Generative AI Course

Day-1: Introduction to Generative AI

- Subtopics:
    - Overview of Generative AI
    - Large Language Models (LLMs): Concepts and Applications
    - Generative AI & LLMs
    - LLM use cases and tasks
    - Text generation before transformers
    - Transformers architecture
    - Generating text with transformers
    - Prompting and prompt engineering
    - Generative configuration
    - Pre-training large language models
    - Computational challenges of training LLMs
- Hands-on:
    - Introduction to Huggingface for NLP tasks (NER, Sentiment Analysis, Summarization, etc.)

Day-2: LLM Implementation using open-source tools (LM Studio, GPT4all, Langchain, Ollama)

- Subtopics:
    - Introduction to Open Source LLM Tools: LM Studio, Ollama, GPT4all
    - Understanding Langchain
    - Langchain installation and setup
    - LLMs, Prompt Templates
    - Chains
    - Simple Sequential Chain
    - Sequential Chain
    - Agents
    - Memory
- Hands-on:
    - Parameter tuning and prompt engineering with LM Studio and GPT4all
    - Build a local Streamlit chat App
- Take Home Assignment:
    - Build a local code summarizer with Ollama

Day-3: Finetuning LLMs

- Subtopics:
    - Instruction fine-tuning
    - Single task and multitask Instruction Fine-Tuning
    - Scaling Instruct Models

    - Parameter efficient fine-tuning (PEFT): LoRA, Soft Prompts
    - LLM Evaluation Metrics and Techniques
- Hands-on:
    - Fine-tuning LLMs for Custom Tasks
- Take Home Assignment:
    - Using long-chain to build a local chat app with a fine-tuned model

Day-4: Advanced LLM Implementation using Langchain

- Subtopics:
    - External Data Augmentation:
        - RAG
        - Conversational RAG
        - Local RAG with domain-specific data
    - Domain-Specific Tasks
        - Text Generation and Completion
        - Text Classification and Sentiment Analysis
        - Summarization, Code Generation and Completion
    - Evaluation with Langsmith
- Hands-on:
    - Setting up Langchain on the local machine
    - Developing a local RAG with open-sourced LLMs (Ollma) and streamlit
- Take Home Assignment:
    - Developing a legal document analysis solution with a framework (Streamlit)

Day-5: Building and Deploying MVPs using Langchain and open-source LLMs

- Subtopics:
    - Building a local multi-pdf chat application with Langchain:
        - Multi-source data Chunking
        - Building a vector database
        - Response generation
    - Multi Programming Code Assistant App Using CodeLlama
        - Understanding CodeLLama
        - Creating Custom Model
        - Building the Application
        - Demo and deployment
    - Deploying models using Groq API
- Take Home Assignment:
    - Build a multi-lingual invoice Extractor

Day-6: Introduction to Azure OpenAI Studio

- Subtopics:
    - Azure's Resource Groups and Resource Management
    - Azure Portal navigation and its user interface
    - Introduction to Cloud Deployment (Azure)
    - Setting up Azure AI Studio
    - Understanding AI Studio Playground
    - Deploying OpenAI Models
    - Scaling and Monitoring LLM Deployments
    - RLHF: Obtaining Feedback from Models, Reward Models
    - GenAI Project lifecycle cheat sheet
- Hands-on:
    - Setting up an AI environment on Azure AI Studio
    - Build your copilots with Azure AI Studio

Day-7: Fine-tuning and Deployment with OpenAI Studio

- Subtopics:
    - Creating Advanced Prompts
    - Building Text Generation Applications
    - Building Chat Applications
    - Fine-Tuning LLMs on Azure
    - Model Deployment and Application Building
- Hands-on:
    - Build a RAG application with AI Studio

Day-8: Advanced LLM Deployment with Azure Open AI

- Subtopics:
    - Security and Access Control for LLM Deployments
    - Best Practices for LLM Deployment on Azure
    - Reviewing Gen-AI Project Lifecycle
    - Role-Based Access Control (RBAC) and Managed Identities
    - Cost management best practices using Azure Cost Management tools
- Final Project:
    - Building an end-to-end contract review application