**Course Title:** Pattern Recognition

**Class:** PhD

**Semester:** 1

**Session:** 2020

**File Type:** PowerPoint Presentations and PDF files

**Instructors:** Dr. Saima Farhan

**Link:** [**https://drive.google.com/drive/folders/1yv82SUUIY3PQg7uMrgKf\_5Y9GNvPsGny?usp=sharing**](https://drive.google.com/drive/folders/1yv82SUUIY3PQg7uMrgKf_5Y9GNvPsGny?usp=sharing)

|  |  |
| --- | --- |
| S. No. | Course Content |
| 1 | Pattern recognition, classification and matching problems  Pattern recognition system and its features  Feature extraction and classification  Supervised vs. unsupervised pattern recognition  Statistical vs. structural pattern recognition  Sensing and decision making |
| 2 | Bayes decision theory   * [Bayes decision rule](http://www.cedar.buffalo.edu/~srihari/CSE555/Chap2.Part1.pdf) * [Minimum error rate classification](http://www.cedar.buffalo.edu/~srihari/CSE555/Chap2.Part2.pdf) * [Normal density and discriminant functions](http://www.cedar.buffalo.edu/~srihari/CSE555/Chap2.Part3.pdf) |
| 3 | Bayes decision theory   * [Error integrals and bounds](http://www.cedar.buffalo.edu/~srihari/CSE555/Chap2.Part4.pdf) * [Bayesian networks, compound decision theory](http://www.cedar.buffalo.edu/~srihari/CSE555/Chap2.Part5.pdf) |
| 4 | Generative methods   * Maximum-Likelihood and Bayesian parameter estimation   + [Maximum-Likelihood estimation](http://www.cedar.buffalo.edu/~srihari/CSE555/Chap3.Part1.pdf)   + [Bayesian parameter estimation](http://www.cedar.buffalo.edu/~srihari/CSE555/Chap3.Part2.pdf) |
| 5 | Generative methods   * Maximum-Likelihood and Bayesian parameter estimation   + [Dimensionality and computational complexity](http://www.cedar.buffalo.edu/~srihari/CSE555/Chap3Part3-3.pdf)   + [Principal components analysis](http://www.cedar.buffalo.edu/~srihari/CSE555/Chap3.Part5.pdf)   + [Fisher linear discriminant](http://www.cedar.buffalo.edu/~srihari/CSE555/Chap3.Part6.pdf) |
| 6 | Generative methods   * Maximum-Likelihood and Bayesian parameter estimation   + [Expectation maximization](http://www.cedar.buffalo.edu/~srihari/CSE555/Chap3.Part7.pdf)   + [Hidden markov models](http://www.cedar.buffalo.edu/~srihari/CSE555/Chap3.Part8.pdf) |
| 7 | Generative methods   * Nonparametric techniques   + [Density estimation](http://www.cedar.buffalo.edu/~srihari/CSE555/Chap4.DensityEstimation.pdf) |
| 8 | Discriminative methods   * Distance-based methods   + [Nearest neighbor classification](http://www.cedar.buffalo.edu/~srihari/CSE555/Chap4.NearestNeighbor.pdf)   + [Fuzzy classification](http://www.cedar.buffalo.edu/~srihari/CSE555/Chap4.FuzzyClassification.pdf) |
| 9 | Discriminative methods   * Linear discriminant functions   + [Hyperplane geometry](http://www.cedar.buffalo.edu/~srihari/CSE555/Chap5.Part1.pdf)   + [Support vector machines](http://www.cedar.buffalo.edu/~srihari/CSE555/SVMs.pdf) |
| 10 | Discriminative methods   * Artificial neural networks   + [Biological motivation and back-propagation](http://www.cedar.buffalo.edu/~srihari/CSE555/Chap6.Part1.pdf) |
| 11 | Non-metric methods   * [Recognition with strings](http://www.cedar.buffalo.edu/~srihari/CSE555/Chap8.Part1.pdf) * [String matching](http://www.cedar.buffalo.edu/~srihari/CSE555/Chap8.Part2.pdf) |
| 12 | Non-metric methods   * Syntactic recognition of strings * Syntactic recognition of trees |
| 13 | Unsupervised learning and clustering |
| 14 | Pattern recognition systems for   * Character recognition * Handwriting recognition |
| 15 | Pattern recognition systems for   * Document classification * Fingerprint classification |
| 16 | Pattern recognition systems for   * Speech and speaker recognition * Object identification |