CLOUD VISION TECHNOLOGIES

Course Curriculum

Generative AI

Generative Ai & Prompt Engineering Course Offered By Cloud Vision Technologies !

1. Introduction to Python

Basics of Python Programming :

Installation and Setup:

> Installing Python and setting up a development environment

> (IDEs like PyCharm, VSCode, Jupyter Notebooks)

Syntax and Basic Constructs:

> Variables and data types (integers, floats, strings, booleans)

> Basic input and output

> Comments and documentation

Control Structures :

Conditional Statements:

> if, elif, else

Loops:

> for, while

> Loop control statements (break, continue, pass)

Functions :

Defining Functions:

> Parameters and return values

> Scope and Lifetime:

> Local and global variables

Lambda Functions:

> Anonymous functions

2. Data Structures & Algorithms

Core Data Structures :

Lists:

> Creating, accessing, modifying, and iterating over lists

> List comprehensions

Tuples:

> Creating and using tuples

> Unpacking tuples

Sets:

> Creating and using sets

> Set operations (union, intersection, difference)

Dictionaries:

> Creating and using dictionaries

> Dictionary methods and comprehensions

Advanced Data Structures :

Collections Module:

> defaultdict, Counter, OrderedDict, deque

3. File Handling and Data Processing

File Operations :

Reading and Writing Files:

> Opening, reading, writing, and closing files

> Working with different file modes (r, w, a, rb, wb)

Working with CSV and JSON:

> Reading from and writing to CSV and JSON files using csv and json modules

4. Object-Oriented Programming

OOPs Basics :

Classes and Objects:

> Defining classes and creating objects

> Instance variables and methods

Class Variables and Methods:

> Using class variables and class methods

Inheritance:

> Single and multiple inheritance

Polymorphism and Encapsulation:

> Method overriding

> Private variables and name mangling

5. Modules and Packages

Modular Programming :

Creating and Importing Modules:

> Defining and using modules

Packages:

> Organizing code into packages

> Importing from packages

6. Exception Handling and Debugging

Error Handling :

Exception Types:

> Common exceptions (ValueError, TypeError, etc.,)

Try, Except Blocks:

> Using try, except, else, and finally

Custom Exceptions:

> Creating and raising custom exceptions

Debugging :

Debugging Techniques:

> Using print statements and logging

> Using debuggers (pdb)

7. Advanced Python Concepts

Decorators and Context Managers :

Decorators:

> Function decorators

> Class decorators

Context Managers:

> Using with statement

> Creating custom context managers with __enter__ and __exit__

Iterators and Generators :

Iterators:

> Creating iterators using __iter__ and __next__

Generators:

> Creating generators with yield

> Generator expressions

8. Working with Libraries

Scientific Computing :

NumPy:

> Arrays and matrix operations

Pandas :

> DataFrames for data manipulation

> Reading and writing data (CSV, Excel)

Data Visualization :

Matplotlib:

> Plotting graphs and charts

Seaborn :

> Statistical data visualization

9. Testing

Unit Testing :

Unittest Framework:

> Writing and running tests

> Test fixtures and test suites

Pytest:

> Advanced testing with pytest

GENERATIVE AI

GenAI and It's Industry Applications :

> Introduction to Generative AI
> AI vs ML vs DL vs NLP vs Generative AI
> Generative AI principles
> What is the role of ML in Gen-AI
> Different ML techniques (Supervised, Unsupervised, Semisupervised
> & Reinforcement Learning)
> Applications in various domains
> Ethical considerations

NLP & Deep Learning :

> NLP essentials
> Basic NLP tasks
> Different text classification approaches
> Frequency based - Bag of words,TF-IDF, N-gram.
> Distribution Models – CBOW, Skipgram(Traditional approaches)and word2vec, Glove.
> Ensemble Methods (Random Forest, Gradient Boosting, AdaBoost) &
> Traditional Machine Learning Models – Naïve Bayes, Support Vector
> Machine (SVM), Decision Trees, Logistic Regression.
> Deep learning techniques – CNNs, RNNs, LSTMs, GRU and Transformers

Generative AI Models :

> Autoencodes
> VAE's and applications
> GAN's and it's applications
> Different types of GAN's and applications

