PROJECT DOCUMENT

Eco Prompt: Inspiring Sustainability through AI generated prompts

Under the Guidance of:

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1. Problem Statement:

The carbon footprint of AI is affected by the **complexity of its tasks**. This project focuses on creating a **Prompt Generation Model (PGM)** for image generation, aiming to convert user inputs into efficient prompts which reduces the computational workload of the LLM while maintaining image quality and relevance.

2. Literature Survey-Base Papers:

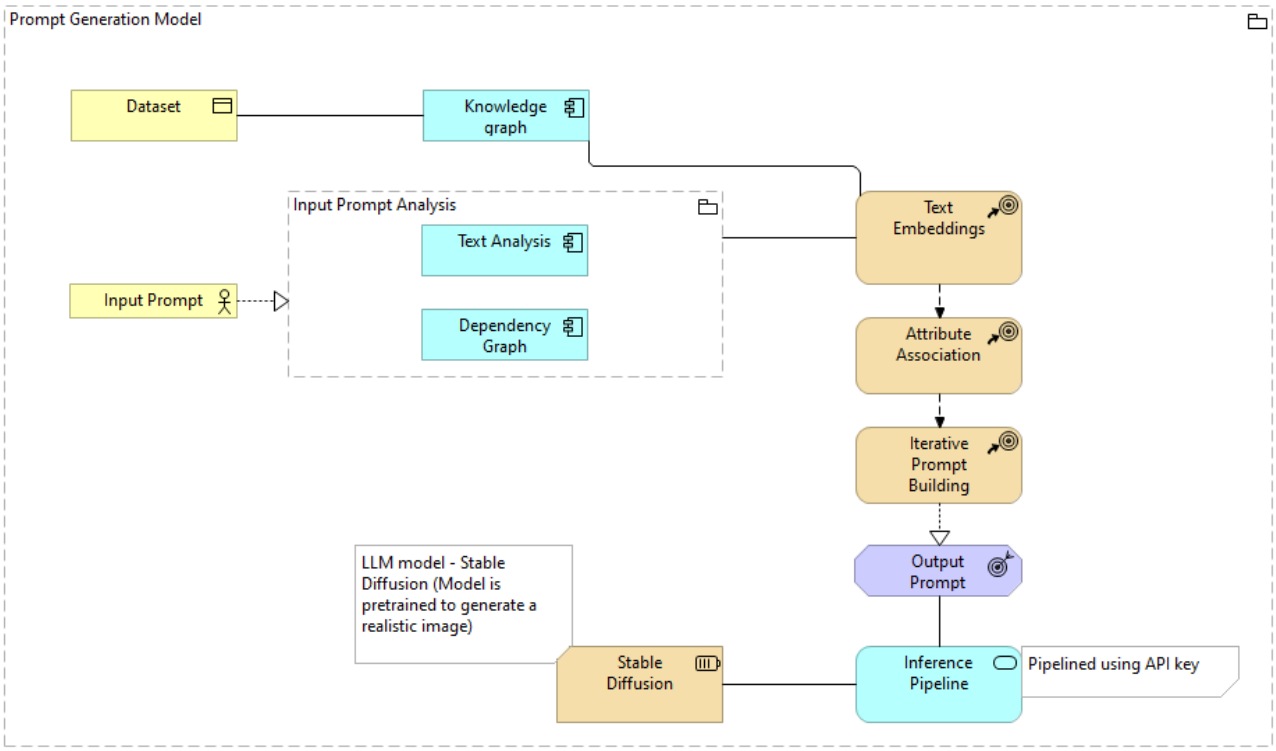
S.No	Title	Journal/Conference
1	Graph of Thoughts: Solving Elaborate Problems with Large Language Models	CHI Conference on Human Factors in Computing Systems Extended Abstracts (2023)
2	Beyond Chain-of-Thought, Effective Graph-of-Thought Reasoning in Large Language Models	Advances in Neural Information Processing Systems 31: Annual Conference on Neural Information Processing Systems (2023)
3	Natural Language is All a Graph Needs	Proceedings of the IEEE conference on computer vision and pattern recognition (2023)
4	DreamBooth: Fine Tuning Text-to-Image Diffusion Models for Subject-Driven Generation	Proceedings of the IEEE conference on computer vision and pattern recognition (2023)

