IMAGE PROCESSING AND PATTERN RECOGNITION (ELECTIVE III)

| Course | Code :13IT1106 | L | Т | Р | С |
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Course Educational Objectives:

This subject aims to teach the students how a computer can emulate functions typical of human vision and enable them to design and implement image processing and pattern recognition applications

- To be familiar with Image model, sensing and acquisition, digital image representation, properties of human visual system, various applications.
- Different image processing operations for improving image quality through enhancement, restoration and filtering etc..
- Affine transformation and registration compressing data to save storage and channel capacity during transmission.
- Image segmentation for partitioning into objects and background.
- Extraction of image features, quantifying shapes, pattern recognition, image analysis

Course Outcomes:

At the end of the course the student will be able to

- Get adequate background knowledge about image processing.
- Get adequate background knowledge about pattern recognition.
- Get practical knowledge and skills about image processing tools.
- Get practical knowledge and skills about pattern recognition tools.
- Get necessary knowledge to design and implement a prototype of an image processing and pattern recognition application.

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THE DIGITIZED IMAGE AND ITS PROPERTIES:

Applications of image processing, image function, image representation, sampling, quantization, color images, metrics and topological properties of digital images, histograms, image quality, noise image.

UNIT-II

IMAGE PREPROCESSING:

Pixel brightness transformation, position dependent brightness correction, gray scale transformation; geometric transformation, local preprocessing-image smoothening,

edge detectors, zero-crossing, scale in image processing, canny edge detection, parametric edge models, edges in multi spectral images, local preprocessing and adaptive neighborhood pre processing; image restoration;

UNIT-III

IMAGE SEGMENTATION:

Threshold detection methods, optimal thresholding, multispectral thresholding, thresholding in hierarchical data structures; edge based image segmentation- edge image thresholding, edge relaxation, border tracing, border detection,

UNIT-IV

MATHEMATICAL MORPHOLOGY:

Basic morphological concepts, four morphological principles, binary dilation, erosion, Hit or miss transformation, opening and closing; thinning and skeleton algorithms; Morphological segmentation -particles segmentation and watersheds, particle segmentation.

IMAGE TEXTURES :

statistical texture description, methods based on spatial frequencies, cooccurrence matrices, edge frequency, and texture recognition method applications Image representation and description-representation, boundary descriptors, regional descriptors

UNIT-I

(12 Lectures)

(12 Lectures)

(12 Lectures)

(12 Lectures)

2013

UNIT-V

(12 Lectures)

PATTERN RECOGNITION FUNDAMENTALS:

Basic concepts of pattern recognition, fundamental problems in pattern recognition system, design concepts and methodologies, example of automatic pattern recognition systems, a simple automatic pattern recognition model

TEXT BOOKS:

- Millan sonka, Vaclav Hiavac, Roger Boyle, "Image Processing Analysis and Machine Vision", 3rd Edition, CL Engineering, 2013.
- 2. Rafel C. Gonzalez, Richard E. Woods, "*Digital Image Processing*", 3rd Edition, Pearson Education, 2008.

REFERENCES:

- 1. Julus T. Tou, Rafel C. Gonzalez, Addision, "*Pattern Recognition Principles*", 1stEdition, Wesley publishing company.
- 2. Earl Gose, Richard Johnsonbaugh, "*Pattern Recognition and Image Analysis*", 1st Edition, Prentice Hall of India Private limited, 2009.

WEB REFERENCES:

http://nptel.iitm.ac.in/courses/106108057

