
AI Courses by OpenCV

COMPUTER VISION II

Module 1 : Facial Landmark Detection

1. Different Face Processing Applications
2. Facial Landmarks Detection using dlib
 - Introduction to Dlib
 - Facial Landmark Detection using Dlib
3. Application - Face Alignment
4. Improving Facial Landmark Detector
 - Improve in Speed
 - Improve in Stability
 - Landmark Stabilization in OpenCV
 - Optical flow
 - Lucas-Kanade Optical flow
5. Facial Landmark Detection Theory
 - Machine Learning Basics
 - Paper Review
6. Train a custom Facial Landmark Detector
 - How to Train a Custom landmark Detector

Module 2 : Applications of Facial Landmarks

1. Alpha Blending

- Alpha Blending in OpenCV
2. Image Warping
 - Affine Transform
 - Geometric Transform
 - Triangle Warping
 3. Delaunay Triangulation
 - Theory of Delaunay Triangulation
 4. Face Averaging
 - Face Averaging using OpenCV
 5. Face Morphing
 - Face Morphing using OpenCV
 6. Application: Bug Eyes
 - Create a Bug eye app
 7. Head Pose Estimation
 - Head Pose Estimation in OpenCV

Aissgnment1: Smile Detection

Module 3 : SnapChat Filters

1. Face Swap
 - How Face Swapping can be achieved
 - Seamless Cloning
 - Seamless Cloning in OpenCV
 - Face Swapping in a video

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2. Application: Beard Filter
 3. Application: Aging filter
 4. Non-linear Deformations
 - Moving Least Square
 - Application: MLS based Happify and Fatify Filters

Project1: Virtual Makeup

Module 4 : Face Recognition

1. Introduction to Face Recognition
 - Introduction to Face Recognition
2. Eigen Faces
3. Fisher Faces
4. Local Binary Patterns Histograms
5. Face Recognition API in OpenCV
6. Deep Learning based Face Recognition

Project2: DoppelGanger- Find Celebrity Look-Alike

Module 5 : Introduction to Deep Learning

1. Basics of Neural Networks
 - What is Neural Network
 - How does Neural Network Learn
2. Introduction to TensorFlow Keras(python) and LibTorch(C++)
 - Deep Learning Frameworks
 - The Keras Framework(Python)
 - Linear Regression using Keras(Python)
 - Introduction to LibTorch(C++)



3. LibTorch Installation and Usage(C++)

- How to run LibTorch code on your Local System
- How to run LibTorch code on Google Colab
- Linear Regression using LibTorch

4. Feed Forward Neural Network

- Importance of Hidden Layer in a Neural Network
- Training a Neural Network using Backpropagation
- Example: Image Classification using MLP

5. Convolutional Neural Network(CNN)

- What is CNN
- Example: Image Classification using CNN
- Data Augmentation(Python)

Assignment2: Improve CNN Training

Module 6 : Leveraging Pre-Trained Model

1. Introduction to Pre-trained model(Python)

- Pre-Trained models in Keras

2. How to get Free GPU

- Introduction to Google Colab
- Introduction to Kaggle Kernels

3. Transfer Learning and Fine Tuning in Keras(Python)

- How to use Custom Dataset in Keras
- Introduction to Kaggle Datasets
- Fine-Tuning an Image Classifier using Google Colab
- Fine-Tuning an Image Classifier using Kaggle Kernel

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4. Troubleshooting using Tensorboard(Python)
 - Using Tensorboard with Keras
 5. From PyTorch to LibTorch(C++)
 6. Fine Tuning using LibTorch(C++)
 7. Fine Tuning using Caffe
 - Introduction to Caffe
 - Fine-Tuning in Caffe using Colab(C++)
 - Inference of Trained Caffe model using OpenCV(C++)
 - Train an Image Classifier using Fine-Tuning in Caffe(Python)

Module 7 : Object Detection

1. Object Detection Overview
 - What is Object Detection
 - Traditional Object Detection Pipeline
2. Two Stage Object Detectors
 - Different two-stage Detectors
 - Faster R-CNN in OpenCV(C++)
3. Single Stage Object Detectors
 - SSD Object Detector in OpenCV
4. YOLO
 - What is YOLO
 - YOLO object Detection in OpenCV
5. Measure Performance of Object Detectors

- Evaluation Metrics for Object Detection

Module 8 : Train a Custom Object Detector using YOLO

1. Problem Description

- Which Object to Detect
- Where to get the data for Training

2. YOLO and DarkNet

- What is DarkNet
- Build DarkNet
- Run YOLO on DarkNet

3. Stepwise explanation of how train your detector on Colab

- How to link your Google Drive
- Compile DarkNet
- Download and Prepare Dataset
- How to start Training
- Run Inference on New Images

Project3: Train a Face Mask detector

Module 9 : Text Detection and Recognition

1. Overview of OCR

- What is OCR
- The OCR Pipeline
- Challenges
- Datasets and Competitions

2. Graphic Text Recognition using Tesseract

- What is Tesseract
 - Introduction to OCR using Tesseract
 - Tesseract OCR Failure Cases
 - Improving Tesseract OCR failures
3. Text Detection
 - Text Detection using EAST
 - Text Detection using CRAFT(Python)
 4. Modified Pipeline for scene Text Recognition using Tesseract(Python)
 5. Scene Text recognition using Keras OCR(Python)
 - Text Recognition using CRNN
 6. Comparing Keras-OCR and Tesseract(Python)

Assignment3: OCR on invoice

Case Study: Automatic Number Plate Recognition(Python)

1. ALPR system using YOLO-Net
 - YOLO-Net: License Plate Detector using YOLOv3
 - ALPR using YOLO-Net and Tesseract
 - ALPR using YOLO-Net and YOLO-OCR
2. ALPR system using WPOD-Net
 - ALPR using WPOD-Net and Tesseract
 - ALPR using WPOD-Net and YOLO-OCR

Module 10 : Deploy Applications on Cloud

1. Create a Web Application using Flask
 - What is Flask
 - A minimal Flask Application
 - Using HTML Templates
 - A complete Flask Application
2. Deploy Web App on Heroku [Paas]
 - What is Heroku
 - How to create an account on Heroku
 - Prepare Application for Deployment
 - How to Deploy using Heroku CLI
 - How to Deploy using Heroku website
3. Deploy Web App on Google GCP [Iaas]
 - What is Google Cloud Platform(GCP)
 - Create account on Google Cloud Platform
 - Create and Configure a VM instance
 - Setup VM and Deploy App
 - Change Firewall settings and Check Deployment

Assignment4: Deploy your Web App on Heroku