

17ES017 DIGITAL IMAGE AND VIDEO PROCESSING

Hours Per Week :

| L | T | P | C |
|---|---|---|---|
| 3 | 1 | - | 4 |

Total Hours :

| L | T | P | WA/RA | SSH/HS | CS | SA | S | BS |
|----|----|---|-------|--------|----|----|---|----|
| 45 | 15 | - | 15 | 30 | - | 5 | 5 | - |

Course Objectives:

- To learn basic operations on Images.
- To learn advanced digital image processing techniques related to segmentation and recognition.
- To learn fundamentals of digital video processing.
- To learn video compression techniques.

Course Outcomes:

- Able to apply basic mathematical tools on images to perform filtering
- Acquire ability to interpret and analyze 2D signals in the frequency domain through the Fourier transforms.
- Able to do further research in video processing.

SKILLS:

- To program operations on images
- Object detection using image processing
- Basic operations on video signals

ACTIVITIES:

- Smoothing of image using filters.
- Sharpening of image by using filters.
- Implementation of wavelet transforms.

UNIT-I

Fundamentals steps of Image processing: Components of an Image processing system, Image sampling and quantization, relationship between the pixels. Gray level transformation, Histogram processing, Smoothing and sharpening spatial filters, Smoothing and sharpening frequency domain filters.

UNIT-II

Image compression and segmentation: Compression models, Error free coding, lossy coding, compression standards. Image segmentation: Edge linking and boundary detection, Thresholding, Region based segmentation.

UNIT-III

Video Representation : Video formation, perception and representation: Color perception and specification, Video capture and display, Analog video raster, Analog color TV systems, Digital Video Video Sampling: Basics of lattice theory, sampling over lattice, Sampling of video signals, filtering operations, Conversion of signals sampled on different lattices, Sampling rate conversion of video signals.

UNIT-IV

Video Modeling: Camera model, illumination model, object model. Scene model, Two dimensional motion models 2-D motion estimation: Optical flow, General methodologies, Pixel based motion estimation, Block matching algorithm, Mesh-based motion estimation, Global motion estimation. Application of motion estimation in video coding.

UNIT-V

Video Coding: Information theory, Binary encoding, Scalar quantization, Vector quantization, Waveform based video coding: Block based transform coding, Predictive coding, Object based scalability, Wavelet Transform based coding.

TEXTBOOKS:

1. Digital Image Processing 3e by Rafael C. Gonzalez Richard E. Woods Pearson Education India; Third edition (23 June 2016)
2. Video Processing and Communications (Prentice-Hall Signal Processing Series) by Yao Wang Jorn Ostermann Ya-Qin Zhang Pearson (27 September 2001)

REFERENCEBOOKS:

1. Digital Video Processing (Prentice-Hall Signal Processing Series) by A. Murat Tekalp Prentice Hall; 2 edition (18 June 2015)
2. Handbook of Image and Video Processing (Communications, Networking and Multimedia) 2nd ,Kindle Edition by Alan C. Bovik Academic Press; 2 edition (21 July 2010)