

Title: Deep Learning-based Computer Vision and its Applications

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Abstract

This workshop starts with the introduction of Image and Video processing techniques. Furthermore, Computer Vision approaches are introduced, including: 1) Object Detection in Visual Surveillance Environment 2) Visual Object Tracking 3) Classification/Recognition of different types of objects. Subsequently, detailed Convolutional Neural Network (a Deep Learning Architecture) are explained. Next, different application areas along with challenges in the Computer Vision environment are covered by the instructor. Finally, instructor engages with participants to do hand-on practice on Deep Learning related to the application areas of Computer Vision. Hands-on practice is done on benchmark dataset using Python, TensorFlow with the help of Jupyter Notebook.

Theoretical Background:

One of the main targets of Computer Vision is to interpret the content of Image and Video data. To interpret Image content, one of the essential goals is to build a model depending on a known set of features extracted from Image and Video. The built model is then employed to produce inference of the unknown data. Machine/Deep learning is the science of designing and applying algorithms that are able to learn things from past cases. Many of the latest spectacular achievements of Machine Learning and Deep Learning, its dominant existence in many industries, and its fast penetration in our daily work and life are approving that, these techniques are extremely useful for generating the model.

Workshop Structure:

The workshop is split into 5 modules. It comprises approximately 70 slides.

Sr. No.	Modules	Duration (approximately)
1.	Introduction of Image and Video Processing	30 Minutes
2.	Introduction of Computer Vision	20 Minutes
3.	Understanding the concept of Deep Learning	90 Minutes
4.	Application areas and challenges of Computer Vision	10 Minutes
5.	Hands-on Convolutional Neural Network for object recognition Problem	90 Minutes

Syllabus:

1. Introduction to Image Processing
2. Introduction to Video Processing
3. Different types of Image in research
4. Key stages in Digital Image Processing
5. Filtering operation on Image
6. Introduction to Computer Vision (Object Detection, Tracking and Recognition)

7. Deep Learning Techniques
8. Basic concepts of Convolutional Neural Network
9. Train, Validation, and Test datasets
10. Under-fitting and Over-fitting problems and solutions
11. Application areas of Computer Vision
12. Challenges in Computer Vision
13. Hands-on experience on Deep Learning related to the application areas of Computer Vision

Case Study:

Implementation of Convolutional Neural Network on benchmark dataset using Python, TensorFlow with the help of Jupyter Notebook.

Who Should Attend:

1. Interested in Image processing, Computer Vision, and Deep Learning.
2. Looking for a career in Computer Vision and Deep Learning field.
3. Those who want to improve their concepts, practical and technical skills and create something innovative.
4. Those who want to do research in the Computer Vision area.

Pre-requisite:

1. Basic knowledge of Python
2. School level Mathematics

Requirement from Participants:

1. Laptop with internet connection

Outcomes:

1. Familiarity with Deep Learning Algorithms using Python
2. Hands-on designing of small project on their own