

## **CS 511: IMAGE PROCESSING (3-0-0: 3)**

### **Introduction and Fundamentals of Digital Image Processing**

Origins, Fundamental steps, Components and Applications of Digital Image Processing; Visual Perception, Image Sensing and Acquisition , Image Sampling and Quantization, Basic Relationships Between Pixels, Image File Format.

### **Image Enhancement in Spatial Domain and Frequency Domain**

Some Basic Gray Level Transformations, Histogram Processing, Enhancement using Arithmetic/ Logic Operations, Smoothing and Sharpening Spatial Filters, Fourier Transform and Frequency Domain, Smoothing and Sharpening Frequency-Domain Filters; Homomorphic Filtering.

### **Image Restoration**

Model of the Image Degradation and Restoration Process; Noise Models; Restoration In the Presence of Noise only-Spatial Filtering; Linear Position-Invariant Degradations; Estimating the Degradation Function; Inverse Filtering; Weiner Filtering; Geometric Transformations.

### **Morphological Image Processing**

Preliminaries; Basic Morphological Operations – Opening and Closing, Dilation and Erosion; Morphological Algorithms; Extension Of Morphological Operations to Gray-Scale Images.

### **Colour Image Processing**

Colour Models; Pseudocolour Image Processing; Colour Transformations; Smoothing and Sharpening, Colour Segmentation.

### **Image Segmentation**

Detection of Discontinuities; Edge Linking and Boundary; Thresholding; Region-Based Segmentation; Use of Motion in Segmentation.

### **Image Representation and Description**

Boundary Representation; Boundary Descriptors, Regional Descriptors

### **Image Compression**

Fundamentals; Image Compression Models; Error-Free Compression; Lossless compression; Image Compression Standards.

### **Text Books and References**

1. R. C.Gonzalez and R. EWoods, "Digital Image Processing", Pearson Prentice Hall.
2. A. K.Jain, "Fundamentals of Digital Image Processing", PHI.
3. B. Chandra andD.D.Majumder "Digital Image Processing and Analysis", PHI.
4. S.Jayaraman, S.Esakkirajan and T.Veerakumar, "Digital Image Processing", Tata McGraw Hill.
5. E.Gose, R. Johnsonbaugh and S.Jost, "Pattern Recognition and Image Analysis", PHI.