

MCPE2018 IMAGE PROCESSING (3-0-0)

Course Objectives

- To learn the fundamentals of image processing and various transformations applied in an image.
- To learn image enhancement techniques.
- To understand image restoration.
- To impart knowledge on different compression techniques.

Module I

Introduction: Introduction to Digital Image Processing, Characteristics of Digital Image, Basic relationship between pixels, Image sampling and quantization, Color models, Basic Geometric Transformations.

Module II

Filtering in the Frequency Domain: preliminary concepts, 2D DFT and its properties, basic Filtering in the Frequency Domain, image smoothing and sharpening.

Image Restoration and Reconstruction: Image restoration/degradation model, noise models, restoration in the presence of noise only, estimating the degradation function.

Module III

Color Image Processing: Color Models, Color Transformation, Wavelets and Multi-resolution processing: multiresolution expansions, wavelet transforms in one and two dimension.

Module IV

Image Compression: Fundamentals, Error-free compression: variable length coding, LZW coding. Lossy compression: lossy predictive coding

Morphological Image Processing: Erosion and Dilation, opening and closing.

Course Outcomes: Upon completion of this course, the students will be able to:

- CO1 Compare various image enhancement techniques
- CO2 Construct the image from the degraded image
- CO3 Analyze and use appropriate image compression techniques
- CO4 Suggest proper image feature for classification problems
- CO5 Apply the theory and algorithms that are widely used in digital image processing

Textbooks:

1. Rafael C. Gonzalez, Richard E Woods, "Digital Image Processing", Fourth Edition, Pearson Education, 2018.

Reference Books:

1. A.K. Jain, "Fundamentals of Digital Image Processing", PHI, New Delhi, 1995.
2. S E Umbaugh, "Digital Image Processing and Analysis: Application with MATLAB and CVIP Tools", Third Edition, Taylor & Francis, CRC Press, 2018.
3. Frank Y. Shih, "Image Processing and Pattern Recognition", Wiley – IEEE Press, 2010.