2.1 Summary of Literature Survey:

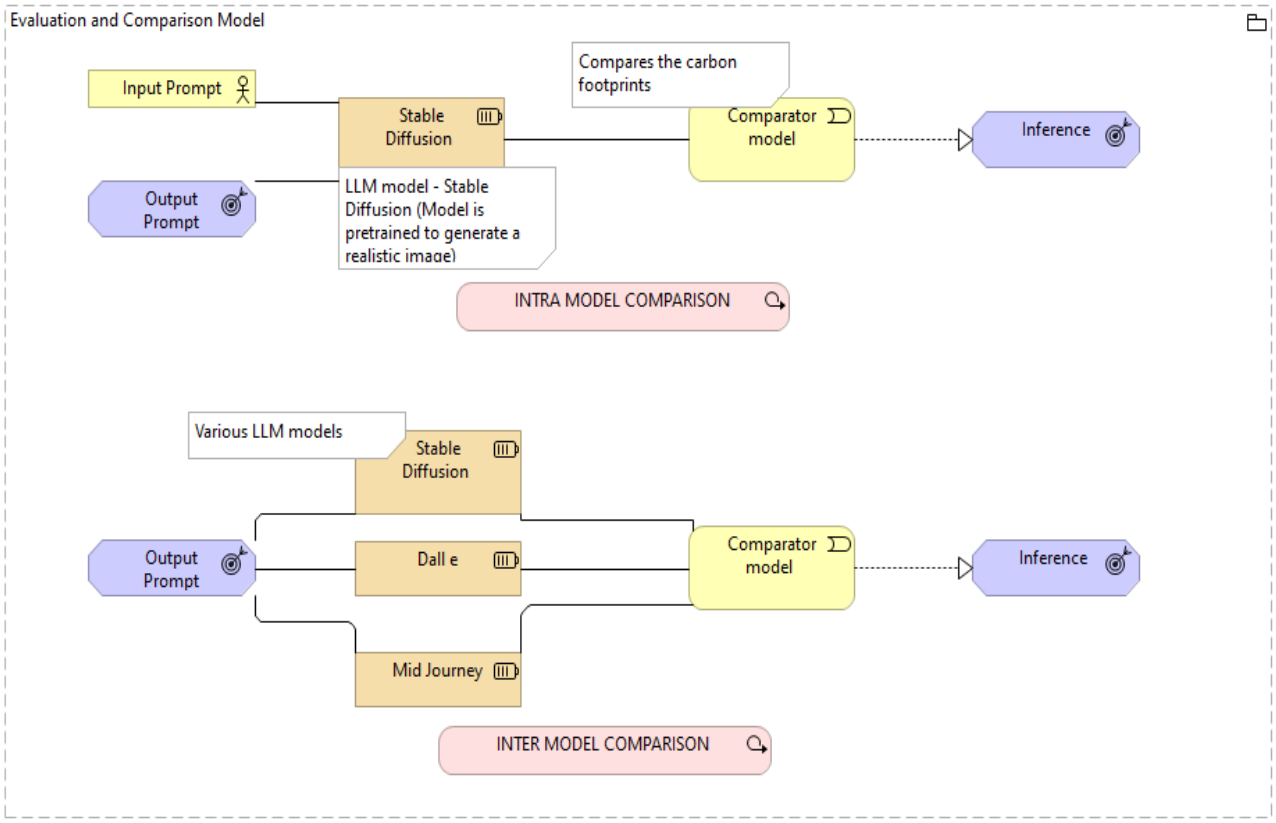
The Graph of Thoughts examines the use of big language models to solve complicated problems, emphasising the importance of successful graph-based reasoning beyond standard chain-of-thought approaches. The study, "Beyond Chain-of-Thought," investigates strategies for reasoning with massive language models, which could have far-reaching consequences for AI and cognitive computing. It emphasises the significance of graph-based representations in natural language interpretation, since they bridge the gap between language and visual data. “DreamBooth” is dedicated to fine-tuning text-to-image diffusion models for subject-driven creation, thereby adding to the field of computer vision and enabling more advanced text-to-image synthesis approaches. These papers cover cutting-edge research trends at the interface of natural language processing and computer vision, as well as prospective advances in AI and human-computer interaction.

3. Proposed Architecture (Tentative):

3.1. Phase 1:



3.2. Phase 2:



5. Module Description:

5.1. PHASE 1:

- Prompt Generation Model
- LLM Model
- Intra Comparison Model

5.2. PHASE 2:

- Prompt Model Fine-tuning
- Evaluation Model
- Comparison Model

6. Detailed Module Description – Phase 1:

6.1. Prompt Generation Model:

6.1.1. Knowledge Graph Generation

- Identifies a specific entity from a predefined knowledge graph, and generates a subgraph that highlights relationships associated with that identified entity.

6.1.2. Input Prompt Analysis

- Tokenize the input sentence and extracts the important keywords, assign the Parts of the Speech tag to each token.

6.1.3. Text Embedding

- Adding the additional description to the user input prompt from the Knowledge Graph, and generates more contextual output prompts.

