LIVE

Deep Learning & Generative AI

মোট ক্লাস: 25টি;
কোর্সের সময়কাল: 50+ ঘন্টা
কোর্স ফি: 6000 টাকা / 55 USD
ক্লাসের সময়: 9:00PM (02 ক্লাস/সপ্তাহ)

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Course Instructor
Md. Asif Iqbal Fahim
AI Engineer at InfinitiBit GmbH
Former Machine Learning Engineer
Kaggle Competition Expert (x2)

Watch Demo Class: Link!

Module 1: Introduction to Deep Learning and AI (4 Classes)

Class 1: Introduction to AI and Machine Learning
- Overview of AI, ML, and DL
- Key Concepts and Terminologies
- Historical Context and Evolution
- Key Concepts:
  - Generative AI
  - LLM
  - Vector Database
  - Hugging Face
  - LangChain
- Importance of Kaggle profile.
  - Kaggle Competition
- The job of DL, LLM, Generative AI

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Class 2: Basics of Neural Networks
- Artificial Neurons
- Activation Functions
  - Linear, Sigmoid, Softmax, Tanh
  - ReLu, Leaky ReLu,
- Dying Relu Problem
- ANN Architecture
- Forward and Backward Propagation
- Training Neural Networks with Python

Class 3: Deep Learning Frameworks and Tools
- Introduction to Popular Frameworks
  - Keras
  - TensorFlow
  - PyTorch
- Setting up the Environment
- Basic Operations
- Model Creation with Python

Class 4: Training Deep Learning Models
- Data Import, Preparation, and Preprocessing
- Loss Functions and Optimization Algorithms
  - Gradient Descent Optimizer
  - Variants of Gradient Descents (Momentum, Nesterov Momentum, AdaGrad, RMSProp, Adam and Nadam)
- Gradient Problems (Vanishing & Exploding)
- Key Concepts of-
  - Overfitting, Underfitting, and Bestfitting
  - Regularization Techniques

Module 2: Computer Vision (8 classes)
Class 5: Introduction to Computer Vision
- Overview of Computer Vision Tasks
- Image data Handling
- Data Augmentation

Class 6: Convolutional Neural Networks (CNNs)
- CNN architecture and components
- Convolution and pooling layers
- Fully connected layer

Class 7: Advanced CNN Architectures
- Popular CNN models (LeNet, AlexNet, VGG, ResNet, Inception)
- Transfer learning

●   Fine-tuning

Class 8: Object Detection and Localization
●   Techniques (R-CNN, Fast R-CNN, Faster R-CNN, YOLO)
●   Implementation and applications

Class 9: Semantic Segmentation and Image Segmentation
●   Techniques (U-Net, Fully Convolutional Networks)
●   Practical examples and use cases
●   Implementation with Python

Class 10: Generative Adversarial Networks (GANs) in Computer Vision
●   Introduction to GANs
●   Architecture
●   Training of GANs with Python

Class 11: Applications of GANs in Computer Vision

●   Variants of GANs (DCGAN, CycleGAN, StyleGAN) & Image generation
     and transformation
●   Style transfer and super-resolution
●   Training stability and challenges
●   Implementation with Python

Class 12: Computer Vision Projects
●   Implementing a real-world project
●   Best practice and troubleshooting (**Modular Code**)
●   Project Name: Automatic Dhaka traffic detection using the YOLO model.

Module 3: Natural Language Processing (NLP) (7 classes)

Class 13: Introduction to NLP
●   Overview of NLP tasks
●   Text preprocessing techniques
●   Regex
●   Implementation with Python

Class 14: Word Embeddings and Representations
●   Tf-idf, Word2Vec, GloVe, FastText
●   Contextual embeddings (ELMo, BERT)
●   Implementation with Python

Class 15: Recurrent Neural Networks (RNNs) and Variants
●   Basic RNN architecture

- Long Short-Term Memory (LSTM)
- Gated Recurrent Unit (GRU)
- Implementation with Python

Class 16: Seq2Seq Modeling, Attention Mechanisms and Contextual Embeddings
Attention Mechanisms and Transformers

- Sequence-to-Sequence Models for Neural Machine Translation (NMT)
- Attention mechanism
- Deep Dive into Contextual Embeddings
- Implementation with Python

Class 17: Advanced Transformer Models & Extended Contextual Embeddings
- Transformers in depth
  - Input Embeddings
  - Positional Encodings
  - Self-Attention, Multi-Head Attention
  - Encoder
  - Decoder
  - Output Layer
- Transformer Variations: Encoder only, Decoder only, Encoder-Decoder, and their applications
- Extended Contextual Embedding Techniques with Transformer Model
- Evaluate NLP models

Class 18: Transformer Model Pretraining, Fine-Tuning, and GPT Decoding
- Pretraining Transformer Models
- Fine-Tuning Techniques
- GPT Decoding Strategies (Greedy, Beam Search, Sampling)
- Implementation with Python

Class 19: End-to-End NLP Project
- Implementing a real-world project
- Best practices and troubleshooting (**Modular Code**)
- Project Name: Word Spelling Correction

Module 4: Generative AI (6 classes)

Class 20: Introduction to Generative AI
- Overview of generative models
- Instruction Tuning (Basic & Advanced Prompt Engineering)
- Evaluation of LLMs (Metrics and Benchmarks)
- Applications and use cases

Class 21: Multimodality - Variational Autoencoders (VAEs) and Multimodal LLMs

- Understanding Multimodal Inputs (Text, Image)
- VAE Architecture demonstrates Multimodal Data
- Integrating Multiple Modalities into LLMs
- Applications for Multimodal LLM-powered chat assistant

Class 22: Model Optimization Techniques for Deep Learning & LLM Model

- Quantization (Linear Quantization , Quantization Aware Training (QAT) , Post Training Quantization (PTQ) , 1.58-Bit LLMs)
- Knowledge Distillation (Teacher-Student Training)
- Parameter-Efficient Fine-Tuning (PEFT): LoRA(Low-Rank Adaptation), QLoRA (Quantized LoRA)
- Implementation with Python

Class 23: Reinforcement Learning Intro & LLM Improvement with RAG & RL
- Introduction to Reinforcement Learning (Agent, Environment, Reward)
- LLM Improvement with RAG
- Preference Alignment of LLMs (Reinforcement Learning from Human Feedback using PPO (Proximal Policy Optimization), Direct Preference Optimization, Offline RL with Preference Optimization)
- Implementation with Python

Class 24: End-to-End Chatbot Development (Generative AI Project)
- Project Name: End-to-End LLM powered Chatbot with Ollama, Langchain, Vector Database with ChatUI

Class 25: Job & Final Project Guidelines
- Resume Building and Portfolio Development (Showcasing Projects and Skills & Final Project Guidelines)
- ML Industry Interview Guidelines.

Contact Details:

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