ITESM Campus Monterrey

**Proof of Concept: Encoder-Decoder with Attention for Sentiment Analysis**

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Research Stay - Going beyond Artificial Intelligence: Artificial Emotions

TC3073 | Group 573

## Introduction

Combining Encoder-Decoder architectures with attention mechanisms has transformed natural language processing (NLP) tasks by enabling models to focus dynamically on the most relevant parts of input sequences. In sentiment analysis, this capability is particularly valuable for identifying sentiment-rich phrases and nuanced expressions. This Proof of Concept (PoC) demonstrates how an Encoder-Decoder model with attention can improve sentiment classification accuracy.

## Business Problem

Sentiment analysis is essential for understanding public opinion, customer feedback, and market trends. However, traditional models often struggle with:

* Complex Sentiment: Detecting sentiment in text with nuanced expressions or conflicting emotions.
* Long Sequences: Maintaining context across lengthy text inputs.
* Critical Features: Identifying the most sentiment-relevant words or phrases.

**Proposed Solution**

This PoC proposes the development of an Encoder-Decoder architecture enhanced with attention mechanisms for sentiment analysis. The approach includes:

Model Architecture: Implement an Encoder-Decoder model with attention layers (e.g., Bahdanau or Luong attention) to focus on sentiment-critical parts of input text.

* Dataset: Train the model on labeled datasets such as IMDb movie reviews or Twitter sentiment datasets.
* Evaluation Metrics: Assess performance using metrics such as accuracy, precision, recall, and F1-score.
* Comparison: Benchmark against traditional sentiment classification models to demonstrate the impact of attention mechanisms.

## Expected Outcomes

The implementation is expected to achieve:

* Improved Classification Accuracy: Enhanced detection of nuanced sentiments through attention-guided focus.
* Context-Aware Predictions: Effective handling of long and complex text sequences.
* Insights into Attention: Understanding the role of attention mechanisms in prioritizing sentiment-rich text segments.

## Conclusion

This PoC showcases the potential of Encoder-Decoder architectures with attention for sentiment analysis tasks. By addressing the limitations of traditional approaches, this solution offers a robust framework for sentiment classification in complex and nuanced text data. The findings will provide a foundation for further advancements in sentiment analysis and related NLP applications.