Course 3, Computer Vision

# Section 1 :

* Computer Vision definition

# Section 2 :

* Image segmentation definition.
* Image segmentation technique, watershed algorithm.
* Edge Detection definition.
* Canny Edge detection algorithm is one technique.
* Feature Extraction is the process of extracting meaningful information or features from an image such as people, vehicles etc. SIFT is a popular technique.
* Image segmentation, edge detection, feature extraction have applications in medical, autonomous, surveillance, and image editing.

# Section 3 :

* Object detection is the task of identifying and localizing objects in an image or video. CNNs are widely used.
* Object tracking is the process of following a specific object’s trajectory, over time in a video sequence.
* Image Classification is the process of applying label or class to an input image. CNN is primarily used.
* Most frequent challenges in CV are Occlusion, Scale Variation, Viewpoint changes and illumination variations.

# Section 4 :

* Deep Learning definition. How it helps in CV.
* CNN, It’s architecture, training CNN (do from Written notes).
* Transfer learning definition, it allows for implementation with less training data, and computational resources. There are different ways of implementing transfer learning using fine-tuning, such as freeze some layers and train the rest, freeze most and train only a few layers.

# Section 5 :

* Image recognition and localization is the process of identifying and locating objects or patterns within an image.
* Face detection is a subset of image recognition that focuses on identifying and locating human faces. Widely used in biometric auth, surveillance systems etc. Face recognition goes a step further by identifying specific individuals based on their facial features.
* Viola-Jones algorithm is a popular face detection algorithm that uses Haar-like features and a cascade classifier to detect faces.
* Object character recognition(OCR) is a technique that allows the extraction of text from images. It involves analyzing shapes and patterns of characters in an image and converting them into machine readable text. Traditional methods have been complemented with Deep Learning methods such as CNN. The limitations of OCR are Lighting conditions, Image quality, Font styles, and Languages.

# Section 6 :

* Image registration is the process of aligning two or more images taken of the same scheme but from different angels or viewpoints or sensors. Feature based image registration is a popular technique where we detect and match distinctive features such as corners, edges, etc between images.
* Image stitching is the process of combining multiple overlapping images into a single panoramic image. RANSAC is a popular technique.
* Panorama creation is the last step in the image stitching pipeline and involves the construction of the overlapped images into a panoramic image.

# Section 7 :

* Motion Tracking definition (From Handwritten notes)
* Optical flow (From Handwritten notes)
* Video Processing (From Handwritten notes, Unit1)
* Background Subtraction (From Handwritten notes)

# Section 8 :

* Real-Time Video Analysis
* Applications in Robotics