INT426: GENERATIVE ARTIFICIAL INTELLIGENCE

L:2 T:0 P:2 Credits:3

Course Outcomes: Through this course students should be able to

CO1 :: understand the foundations and principles behind generative models.

CO2 :: gain practical experience in crafting and refining prompts for language models through hands-on exercises and projects.

CO3 :: apply prompt engineering skills to real-world scenarios, such as information retrieval, question-answering, or text generation.

CO4 :: explore different architectures used in large language models, such as transformers, and understand their advantages and limitations.

CO5 :: complete hands-on projects that involve coding and implementing generative models to solve specific problems or generate creative outputs.

CO6 :: apply the learned skills and techniques through hands-on projects that involve a combination of ChatGPT, data analysis, visualization, and presentation creation.

Unit 1

Introduction to Generative AI: Fundamentals of Generative AI, Generative AI model types, Applications of Gen AI, How Gen AI works, Lifecycle of a Gen AI project, Gen AI in software applications, Gen AI in Business and Society, Difference between GPTs and search engines, Ethical and responsible AI,

Unit 2

Prompt Engineering: Transforming computing, The ACHIEVE framework, Introduction to Large Language Models, fundamentals of prompt, prompt patterns, prompt tuning

Prompt Pattern I: question refinement pattern, cognitive verifier pattern, audience persona pattern, flipped interaction pattern

Unit 3

Prompt Pattern II: Game Play Pattern, Template Pattern, Meta Language Creation Pattern, Recipe Pattern, Alternate approaches pattern

Prompt Pattern III: Combining Patterns, Expansion patterns, Menu Action Patterns, Check List Pattern, Tail Generation Pattern, Semantic Filter Pattern

Unit 4

Large Language Models: Generative AI and LLMs, transformers architecture, generating text with transformers, Pre-training LLMs, fine tuning and evaluating LLMs, reinforcement learning and LLM-powered applications

Unit 5

Code with AI: Build web apps with AI, Data Mastery with Excel and ChatGPT, AI-driven chatbots, Build a Movie App with GPT-3.5, and Dall-E, Build a chatbot with ChatGPT -4, Fine tune the chatbot with your own data.

Unit 6

ChatGPT Advance Data Analysis: ChatGPT Advanced Data Analysis vs. ChatGPT, Building Data Visualization and Creating a Presentation, working with structured data, working with media, Zip files for automation, working with small documents, appropriate use of ChatGPT Advanced Data Analysis, Human and AI Process planning, Error identification techniques, error handling

List of Practicals / Experiments:

List of Practical

- Write a program to create a list of reviews and classify the reviews as positive or negative.
- Write a program to build a chatbot using GenAI.
- Create a prompt for a large language model, such as ChatGPT, to describe how large language models work. Ask at least three follow-up questions based on the output
- Write a prompt and test it with ChatGPT or another large language model that uses the Persona Pattern.
- Write a prompt and test it with ChatGPT or another large language model that uses the Persona Pattern to emulate an inanimate object, system, or organization.
- Write a prompt and test it with ChatGPT or another large language model that uses the Question Refinement Pattern.
- Write a program to summarize dialogue using GenAI.
- Fine-tune FLAN-T5 with reinforcement learning to generate more positive summaries.
- Build a “Whac-a-Mole” style game called “FaceBomp”.
- Standardize, data cleaning, extraction and perform sentiment analysis with ChatGPT.
- Build a Movie App with GPT-3.5 and Dall-E
- Build a Chatbot with ChatGPT-4