

CSME 104A - MACHINE LEARNING

3L, 3T

3 Hours, 100 Marks

Machine Learning - Definition and learning tasks, Supervised, unsupervised and semi-supervised learning. Hypothesis Space. Inductive learning. Classification & Regression, Training & Test datasets, Distance Metrics & Similarity Measures, Correlation & Higher Order Measures. Error Estimation. Classification Errors, Confusion Matrices.

Data - Bias and Variance, Pre-processing, Scaling and Dimensionality Reduction (PCA). Statistical learning - Naïve Bayes, Bayes Optimal Classifier. Linear & Logistic Regression. Overfitting & Underfitting. Bayesian Networks, Inference in Bayesian Networks. Instance-Based Learning: k-Nearest neighbor algorithm, Radial basis functions. Case-based learning.

Introduction to Decision Trees. Classification & regression using Decision Trees. Kernel Methods and Non-Linear Learning. Support Vector Machines. Classification using SVMs, Ensemble Methods – Boosting, Bagging, Random Forests & their applications.

Perceptron & Neural Network Learning - Feed forward & Back Propagation Neural Networks. Gradient Descent, Activation Functions & Regularization. Loss Functions & Convergence.

Unsupervised Learning and Challenges: Clustering, K-means, EM algorithms, Mixture of Gaussians, Hidden Markov Models. Hierarchical, Associate Rules. Overview of Deep Learning.