Computer Vision - Shaastra Trainer

Centre For Innovation

Computer Vision

Computer vision is a field of artificial intelligence (AI) that enables computers and systems to derive meaningful information from digital images, videos and other visual inputs and take actions or make recommendations based on that information.

Abstract

This session will start from the basics of Neural Networks, Convolutional Neural Networks and go diving deep into Semantic Segmentation, GANs etc. We will also cover how to start a Computer Vision project from scratch and give insights into it. At the end of the workshop you will be able to start your own Computer Vision Project and compete in Competitions :)

Duration

2 sessions : 3 hours each

Session 1	Neural Networks, Activation Functions and Optimizers, What is an Image?, Convolutional Neural Networks, Model Architecture on CNNs
Session 2	Application of Computer Vision, Python Libraries, First Computer Vision Project, How to read a research paper

Pre-requisites

Basic knowledge on how Neural Networks work would be recommended. The session will be going over that topic very briefly

Detailed Plan

The whole workshop will span for 2 days and consist of 2 sessions with 9 modules in total

Session 1

Module 1 : Neural Networks

- Forward Propagation
- Backward Propagation
- Gradient Descent
- Normalisation

Module 2 : Activation Functions and Optimizers

- Activation Functions like ReLU, Sigmoid and when to use them
- Optimizers and concept of Momentum and Hyperparameters

Module 3 : What is an Image?

- Pixels and Channels
- Colour and Grayscale Image
- Data Augmentation

Module 4 : Convolutional Neural Networks

- Filters and How they work
- Padding, Strides and Pooling Layer
- Why are CNN's so good for Images

Module 5 : Model Architecture on CNNs

- Basic Models : VGG, AlexNet, LeNet etc
- Models with Skip Connections : ResNet, DenseNet etc
- Inception Networks and other popular models

Session 2

Module 6 : Application of Computer Vision

- Image Classification
- Semantic Segmentation
- Object Detection
- Generative Adversarial Networks (GAN)

Module 7 : Python Libraries

- What are Python Libraries and why is it useful?
- Numpy
- Matplotlib
- Other useful libraries like OpenCV, Pandas etc

Module 8 : Your First Computer Vision Project

- How to start the project
- Steps to follow while doing the project
- How to find errors and debug them

Module 9 : How to read a research paper