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 I

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 II

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 III

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 IV

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 V

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 VI

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:

Practicals

- Set up programming environment to use code to send prompts to OpenAI's cloud-hosted service.
- Define a prompt that will classify the sentiment of a restaurant review.
- Build a Chatbot Using Gen AI
- Use the Persona Pattern to perform an analysis of some content that your provide ChatGPT
- Write a prompt and test it with ChatGPT or another large language model that uses the Question Refinement Pattern.

- Write a game play pattern for "cave exploration game to discover a lost language".
- Write a semantic filter pattern to Filter email to remove redundant information.
- Perform dialogue summarization task using generative AI
- Fine Tune a generative AI model for dialogue summarization
- Fine Tune FLAN-T5 with reinforcement learning to generate more-positive summaries
- Build a "Whac-a-Mole" style game called "FaceBomp".
- Standardize, extract, classify, and generate data through the Excel and ChatGPT.
- Create an AI-powered Health Assistant using the ChatGPT Playground Graphical User Interface, simulating a conversation between a family doctor and a patient.
- Read the csv file, generate the visualizations, save them to files, and then create the powerpoint

References:

1. GENERATIVE AI: NAVIGATING THE COURSE TO THE ARTIFICIAL GENERAL INTELLIGENCE FUTURE by MARTIN MUSIOL, WILEY