6.1.4. Attribute Association

- Based on the Dependency Graph, the weights will be assigned the keywords of the user input prompt.

6.1.5. Iterative Prompt Building

- Rephrasing of the generated prompts will be carried out to generate output prompts, from all the output prompts, most meaningful prompts will be returned based on the cosine similarity score.

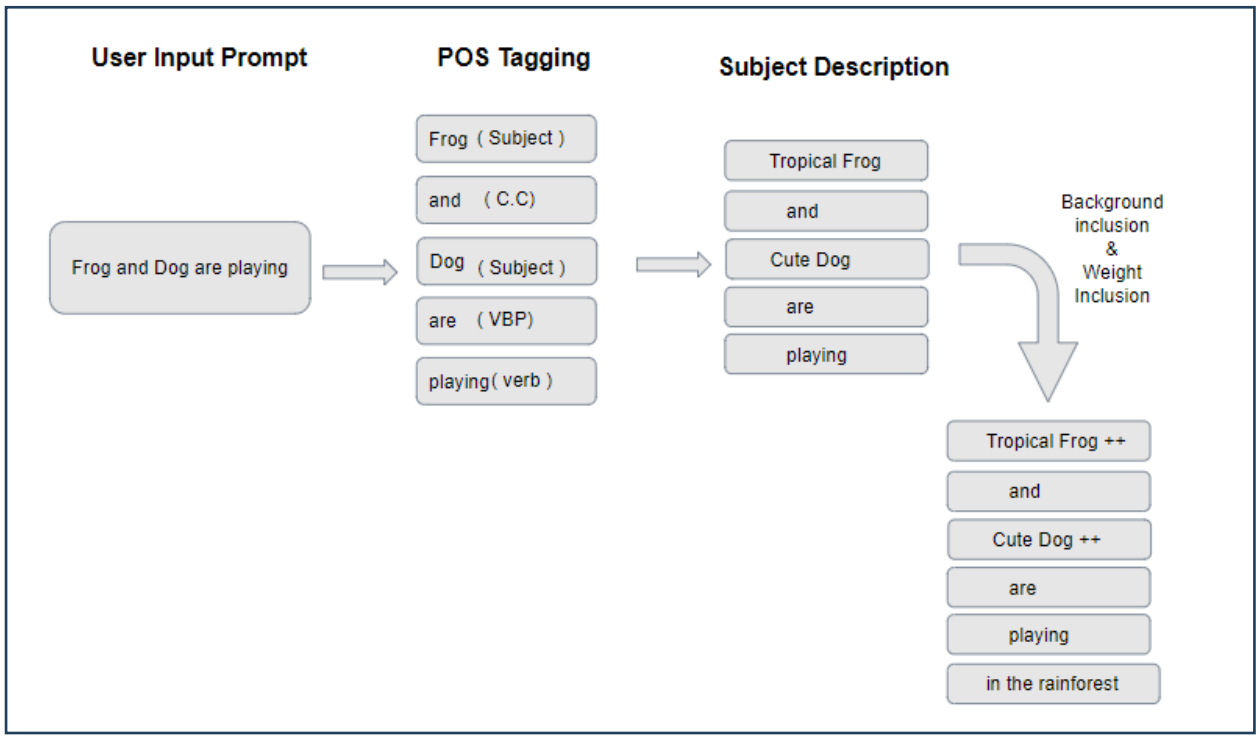
6.2. LLM Model

6.2.1. Inference Pipeline Creation:

- Choose the appropriate version of stable diffusion image generation model, run it locally. Then, create a pipeline to Stable Diffusion and access the API to generate the image using user prompt and generated prompt.

7.Algorithm and Pseudo Code:

- Get prompt from the user - **user input prompt**
- Extract the keywords - **Tokenization**
- Perform **POS** tagging - **Subject** Identification
- **Prediction of sentiment** of the user input prompt
- Implementation of **Dependency Graph** for user input prompt
- Implementation of **Knowledge Graph** for dataset
- **Text Embeddings** and **Attribute Association** to subject of the user input prompt
- Adding **descriptive details** to the user input prompt - **Anatomy of Good Prompt**



8. Conclusion:

This project addresses the critical issue of reducing the carbon footprint of artificial intelligence systems by targeting the complexity of their tasks. Our approach, the Prompt Generation Model (PGM) for image generation, is designed to efficiently convert user inputs into prompts that effectively guide Large Language Models (LLMs) in generating images. By optimizing prompt generation, we aim to minimize the computational workload of LLMs while preserving the quality and relevance of the generated images. This research represents a significant step towards more environmentally sustainable AI practices, contributing to the broader goal of responsible and eco-friendly artificial intelligence development.