

Objectives: To learn basic concepts of supervised machine learning methods. To learn mathematical concepts, and algorithms used in machine learning.

Unit I: Introduction: Learning Problems, designing a learning system, Issues with machine learning. Concept Learning, Version Spaces and Candidate Eliminations, Inductive bias, Supervised, Unsupervised and Semi supervised Learning

Unit II: Supervised Learning: Decision Tree Representation, Appropriate problems for Decision tree learning, Algorithm, Hypothesis space search in Decision tree learning, inductive bias in Decision tree learning, Issues in Decision tree learning, Overfitting, Underfitting, Pre-pruning, Post-pruning

Unit III: Artificial Neural Networks: Neural Network Representation, Appropriate problems for Neural Network Learning, perceptron, Cost function, Gradient descent, Hypothesis formation, Multilayer Networks and Back Propagation Algorithms, Remarks
on Back Propagation Algorithms Case Study: face Recognition

Unit IV: Bayesian Learning: Bayes Theorem, Bayes Theorem and Concept Learning, Maximum Likelihood and Least squared Error Hypothesis, Maximum likelihood hypothesis for Predicting probabilities, Minimum Description Length Principle, Bayes Optimal Classifier, Gibbs Algorithm, Naïve Bayes Classifier, Bayesian Belief Network, EM Algorithm Case Study: Learning to classify text

Unit V: Overview of typical application areas such as Recommender System etc

Reference Books

1. Machine Learning by Tom M Mitchell McGraw Hill, ISBN: 0070428077
2. Machine Learning in Action by Peter Harrington Manning Publications Co., ISBN 9781617290183
3. The Elements of Statistical Learning: Data Mining, Inference, and Prediction by Trevor Hastie, Robert Tibshirani, Jerome H. Friedman Springer Series in Statistics, Second edition, ISBN 978-0-387-84858-7
4. Real-World Machine Learning by Henrik Brink, Joseph Richards, Mark Fetherolf Manning Publications Co., ISBN-10: 9781617291920, ISBN-13: 978-1617291920