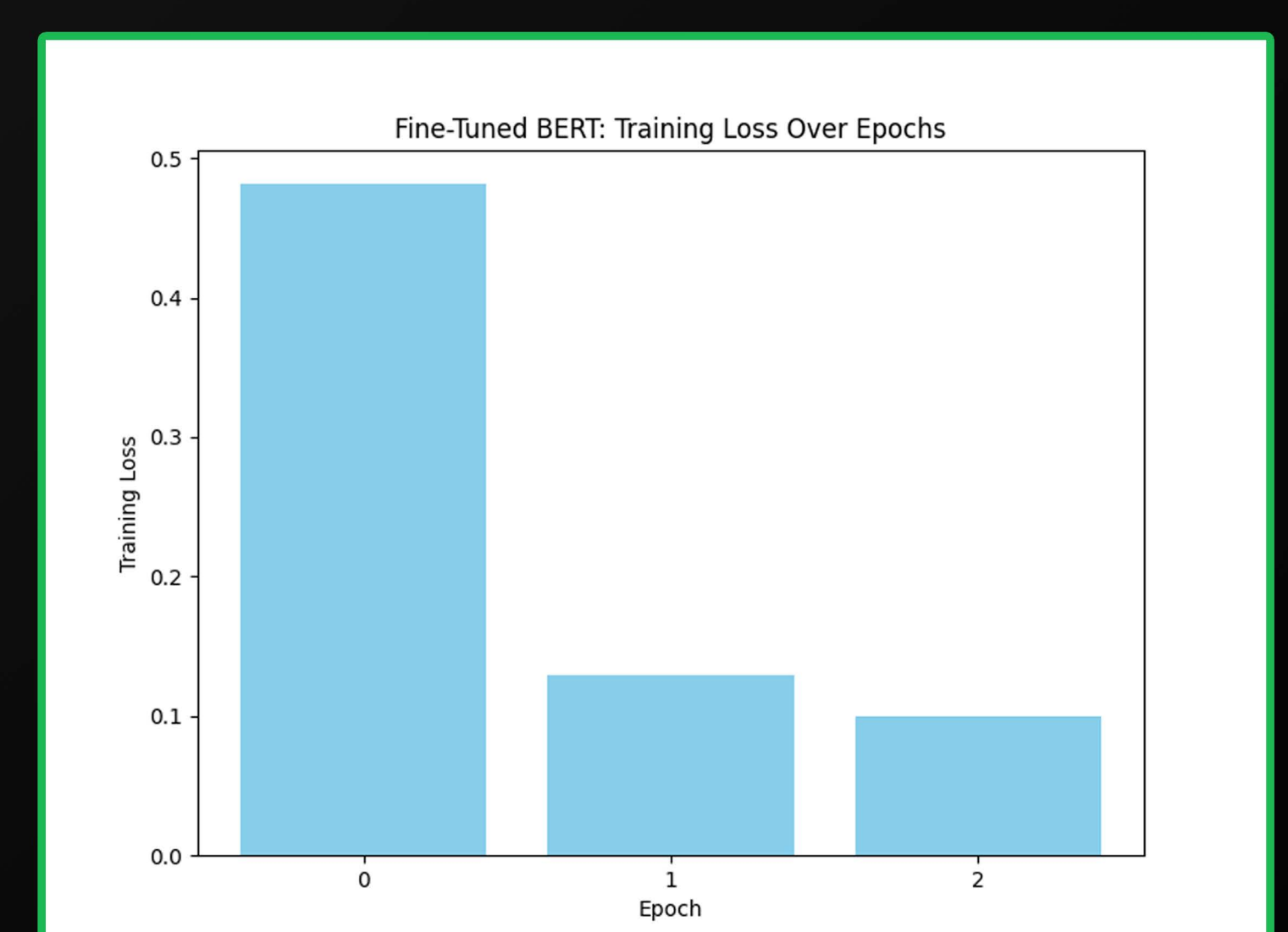
Fine-Tuned Model



Baseline Results



BERT Results



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