Generative AI Course contents (5 Days)
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Day 1

Introduction to Generative AI

- Introduction to Artificial Intelligence and Machine Learning

- Understanding Generative AI: An Overview

- Mechanics of Generative AI

- Difference between Discriminative and Generative Models

Generative AI Applications

- Text-based Applications: Content generation, Language translation, and more

- Image-based Applications: Image synthesis, Style transfer, and more

- Video Generation: MAV by Meta, GEN-1, IMAGEN by Google

- Audio Applications: Speech synthesis, Music generation, and more

- Generative AI Ecosystem Understanding - ChatGPT, Azure OPEN AI, Google's BARD, Hugging Face, llmanda, AutoGPT, Midjourney, LaMDA, LLaMA, Stable Diffusion DALLE-2 etc.

Training and Evaluation of Generative Models
- Likelihood Estimation
- Mode Collapse and Training Challenges
- Evaluation Metrics
- Practical Tips for Training

Applications of Generative Models
- Image Generation
- Text Generation
- Audio Generation
- Data Augmentation
- Anomaly Detection

Day 2

Prompt Engineering for Generative AI

- Introduction to Prompt Engineering

- The Art of Crafting Prompts: Principles, techniques & best practices

- Type of Prompt Engineering - Zero shot, One Shot , Few shop prompts

- Conceptual understanding - Tokens, Max Tokens, temparature

- Chain of Thoughts understanding

- Standard methods for formatting, summarizing, inferring prompts to get best results.

- Conceptual understanding of RAG - Retrival augmented generation

Getting Started with Open AI/Azure Open AI

- Getting started with the OpenAI/Azure Open AI Platform

- Understanding of Models

- Understanding temperature, token length, penalties, Top P etc.

- Using the Playground

- Getting started with the OpenAI API

- Authentication and Access Keys

- The Completions endpoint

- The Chat Completion endpoint

- Fine-tuning the model

- Controlling Hallucinations

- Azure Open AI Understanding

- Azure Open AI Privacy, security , Integration with Azure Services etc.

Day 3

Getting started with Open Source LLM ecosystem

- Understanding of Open source LLM ecossytem

- Deep dive Meta Llama 2, Falcon etc.

- Leveraging Models from Hugging face

Generative AI - LLM Ecosystem and Frameworks

- LangChain Ecosystem Deep dive

    - Langchain Concepts

    - Using multiple LLMs (Chains)

    - Working with Chains (Conversational Retrieval QA, Retrieval QA, Summarization, API etc.)

    - Working with Memory, Embeddings, Agents

    - Structured Data and Output Parsing Techniques

    - Working with Data loaders - Ingesting documents

    - Working with text splitters - Chunking Data

- Understanding of LlamaIndex & its usage.

    Explore the capabilities in detail simliar to concepts in langchain

- Understanding of Haystack & its usage .

    Explore the capabilities in detail simliar to concepts in langchain

Day 4

– Vector Databases

        Conceptual Understanding

        Working with Vector Databases (PineCone, fiass/chroma)

        Differences between them

– Embedding Techniques (open ai embedding, sentence transformer embeeding to name few ... this has to be detailed)

        What is embedding techniques

        Various embedding model

        Capabilities and Benefits

        Embedding for image/text etc.

Generative AI – for Software Engineering

– How to leverage Generative AI to improve quality, productivity in software engineering

– Github Copilot

– Prompts for code generation

– Prompts for Test case generation

– Prompts for Code modernization/translation

– Next Gen AI thinking to leverage Gen AI to its best of capability

Building Applicaiton using Generative AI

– Role of Developers as consumers of Generative AI APIs.

– API integration: How to connect and make requests to Generative AI services.

– Building applications that leverage Generative AI outputs.

– Session & Chat History management best practices

– Framework for output validation & continuous prompts improvement cycle

– Deployment Options and Best Practices – Open AI , Open source models etc.

Day 5

Generative AI Legal, privacy, Security Concerns

– Concerns around Legal, privay, Security Concerns

– Concerns around IP

– Responsible AI

– Enterprise Best Practices

Building Application using Generative AI

– Practical Case study (using open ai & open source equivalent)

 – Knowledge Management – Build a Q&A Chain ChatBot for a set of HTML/PDF documents. – Leveraging RAG

 – Domain specific Chat BOT – Finetuning of Models

 – Automate AI workflows with AutoGPT & LangChain

 – Use Midjourney/Dall e to generate stunning images from text

- Document Insights extraction tool - Summary & entity extraction using Generative AI

Solution Architecture for Gen AI

- – Solution Guidelines (Well-Architected principles)

- – Chat Session management

- – Open AI Model Finetuning

- – Standard Architectures for various usecases

- – How to provision security, privacy & transparency

- – Manage Token limitation

- – Deployment Standards – Cloud, on Prem

- – Private GPT Standards

- – PII information protection