

Deep Learning Course Syllabus

Description:

This course is designed for experienced software developers who want to deepen their knowledge in Deep Learning (DL) and acquire professional tools for practical work in the field. Participants in the course will dive into the world of deep learning and modern AI advancements. The course focuses on training neural networks, computer vision, natural language processing, reinforcement learning, audio processing, generative AI, MLOps, and more. The course includes both theoretical learning and practical exercises using Python, Colab, PyTorch, MLOps tools, and many more.

Prerequisites:

- Completion of ML Course (recommended)
- Prior programming experience (Python)
- Basic mathematical background (recommended)

Course Outline:

1. Introduction to Deep Learning

- Introduction to Deep Learning
- GPUs in Deep Learning
- Perceptron Model

2. Multi-Layer Perceptron (MLP)

- MLP Architecture
- Forward & Backpropagation
- Implementation in PyTorch

3. Training Neural Networks

- Training Techniques
- Optimizers (SGD, Adam, Hyper-parameter tuning)

4. Practical Training of Neural Networks

- Hugging Face, Trainer, Dataloader
- Case Study

5. Introduction to Computer Vision

- Convolutional Neural Networks (CNNs)

6. Detection and Segmentation

- OpenCV Basics
- Object Detection and Segmentation (YOLO) 7.

Recurrent Neural Networks (RNN) & LSTMs ○ RNN

and LSTM Architectures

- Exploding & Vanishing Gradients
- Use Case Study

8. Introduction to Natural Language Processing (NLP) ○ NLP

Fundamentals

9. Fine-Tuning a Language Model

- Fine-Tuning Large Language Models (LLMs) ○
Using ClearML

10. Large Language Models (LLMs)

- Understanding LLMs
- Langchain Framework

11. Reinforcement Learning I

- Introduction to Reinforcement Learning

12. Reinforcement Learning II

- Deep Reinforcement Learning

13. Audio Processing I

- Introduction to Audio Processing

14. Audio Processing II

- Advanced Audio Processing
- Weights & Biases (W&B) Framework

15. Model Deployment

- Model Deployment Techniques
- Docker & Kubernetes
- API Deployment

16. Technical Background for ML/DL Practitioners

- Conda Environment Management
- Git Version Control
- Linux Basics
- Running Models on a Server

17. Introduction to MLOps

- MLOps Concepts
- Model Lifecycle Management
- Monitoring and Logging

18. Generative AI

- Introduction to Generative AI
- Overview of Modern Generative AI Models ○

GANs and Diffusion Models

19. Deep Learning Summary & Final Review