Birla Institute of Technology & Science, Pilani
Instruction Division
Second Semester, 2015-2016
Course Handout (Part II)

Date : 06.01.2016

In addition to Part I(General Handout for all courses appended to the Time Table), this portion gives further specific details regarding the course.

Course No. : BITS F446

Course Title: Pattern Recognition

Instructor – in - Charge: RAJ KUMAR GUPTA

Course Description: This is a first course on Pattern recognition. It begins with an introduction to the fundamentals of digital images and develops the theoretical background for the pattern recognition. It goes on to discuss the different aspects like the preprocessing of a digital image, segmentation, representation and description and finally the object recognition. During the course, a flavour of matlab programming will also be given.

Scope & Objective: Over the past 30 years or so, pattern recognition and automation have evolved into a mature subject embracing many topics and applications: these range from automatic (robot) assembly to automatic vehicle guidance, from automatic interpretation of documents to verification of signatures, and from analysis of remotely sensed images to checking of fingerprints and human blood cells. Currently, pattern recognition and automatic visual inspection are undergoing very substantial growth, necessary improvement in quality, safety and cost effectiveness being the stimulating factors. The course introduces the students to the fundamentals of digital images and various processing techniques that are applied to them not only to improve their quality but also to recognize them.

Text Book: Gonzalez, R. C. & R. E. Woods, Digital Image Processing, Pearson Education Asia.

Reference Books: M. Sonka, V. Hlavac and R. Boyle, Image Processing, analysis and machine vision, 2nd Ed, Thompson Asia, 2003.

(ii) Digital Image Processing using Matlab, R. C. Gonzalez, R.E. Woods & S. L. Eddins, Digital Image Processing using matlab, Pearson.

Course Plan:

Lecture No.	Learning Objectives	Topics to be covered	Reference to Text Book
1	To introduction to pattern recognition	Pattern recognition and applications	Lecture notes
2-3	To introduce the concept digital image processing	Digital image, data structure for image analysis	Lecture notes
4-8	To study techniques to preprocess the digital image for analysis	Some basic gray level transformations for image enhancement	Ch. 3 & 4
9-10	Introduction to Matlab	Matlab programming relevant to image analysis for pattern recognition	Lecture notes
11-16	To learn morphological image processing	Set theory, dilation and erosion, opening & closing, hit or miss transformation, basic morphological algorithm, extensions to gray scale image	Ch. 9
17-25	To learn the image segmentation	Detection of discontinuities, edge linked boundary detection, thresholding, region based segmentation, segmentation by morphological watersheds, use of motion in segmentation.	Ch. 10
26-27	Color Images	Introduction, color models, segmentation based on color, applications	Ch. 6
28-31	To introduce the image representation and description	Representation, descriptors, use of principal components for description	Ch. 11
32-37	To study the object	Statistical pattern recognition, neural nets, syntactic pattern recognition,	Ch. 12

	recognition	recognition as graph matching, optimization technique in recognition and fuzzy systems	
38-40	To study the some examples of the applications of pattern recognition	Finger print, iris, handwriting, and face recognition	Lecture notes

Evaluation Scheme:

Evaluation Component	Duration	Weightage	Date, Time & Venue	Nature of Component
Midsem Test	90 Minutes	35%	18/3 2:00 -3:30 PM	Closed/Open Book
Assignment, Quiz, Project		20%		Closed/Open Book
Comprehensive Examination	3 Hours	45%	13/5 FN	Closed/Open Book

Chamber Consultation Hour: To be announced in the class.

Notices: Notices concerning the course will be put up on the FD III notice board.

Make-up Policy: Make-up for the tests will be granted only on genuine grounds of sickness leading to hospitalization **(to be supported by medical certificate and not prescription)** or urgency for going out of town. There will not be any make-up for the assignment /quiz/online tests.

Instructor-in-Charge

BITS F446