

CSEL 585: Introduction to Machine Learning

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Pre-requisite:

- Basic knowledge in artificial intelligence, learning activities.

Objectives:

- To understand the concepts of machine learning.
- To appreciate supervised and unsupervised learning and their applications.
- To appreciate the concepts and algorithms of learning.

Outcomes:

- Ability to explore logic for solving various AI problems.

Module -I: Introduction

(9hrs)

Introduction: Definition-Examples of machine learning applications –Well posed learning problems- Designing a learning system- Perspectives and issues Concept learning and general to specific ordering: Inductive learning hypothesis- Concept learning as search – candidate elimination algorithm-inductive bias.

Module - II: Regression and classification

(9hrs)

Regression: Linear Regression-Simple-Multiple Decision Tree-Pruning: Introduction –Representation-Algorithm-issues Classification: Support Vector machine – Naïve Bayes-Applications

Module - III: Clustering and Learning

(9hrs)

Clustering: k-Means clustering– adaptive Hierarchical clustering –Applications- Neural network : Perceptron, multilayer network- back propagation- introduction to deep neural network Instance based learning :k-NN– Radial basis functions Case based reasoning- Reinforcement learning -Applications.

Module - IV: Probabilistic graphical models

(9hrs)

Graphical Models: Undirected graphical models - Markov Random Fields - Directed Graphical Models -Bayesian Networks - Conditional independence properties - Inference – Learning Generalization - Hidden Markov Models - Conditional random fields(CRFs)

Module - V: Machine learning experiments

(9hrs)

Design-Cross validation - Measuring Performance -Hypothesis testing- Assessing Performance -Comparison of algorithms, Datasets-Case study

Text Book(s):

1. Tom M. Mitchell, Machine learning, McGraw-Hill, 1997.
2. Ethem Alpaydin, Introduction to Machine Learning, MIT Press, Third Edition, 2014.