

Certification course on Deep Learning for Computer Vision Applications

Course Overview

This course will teach you the fundamentals of deep learning and computer vision, and how to apply these techniques to solve various real life computer vision problems. You will learn about the different types of deep learning algorithms, how to train and evaluate models, and how to use deep learning frameworks like TensorFlow and PyTorch. You will also learn about the different applications of computer vision, such as image classification, object detection, and image segmentation.

Course Objectives

By the end of this course, you will be able to:

- Understand the fundamentals of deep learning and computer vision
- Train and evaluate deep learning models
- Use deep learning frameworks to build computer vision applications
- Apply computer vision techniques to solve real-world problems

Course Content

The course will cover the following topics:

- Introduction to Machine Learning, Deep Learning
- Linear Regression, Logistic Regression
- Support Vector Machines
- Neural Networks
- Introduction to Computer Vision
- Image formation, Representation, Transformation
- Filtering, Edge, Blob, Corner detection, Morphological operations
- Introduction to Deep Learning
- Activation functions, Loss functions, Optimization techniques
- Convolutional Neural Networks
- Recurrent Neural Networks
- Generative Networks (GANs and VAEs)
- Transformers
- Deep learning architectures for different Computer Vision problems
- Image Classification

- Object Detection
- Image Segmentation

Course Requirements

- Basic understanding and experience in Python programming
- Basic understanding of Mathematics and Linear algebra

Course Schedule

The course will be delivered over 6 weeks. Each week, there will be 2 lectures, 2 coding sessions, and one quiz.

Course Instructor

The course will be taught by Dr. Manoj Sharma, Mr. Ankit Shukla and Mr. Avinash Upadhyay. Dr. Manoj Sharma is currently serving as Assistant Professor at Bennett University, Greater Noida, He has published over 20 papers in top academic journals and conferences, and he is a leading expert in machine learning and computer vision. Mr. Ankit Shukla has over 8 years of experience in machine learning and deep learning and worked for different Government and Industry funded Projects at CSIR-CEERI, Pilani. Mr. Avinash Upadhyay has over 8 years of experience in machine learning and deep learning and published research papers in top tier conferences.

Course Fee

The course fee is 15,000 INR

Course Outcomes

Upon successful completion of this course, you will be awarded a certificate of completion from the Visual Cognition Laboratory Private Limited, Greater Noida, India.

Course Resources

The following resources will be available to students enrolled in this course:

- Lecture notes
- Programming assignments
- Discussion forum

Course Schedule

Week 1: Introduction to Deep Learning and Computer Vision

- Course Overview
- Introduction to machine learning and deep learning
- Types of learning (supervised, unsupervised, reinforce)
- Linear Regression, Logistic Regression, SVM, Neural Networks
- Introduction to Computer Vision
- Introduction to image formation, representation of image, Filtering
- Visual Features (Edge, blob, corner) detection, Morphological operations

Week 2: Introduction to Deep learning

- What is Deep learning
- Introduction to Neural Networks,
- Multi-layer perceptrons, Backpropagation
- Use of different Activation functions, Loss functions and Optimizers
- Introduction to popular deep learning libraries (Tensorflow, Keras, PyTorch)
- Setting up the development environment and installing necessary libraries
- Training a Linear Neural Network

Week 3: Introduction to Deep learning Architectures

- Introduction to Convolutional Neural Networks (CNNs)
- Understanding of popular CNN architectures (VGG, ResNets, DenseNets)
- Training CNNs for image classification problem
- Handling overfitting problem and Regularisation techniques
- Transfer learning and fine-tuning of pre-trained CNN models

Week 4: Recurrent Neural Networks (RNNs)

- Overview of RNNs and Backpropagation in RNNs
- Problems with RNNs and Introduction to LSTM
- Recurrent Neural Networks (RNNs)
- Training a LSTM model for Video Captioning

Week 5: Generative Models and Transformer

- Overview of Generative Adversarial Networks (GANs)
- Training a Vanilla GAN for image generation
- Introduction to popular GAN variants (DCGAN, CycleGAN, PixPix GAN,

StyleGAN)

- Overview of Transformer architecture
- Use of Transformer for computer vision applications

Week 4: Application of Deep learning Architectures for different computer vision problems

- Introduction to Computer Vision
- Image Classification
- Object Detection
- Image Segmentation