MASTERING IN COMPUTER VISION

Number of days - 5

Highlight of Course :

- **Computer Vision basics**
- **Deep Learning with TensorFlow**
- **OpenCV**
- **Convolutional Neural Network**
- **CNN Building blocks**
- **Semantic Segmentation**
- **YOLO Introduction**

Prerequisites:

Basic knowledge of Python.
Machine Learning
Deep Learning

Description of Course :

This program is well suited for both beginners or experienced developers looking to understand computer vision. It exposes you to TensorFlow2.0. In this course, you will learn

- Computer Vision basics
- Deep Learning and TensorFlow
- Convolutional Neural Network
- CNN Building blocks
- Semantic Segmentation

SECTION 1 - DEEP LEARNING USING TENSOR-FLOW 2.0

MODULE 1 : Deep Learning basics for Computer Vision

- **Introduction to Deep Learning for Computer Vision**
- **Machine Learning Basics**
- **Understanding Classification Metrics**
- **Introduction to Deep Learning Topics**
- **Understanding a Neuron**
- **Understanding a Neural Network**

MODULE 2 : INTRODUCTION TO TENSOR-FLOW

- **Introduction To Tensor-Flow**
- **How to define Tensor**
- **Operations on Tensors**
- **Variable and Variable Type Tensors**

SECTION 2 - COMPUTER VISION

MODULE 3 : Introduction to Computer Vision

- Introduction to Computer Vision
- Applications
- Recent Research in Computer Vision
- Introduction to Segmentation
- Why Transfer Learning ?
- Basic Terminologies

MODULE 4 : Mathematics for Computer Vision

- Linear Algebra
- Calculus
- Probability Theory
- Aligning RGB channel

SECTION 3 - OPEN CV

MODULE 5 : Introduction to OpenCV

- Introduction to OpenCV
- Image basics with Numpy
- Open an Image with Matplotlib
- Get familiar with RGB channels
- Differences between Matplotlib and OpenCV

SECTION 4 - CONVOLUTIONAL NEURAL NETWORK

MODULE 6 : CONVOLUTIONAL NEURAL NETWORK

- **What is Convolution?**
- **Convolution on Colour Images**
- **CNN Architecture**
- **CNN Code Preparation**
- **CNN - MNIST**

MODULE 7 : Working with images & CNN Building Blocks

- **Introduction - Working with Images**
- **Reshaping understanding**
- **Sampling, and Quantization**
- **Working with images - Filtering**

MODULE 8 : CNN Architectures and Transfer Learning

- **CNN Architectures and LeNet Case Study**
- **GPU vs CPU**
- **Transfer Learning Principles and Practice**

SECTION 5 - IMAGE PROCESSING

MODULE 9 :Image Features

- **Feature Detection**
- **Feature descriptors**
- **Model fitting**

MODULE 10 :Lighting

- **Photometry**
- **Lightness**
- **Shading**

MODULE 11 :Image Classification

- Introduction to Image Classification
- Image Classification with KNN
- Linear Classifiers

MODULE 12 :Image Processing

- What Is A Digital Image
- Manipulating Images
- Manipulating Images One Pixel At a Time
- Pixel Transformations

SECTION 6 - SEMANTIC SEGMENTATION

MODULE 13 : Semantic Segmentation

- Semantic Segmentation
- Semantic Segmentation process
- U-Net Architecture

MODULE 14 :Image Segmentation

- Image Segmentation Overview
- Upsampling Methods
- Encoder
- Decoder

MODULE 15 :Object Tracking

- Introduction to Object Tracking
- Optical Flow
- Optical Flow Coding

- Overview of various Tracking API Methods

MODULE 16 :Object Detection

- Object Detection and Sliding Windows
- R-CNN
- Fast R-CNN
- Faster R-CNN

SECTION 7 - SIAMESE NETWORK

MODULE 17 : Siamese Network for Metric Learning

- Metric Learning
- Siamese Network as metric learning
- How to train a Neural Network in Siamese way

SECTION 8 - YOLO

MODULE 18 :YOLO

- Introduction to YOLO v3
- YOLO Weights Download
- YOLO v3 with Python