ITESM Campus Monterrey

**Proof of Concept: Improving Text Summarization with Attention Mechanisms**

Luis Alberto Portilla López

Research Stay - Going beyond Artificial Intelligence: Artificial Emotions

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## Introduction

Attention mechanisms have revolutionized Sequence-to-Sequence (Seq2Seq) models by enabling the decoder to focus on specific parts of the input sequence during generation. This capability addresses key limitations in traditional Seq2Seq architectures, particularly in handling long sequences and complex dependencies. This Proof of Concept (PoC) explores the application of attention mechanisms, such as Bahdanau and Luong attention, in text summarization tasks to generate coherent and concise summaries.

## Business Problem

Organizations and individuals face challenges in processing large volumes of text data to extract key insights. Traditional summarization techniques often struggle with:

* Context Retention: Maintaining relevance across lengthy documents.
* Coherence: Producing summaries that are both grammatically correct and meaningful.
* Complex Dependencies: Handling intricate relationships between sentences or concepts in the text.

## Proposed Solution

This PoC proposes implementing a Seq2Seq model with attention mechanisms to enhance abstractive text summarization. Key steps include:

* Model Architecture: Utilize an encoder-decoder framework with attention layers (Bahdanau and Luong attention).
* Dataset: Use datasets like CNN/Daily Mail or Gigaword for training and evaluation.
* Evaluation Metrics: Measure summarization quality using ROUGE scores and BLEU metrics.
* Comparison: Compare performance between models with and without attention to demonstrate the benefits of the mechanism.

## Expected Outcomes

The implementation is expected to achieve:

* Improved Summarization Quality: More accurate and coherent summaries.
* Enhanced Context Handling: Ability to generate summaries for long and complex documents.
* Insights into Attention Mechanisms: Demonstrate the impact of attention on Seq2Seq performance.

## Conclusion

This PoC highlights the potential of attention mechanisms in enhancing Seq2Seq models for text summarization tasks. By addressing limitations in traditional summarization approaches, attention-based models enable the generation of concise, coherent, and contextually relevant summaries. The findings from this PoC will guide future development of NLP applications utilizing attention mechanisms.