

College Name: VIT BHOPAL
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GEN AI PROJECT PHASE 1 SUBMISSION DOCUMENT

Phase 1: Proposal & Idea Submission

1. Project Title:

Text Generation and Summarization System using Transformers

2. Domain:

Generative AI | Transformer Models | Text Generation | Text Summarization | Natural Language Processing (NLP)

3. Problem Statement:

The project tackles the problem of automating two essential tasks in Natural Language Processing (NLP): text generation and summarization. Many applications, including chatbots, content creation tools, and automated report writing, need to be able to produce text of human quality. In a similar vein, summarizing long documents is crucial for effectively consuming knowledge and extracting information. Existing methods often struggle with coherence, relevance, and factual accuracy. This project aims to leverage the power of Transformer models to create a robust system for both text generation and summarization.

4. Proposed Solution:

The project utilizes pre-trained Transformer models, specifically GPT-2 XL for text generation and Facebook's BART Large CNN for text summarization. These models are integrated into a single system through the following process:

- **Model Selection:** The system makes use of two cutting-edge Transformer models: BART Large CNN for text summarization and GPT-2 XL for text generation.
- **Text Generation:** The GPT-2 XL model receives a text prompt from the user. The model then uses its vast knowledge and linguistic abilities to produce a continuation of the text.
- **Text Summarization:** The BART Large CNN model processes a text passage that the user submits for summarization. This model creates a succinct synopsis of the original text by extracting the most important information.
- **Combined Interface:** Gradio is used to create an interactive interface, allowing users to easily input text for generation or summarization and view the results.

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5. Objectives:

- To implement a combined system that seamlessly integrates text generation and summarization functionalities. To leverage the power of GPT-2 XL and BART Large CNN for accurate and coherent results.
- To create an interactive interface for testing and validating predictions. Also for ease access and interaction.
- To evaluate the system's performance on diverse text inputs and benchmark against existing solutions.
- To experiment with various LLMs (like GPT, BERT with fine-tuning for NSP).

6. Expected Outcome:

- Working Prototype: A fully functional NLP application capable of both generating text from prompts and summarizing longer documents accurately.
- Interactive Interface: A Gradio-based interface that provides a user-friendly experience, allowing users to easily input text, adjust parameters, and view results.
- Performance Metrics: Quantitative and qualitative evaluation of the system's performance, including metrics such as ROUGE scores for summarization and BLEU scores for text generation.
- Comprehensive Documentation: Detailed documentation of the system's architecture, implementation, usage instructions, and evaluation results.
- Demonstrable Use Cases: Showcase potential applications of the system through practical examples and demos.

7. Tools & Technologies to be Used:

- Python (Primary programming language)
- Transformers library (by HuggingFace)
- Pretrained models: GPT-2 XL for text generation and BART Large CNN for summarization
- Gradio: Interactive web interface
- TensorFlow: Backend framework for model execution.
- Jupyter Notebook for experimentation
- Google Colab v4-TPU or GPU for better model inference

8. References:

- Hugging Face Transformers: <https://huggingface.co/docs>
- PyTorch: <https://pytorch.org>
- OpenAI GPT-2 Research and API: <https://openai.com/index/gpt-2-1-5b-release/>
- Gradio Documentation: <https://www.gradio.app/docs>
- Facebook BART Research Paper: <https://huggingface.co/facebook/bart-large-cnn>
- Research Papers: <https://arxiv.org/abs/1706.03762>