

This week, the focus was on enhancing a Language Learning Model (LLM) by integrating it with a knowledge graph. The objective was to improve the model's contextual understanding and depth of information. The project began with basic conditions to allow for clear observation and comparison across different implementations.

Experiments

To create a simple testing environment, only Python dictionaries were used instead of Neo4j, as both methods effectively involve the setup of entities and relationships. This decision was based on the assumption that using Python dictionaries would not introduce significant differences for testing purposes.

The experiment included the following variations:

1. **Original Version** – Baseline model without any knowledge graph integration.
2. **SpaCy-based Knowledge Graph Version** – A model using SpaCy to build a knowledge graph.
3. **Transformer-based(Bert) Knowledge Graph Version** – A model that uses transformers to construct a knowledge graph.
4. **Transformer and Agent-based Knowledge Graph Version** – A model combining transformers and an agent for knowledge graph integration.

Results

1. **Original Version**
The original version displayed consistent and stable results, serving as a strong baseline for comparison.
2. **SpaCy-based Knowledge Graph Version**
Results from the SpaCy-based knowledge graph model showed a tendency to focus on microscopic details. This provided some improvements in entity and relationship identification but limited the model's broader contextual understanding.
3. **Transformer-based Knowledge Graph Version**
The transformer model demonstrated an improvement over the SpaCy-based version, offering more balanced insights by combining detailed knowledge representation with better contextual relevance.

4. **Transformer and Agent-based Knowledge Graph Version**

This combination provided the richest contextual and detailed information among all versions. It particularly excelled in accurately representing specific numbers and proper nouns. However, it was less stable in terms of comprehensive accuracy compared to the original version. In some instances, it produced significantly different responses based on contextual variations.

Overall, The integration of knowledge graphs has shown potential to improve the model's contextual understanding and specificity, though certain implementations exhibited varying levels of stability.