Language Models & Transformer Models :

> Different types of Language models
> Applications of Language models
> Transformers and its architecture
> BERT, RoBERTa, GPT variations
> Applications of transformer models

Prompt Engineering :

> What is Prompt Engineering
> What are the different principles of Prompt Engineering
> Types of Different Prompt Engineering Techniques
> How to Craft effective prompts to the LLMs
> Priming Prompt
> Prompt Decomposition

Large Language Models :

> Generative AI lifecycle
> What is RLHF
> LLM pre-training and scaling
> Different Fine-Tuning techniques

LLM's Embeddings :

> What are word embeddings
> What is the use of word embeddings, where we can use it?
> Word Embeddings – Word2Vec, GloVe and FastText
> Contextual Embeddings – ELMo , BERT and GPT
> Sentence Embeddings – Doc2Vec, Infersent, Universal Sentence
> Encoder
> Subword Embeddings – BPE(Byte Pair Encoding), Sentence Piece
> Usecase of Embeddings.

Different Chunk Metrics :

> What is Chunking
> What is the use of chunking the document
> What are the traditional effective chunking techniques
> What are the problems and limitations with traditional chunking techniques?
> How to overcome the limitations of Traditional chunking

Advanced Chunking Techniques:

1. Character Splitting
2. Recursive Character Splitting
3. Document based Chunking
4. Semantic Chunking
5. Agentic Chunking

RAG and Advanced RA with Langchain :

> What is RAG
> What are the main components of RAG
> High level architecture of RAG
> How to Build RAG using external data sources
> Advanced RAG

Langchain for LLMs :

> What is Langchain
> What are the core concepts of Langchain
> Components of Langchain
> How to use Langchain agents

Vector Databases :

> LlamaIndex
> What are Vector Databases
> Why do we prefer Vector Databases over Traditional Databases
> Different Types of Vector Databases: OpenSource and Close Source
> OpenSource: Chroma DB, Weaviate,Faiss,Qdrant
> Close-Source Vector Databases:Pinecone,ArangoDB,Cloud-Based Solutions

Finetuning LLMs :

> Supervised Finetuning
> Repurposing-Feature Extraction
> Advanced techniques in Supervised Finetuning -PEFT -LoRA, QLoRA

LLMs Evaluation :

Text based LLMs

Automatic Evaluation: BULE Score, ROUGE Score, METEOR, BERT Score.
Human Evaluation: Coherence, Factuality, Originality, Engagement

Image based LLMs

Automatic Evaluation: Pixel-level metrics, FID (Frechet Inception IS (Inception Score), Perceptual Quality Metrics, Diversity Metrics.
Human Evaluation: Photorealism, Style, Creativity, Cohesiveness

Audio generation LLMs

Automatic Evaluation: FAD (Frechet Audio Distance), IS (Inception Score), Perceptual Quality Metrics – PAQM, PAQM – SNR (Signal-toNoise Ratio), PAQM – PESQ (Perceptual Evaluation of Speech Quality)
Human Evaluation:Perceptual Quality – PQ, PQ- Naturalness, PQFidelity, PQ- Musicality, Task Specific Evaluation.

Video Generation LLMs:

Automatic Evaluation: FVD (Frechet Video Distance), Inception Score(IS), Perceptual Quality Metrics, Motion Based Metrics – Optical Flow Error, Content-Specific Metrics.
Human Evaluation: Visual Quality, Temporal Coherence, Content Fidelit.

LLMops :

> Model Deployment and Management
> Scalability and Performance Optimization
> Security and Privacy
> Monitoring and Logging
> Cost Optimization
> Model Interpretability and Explainability.

LLM's on Cloud :

> Amazon Bedrock, Azure OpenAI

Different AI Tools :

> ChatGPT, Gemini, Copilot

CLOUD VISION TECHNOLOGIES

OUR HIGHLIGHTS

- Industry Expert Trainers
- Per Batch 10 Students (Offline & Online)
- Weekdays & Weekend Classes
- State - Of - The Art - Infrastructure
- Practice Test & Mock Interviews
- 100% Placement Assistance*
- Course Completion Certificate

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