

Phase 3: Final Report and Submission

1. Project Title:

Sentence Completion using Generative AI

2. Summary of Work Done

Phase 1 – Proposal and Idea Submission (10 Marks):

In the initial phase, we proposed the development of a Sentence Completion system using Generative AI with a specific focus on GPT-2. The primary objectives were outlined as follows:

- To understand the working of generative models in NLP.
- To implement a sentence completion model using pre-trained models.
- To develop a user interface for interacting with the model.

A detailed proposal was submitted, specifying the problem definition, objectives, tools required, and expected outcomes.


Phase 2 – Execution and Demonstration (15 Marks):

In the second phase, the proposed solution was implemented using Python, the Transformers library, and ipywidgets. The key steps accomplished were:

- Implemented a sentence completion system using a GPT-2 model.
- Designed an interactive interface using ipywidgets to input a sentence and adjust temperature and repetition penalty.
- Integrated the model to complete a user-input sentence, generating a single coherent sentence as output.
- Evaluated the model's performance on different sentence inputs and documented the observed outputs.

3. GitHub Repository Link

You can access the complete codebase and the documents at the following GitHub link:

 **GitHub Repository – Sentence Completion using Gen AI**
<https://github.com/srishtij02/Srishti-Jitpure-IBM-Project>

4. Testing Phase

4.1 Testing Strategy

Testing was conducted to ensure the model's ability to generate coherent and contextually relevant sentence completions. The testing phase focused on the following:

- **Input Handling:** Testing various input lengths and types (short phrases, incomplete sentences).
- **Coherence and Relevance:** Ensuring generated sentences logically align with the input context.
- **Edge Case Testing:** Testing nonsensical or repetitive inputs to evaluate model behavior.

4.2 Types of Testing Conducted

- **Unit Testing:** Individual components like input handling and text generation were tested independently.
- **Integration Testing:** The interaction between the user interface and the model was tested to ensure smooth functionality.
- **User Testing:** Feedback was collected from a group of users to assess the system's ease of use and output relevance.
- **Performance Testing:** The system was tested with various input sentence lengths to monitor response time and model behaviour.

4.3 Results

- **Accuracy:** The model generated contextually relevant sentence completions consistently.
- **Response Time:** The application demonstrated minimal delay, generating outputs quickly.
- **Edge Cases:** Incomplete or repetitive inputs produced plausible but sometimes incoherent sentences, indicating the need for fine-tuning.

5. Future Work

- **Model Fine-tuning:** Fine-tuning the GPT-2 model with domain-specific datasets to enhance sentence relevance and reduce incoherence.
- **Enhanced User Interface:** Developing a more user-friendly interface with additional functionalities like multiple completion options.
- **Real-time Collaboration:** Implementing a collaborative feature for multiple users to interact with the system simultaneously.
- **Feedback Loop:** Incorporating a feedback mechanism for users to rate the generated sentences, allowing for model adjustments based on feedback.

6. Conclusion

The project successfully implemented a Sentence Completion system using GPT-2, leveraging Generative AI to provide contextually appropriate sentence completions. The system demonstrates the potential for NLP applications in sentence prediction, writing assistance, and chatbot development. Future work will focus on fine-tuning the model and expanding its capabilities for generating multiple sentence completions.