

TCS2021 PATTERN RECOGNITION AND IMAGE ANALYSIS

Module 1

Introduction: Applications of Pattern Recognition, Statistical Decision Theory, Image Processing and Analysis, The Internet, Pointers to the Literature.

Module 2

Statistical Decision Making: Introduction, Bayes' Theorem, Multiple Features, Conditionally Independent Features, Decision Boundaries, Unequal Costs of Error, Estimation of Error Rates, The Leaving- One-Out Technique, Characteristic Curves, Estimating the Composition of Populations.

Module 3

Nonparametric Decision Making: Introduction, Histograms, Kernel and Window Estimators, Nearest Neighbor Classification Techniques, Adaptive Discriminant Functions, Minimum Squared Error Discriminant Functions.

Module 4

Clustering: Introduction, Hierarchical Clustering, Partitional Clustering.

Module 5

Artificial Neural Networks: Introduction, Nets without Hidden Layers, Nets with Hidden Layers, The Back-Propagation Algorithm, Hopfield Nets, An Application: Classifying Sex from Facial Images.

Module 6

Processing Of Waveforms And Images: Introduction, Gray Level Scaling Transformations, Equalization, Geometric Image Scaling and Interpolation, Smoothing Transformations, Edge Detection, Laplacian and Sharpening Operators, Line Detection and Template Matching, Logarithmic Gray Level Scaling, The Statistical Significance of Image Features.

Module 7

Image Analysis: Introduction, Scene Segmentation and Labeling, Counting Objects, Perimeter Measurement, Following and Representing Boundaries, Hough Transforms, Least Squares and Eigenvector Line Fitting, Fourier Transforms.

Text Book:

E.Gose et.al- Pattern Recognition and Image Analysis, PHI, New Delhi- 2004.

Reference Books:

1. R.O.Duda et.al- Pattern Classification 2nd Edn, John Wiley, New York, 2002.
2. R.C.Gonzalez and R.E.Woods- Digital Image Processing, 2nd Edn, Pearson Education, New Delhi- 2004.
3. M.Sonka et.al- Image Processing, Analysis, and Machine Vision- Vikas Publication, New Delhi- 2003.