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Delivery	Topics	Delivery Mode	Time
Python	Installation - Anaconda, Pycharm, Virtualenv	Live Code - Jupyter/Colab/Pycharm + Slides	10
	Introduction to python		
	Basic Syntax, comments, Variables		
	Data Types, Numbers, Casting, Strings,Booleans		
	Operators,Lists,Tuples, Sets, Dictionaries		
	If...Else, While Loops, For Loops		
	Functions,Lambda,Arrays		
	Arrays, Classes/Objects, Inheritance, Iterators		
	Scope, Modules, Dates, Math, JSON		
	PIP,Try...Except, User InputP, String Formatting		
	File Handling, Read Files, Write/Create Files, Delete Files		
Numpy	Ndarray, Data types, Array Attributes, Indexing and Slicing	Live Code - Jupyter/colab/pycharm + Slides	2
	Array manipulation, Binary operator, String Function		
	Arithmetic, Statistical, Matrix, linear algebra, sort, search, countings		
Pandas	Data manipulation, Viewing, selection, grouping, merging, joining, concatenation	Live Code - Jupyter/colab/pycharm + Slides	2
	Working with text data, visualization, CSV, XLSX,SQL data puling, operations		
Scipy	Statistics, Linear algebra, models, special fucntions, optimization	Live Code - Jupyter/colab/pycharm + Slides	2
	Probability & Stats Applications		
Neural Networks			
Neural Networks Using Tensorflow and Keras	Basic Mathematics - DL	Live Code - Jupyter/colab/pycharm + Slides + Real time Usecases coding	15
	Introduction to Perceptron & History of Neural networks		
	Activation functions a. Sigmoid b. Relu c. Softmax d. Leaky Relu e. Tanh f. Exponential Linear Units (ELU) g. Swish		
	Gradient Descent		
	Learning Rate and tuning		
	Optimization functions		
	Introduction to Tensorflow		
	Introduction to keras, theano, pytorch - handson		
	Back propagation and chain rule		
	Fully connected layer		
	Cross entropy		
	Weight Initialization		
	Regularization		
	coding perceptron		
	Q&A		
NLP			
Introduction to Statistical NLP Techniques	Introduction to NLP	Live Code - Jupyter/colab/pycharm + Slides + Real time	25
	Preprocessing , NLP Tokenization ,stop words, normalization, stemming andlemmatization		
	Preprocessing in NLP Bag of words ,TF-IDF as features		
	Language model probabilistic models, n-gram model and channel model		
	Hands on NLTK		
	Word2vec		
	Golve		
	POS Tagger		
	NER		
	POS with NLTK		
	Gensim		
	TF-IDF with NLTK		
	Introdcution to sequential models		
	Introduction to RNN		

NLP- NLU Delivery	Intro to LSTM	Slides + Real time Usecases coding	
	LSTM backprop through time		
	Hands on keras LSTM		
	Sentiment Analysis		
	Sentence generation		
	Machine translation		
	Advanced LSTM structures		
	Keras- Machine Translation		
	Encoder decoder with attention		
	Encoder Decoder - Auto Encoder		
	Understanding transformers		
	Attention Models Intuitions		
	Introduction to BERT		
LLM & GPT Models			
Introduction to Generative AI and LLMs	Overview of Large Language Models (LLMs)	Live Code - Jupyter/colab/pycharm + Slides + Real time Usecases coding	10
	Evolution of LLMs (GPT, BERT, T5, LLAMA, CLAUDE, GEMINI, GPT-4O)		
	Key use cases: Text generation, summarization, Q&A, multi-modal tasks		
	Ethical considerations in Generative AI		
	Understanding pre-trained models vs fine-tuned models		
	Exploring OpenAI API, Hugging Face model zoo, and LLAMA.		
	Simple text generation using GPT-based APIs.		
	Experimenting with Claude, Gemini, and LLAMA APIs for interactive tasks.		
Deep Dive into Transformer Models	Transformer architecture in detail - Multi-head Attention - Positional Encoding Feedforward Neural Networks in Transformers -Key LLMs: GPT, BERT, T5, LLAMA, and their differences -Transfer learning in LLMs Fine-tuning BERT for sentiment analysis. Training a text summarization model using T5. Deploying a basic chatbot using GPT-based models. Experimenting with LLAMA for custom tasks.	Live Code - Jupyter/colab/pycharm + Slides + Real time Usecases coding	25
Training and Fine-Tuning LLMs	Understanding the LLM training pipeline -Data preparation and augmentation -Tokenization and vocabulary creation -Loss functions for LLMs (Cross-entropy, Causal Language Modeling Loss) Fine-tuning strategies: -Full fine-tuning -Parameter-efficient tuning (LoRA, Prefix Tuning, Prompt Tuning) -Instruction tuning with custom datasets Advanced fine-tuning techniques: -PEFT (Parameter Efficient Fine-Tuning) -Adapter layers -Efficient training techniques: -Mixed precision training -Batch size tuning -Gradient checkpointing Fine-tuning GPT-2 for text generation on custom datasets. Instruction tuning Claude or LLAMA for task-specific outputs. Implementing LoRA-based fine-tuning for parameter-efficient training. Experimenting with multi-task fine-tuning using Gemini and GPT-4O.	Live Code - Jupyter/colab/pycharm + Slides + Real time Usecases coding	25

Optimization and Quantization of LLMs	Evaluation metrics for LLMs -Perplexity -BLEU, ROUGE, METEOR scores Techniques for optimizing LLMs -Quantization (Post-Training Quantization, Quantization-Aware Training) -Pruning (Structured, Unstructured) -Model distillation -Efficient inference strategies: -ONNX for model optimization -Accelerating inference with TensorRT Quantizing GPT-2 using ONNX and PyTorch quantization libraries. Applying pruning techniques to fine-tuned models. Model distillation: Compressing GPT into a smaller transformer.	Live Code - Jupyter/colab/pycharm + Slides + Real time Usecases coding	15
Capstone Projects	Overview of the Capstone Project: -Defining the problem statement -Dataset selection and preprocessing Model training and evaluation -Presentation and code review Coding Context: -Students will choose a project such as: -Developing a domain-specific chatbot -Building a text summarizer for news articles Creating a personalized content generator Experimenting with Gemini or GPT-4O for custom use cases Teams will submit the project, demonstrate the working model, and document their approach.	Live Code - Jupyter/colab/pycharm + Slides + Real time Usecases coding	4
		Total Hours	**135**