Introduction to Machine Learning

SWAYAM Prabha Course Code: R19

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COURSE OUTLINE	This course provides a concise introduction to the fundamental concepts in machine learning and popular machine learning algorithms. We will cover the standard and most popular supervised learning algorithms including linear regression, logistic regression, decision trees, k-nearest neighbour, an introduction to Bayesian learning and the naïve Bayes algorithm, support vector machines and kernels and neural networks with an introduction to Deep Learning. We will also cover the basic clustering algorithms. Feature reduction methods will also be discussed. We will introduce the basics of computational learning theory. In the course we will discuss various issues related to the application of machine learning algorithms. We will discuss hypothesis space, overtting, bias and variance, tradeo-s between representational power and learnability, evaluation strategies and cross-validation. The course will be accompanied by hands-on problem solving with programming in Python and some tutorial sessions. **Course Outline** 1. Introduction: Basic definitions, types of learning, hypothesis space and inductive bias, evaluation, cross-validation. 2. Linear regression, Decision trees, overfitting. 3. Instance based learning, Feature reduction, Collaborative filtering based recommendation. 4. Probability and Bayes learning. 5. Logistic Regression, Support Vector Machine, Kernel function and Kernel SVM. 6. Neural network: Perceptron, multilayer network, backpropagation, introduction to deep neural network. 7. Computational learning theory, PAC learning model, Sample complexity, VC Dimension, Ensemble learning. 8. Clustering: k-means, adaptive hierarchical clustering, Gaussian mixture model.