Department of Computer Science



Bahauddin Zakariya University, Multan

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***Tentative Study Plan***

Subject: Machine Learning Level: Graduate

Reference Books:

Introduction to machine learning by Ethen Alpaydin 3rd Edition,

The course contents may be changed during the class work. This is programming intensive course and you are expected to have good hands on using python programming language.

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| Week | Topics |
| 1 | Introduction to Machine Learning   * Uses of machine learning * Machine Learning tasks (regression, classification) * Learning and its types, supervised learning, unsupervised learning, semi supervised learning, Reinforcement learning * Data, data types, datasets, noise, data pre-processing |
| 2 | Estimation and Machine Learning   * The estimation model (f) * Why and how to estimate the model * Model accuracy vs interpretability * Basics of probability |
|  | Non-Parametric methods of learning   * Bayesian Decision Theory * Classification * Losses and Risks * Discriminant Function * Association Rules |
| 3 | Supervised Learning   * VC Dimension * Probability Approximately Learning * Linear Regression |
| 4 | Parametric Methods   * Maximum Likelihood estimation * Model Evaluation: bias vs variance * Model Selection and Generalization * Bayes Estimator |
| 5 | Multivariate methods |
| 6 | Dimensionality Reduction |
| 7 | Clustering |
| 8 | Non-Parametric Methods |
| 9 | Decision Trees |
| 10 | Linear Discrimination |
| 11 | Multi Layer Perceptrons |
| 12 | Local Models |
| 13 | Kernel Machines |
| 14 | Graphical Models |
| 15 | HMM |
| 16 | Bayesian Estimation |
| 17 | Combining Multiple Learners |
| 18 | Reinforcement Learning |
| 19 | Design and Analysis of Machine Learning Methods |