

DIALOUGE GENERATOR

INTRODUCTION

Dialogue generation is a core task in Natural Language Processing (NLP) involving the creation of contextually relevant and coherent responses in a conversational setting. Traditional sequence-to-sequence (Seq2Seq) models generate dialogues but often suffer from information loss and irrelevant outputs.

MODELS USED

Seq2Seq without Attention

- Encoder-Decoder architecture
- Uses final encoder state for decoding

Seq2Seq with Attention

- Adds attention layer to focus on relevant input
- Improves coherence and context tracking

Transformer with Self-Attention

- Fully attention-based architecture
- Captures long-range dependencies

METHODOLOGY

Dataset Preparation

- Use a multi-turn dialogue dataset
- Preprocess: tokenize, clean text, and convert to sequences.

Model Implementation

- Applying all three models.

Training

- Use teacher forcing and cross-entropy loss.
- Apply padding and masking for sequence handling.

Evaluation

- Evaluate models using BLEU, METEOR, and ROUGE scores.

Comparison

- Analyze performance to understand the effect of attention on dialogue quality and coherence.

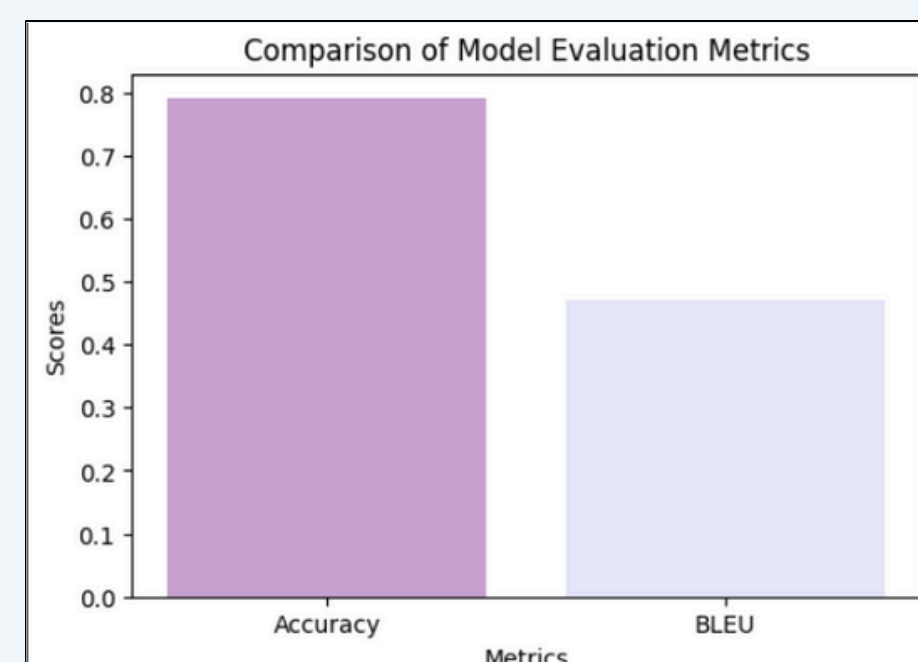
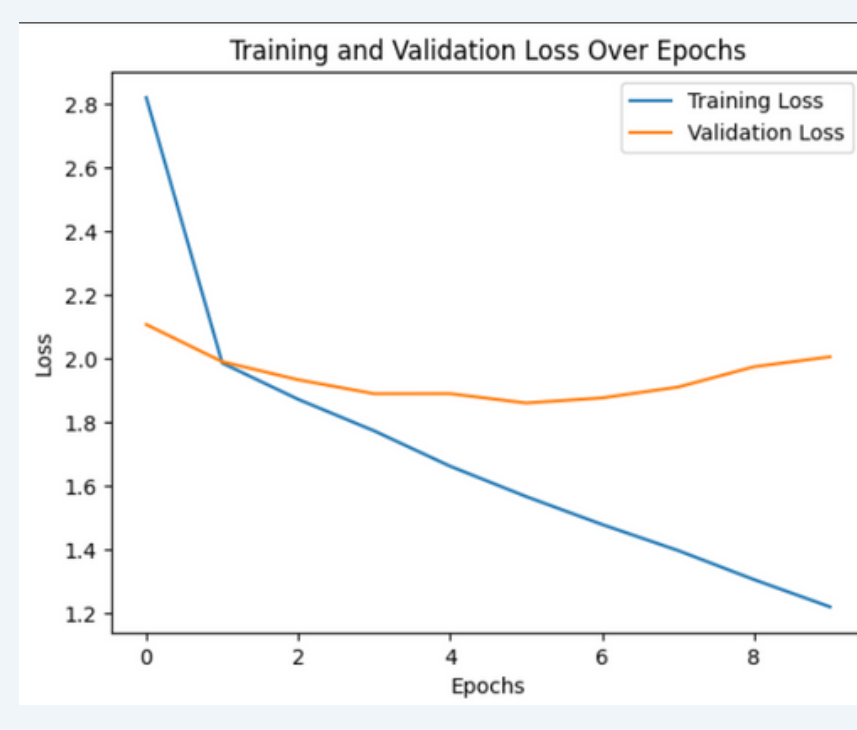
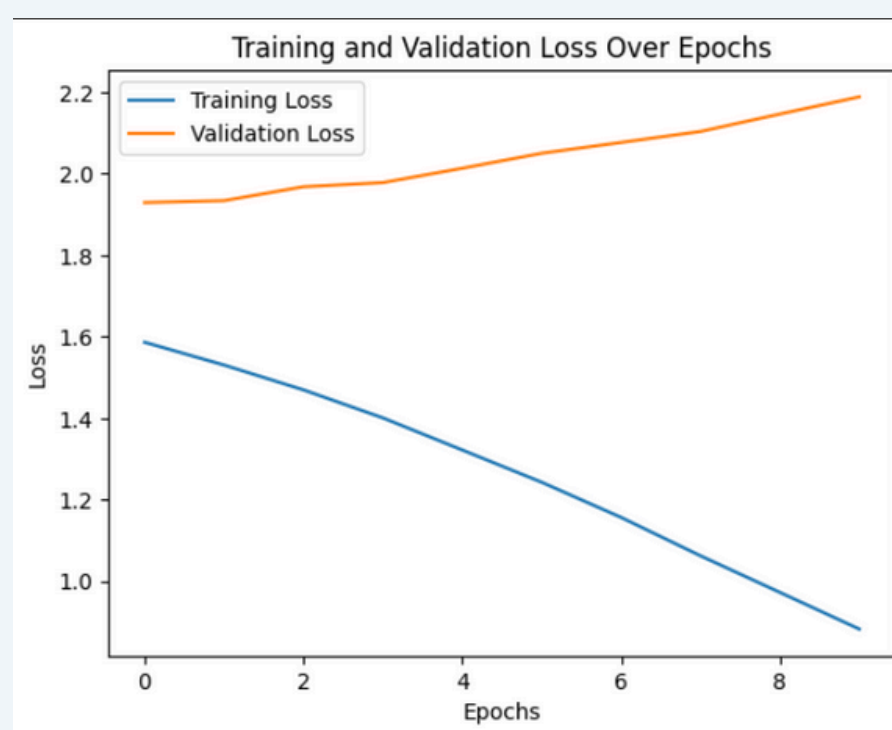
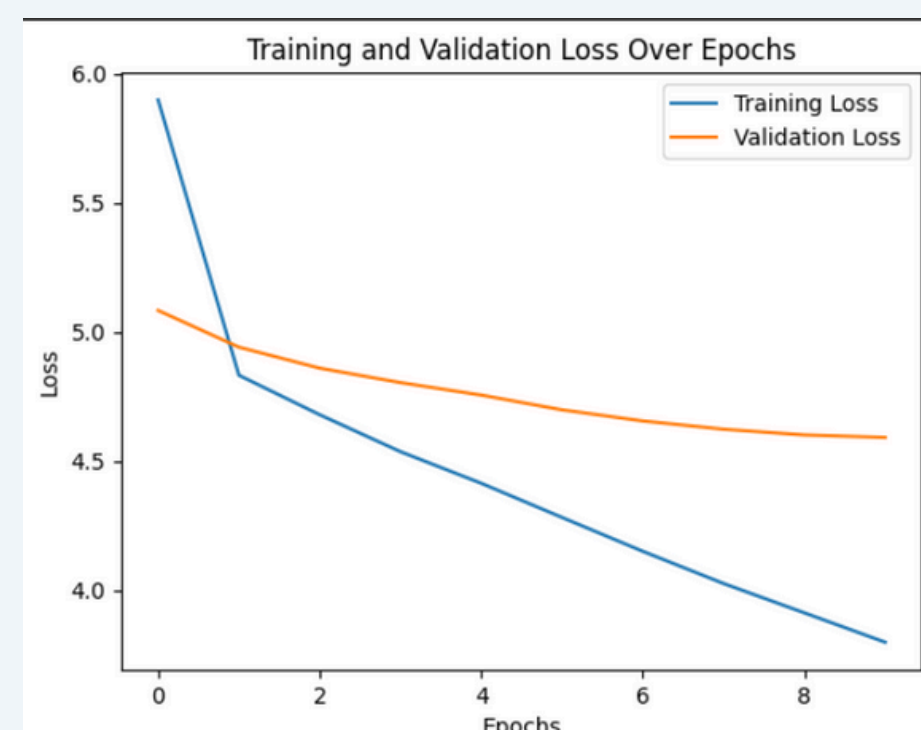
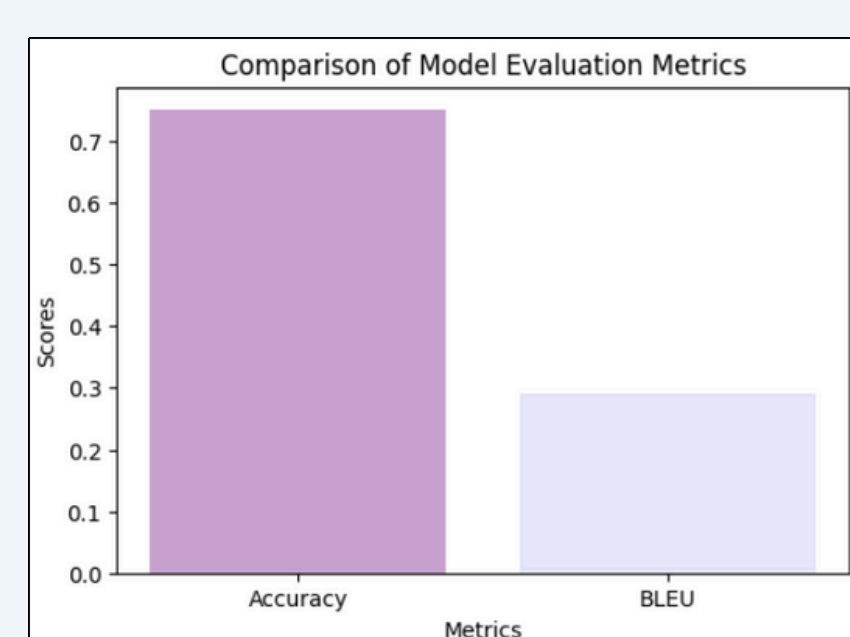
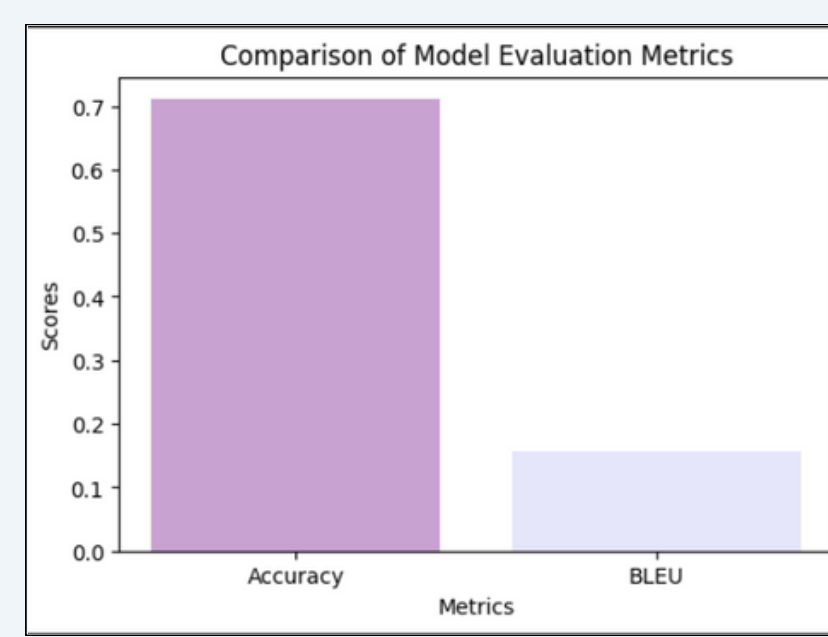
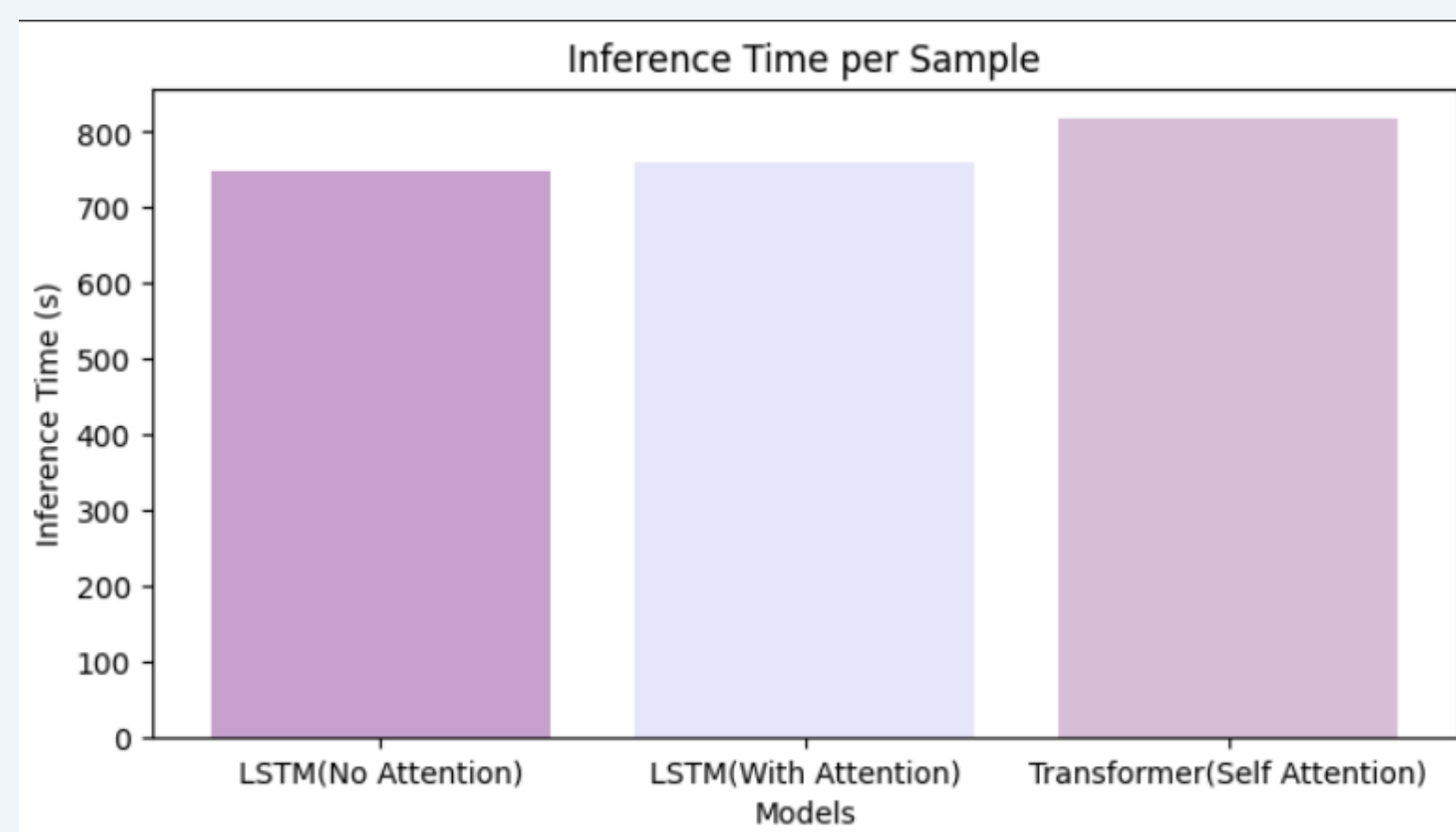
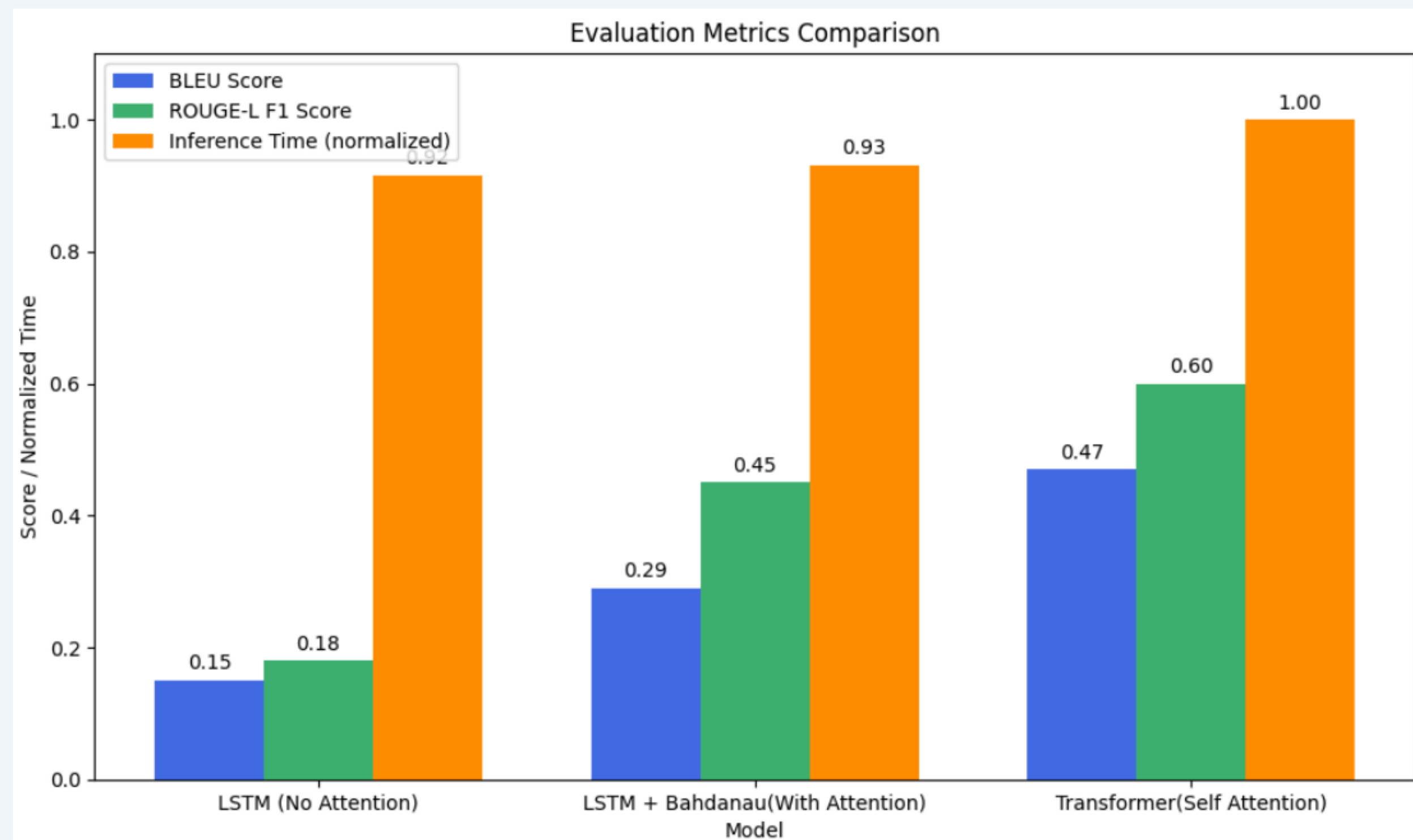
DATASET DESCRIPTION

This dataset is used for research or training of natural language processing (NLP) models. The dataset include various types of conversations such as casual or formal discussions, interviews, customer service interactions, or social media conversations.

- Source : Kaggle
- Dtaset Size : 3510 unique values

ANALYSIS

The LSTM model performed well but showed slight overfitting and struggled with long-range dependencies. Bahdanau Attention improved focus and convergence, achieving the highest accuracy. The Transformer generalized well but needed more training time. Overall, attention mechanisms significantly enhanced anomaly detection



CHALLENGES

- Data Preprocessing Complexity
- Training Time and Resource Constraints
- Overfitting on Small Datasets
- Maintaining Coherence in Generated Dialogues
- Evaluating Dialogue Quality
- Alignment Issues in Attention Mechanisms

CONCLUSION

Adding attention mechanisms dramatically improves the performance of dialogue generators. Basic attention provides local focus, while self-attention enables global context understanding, allowing the model to generate more human-like, coherent responses. This project demonstrates the evolution from simple encoder-decoder architectures to advanced transformer-based models, highlighting the transformative impact of attention in NLP.