



ARSD College, University of Delhi

Model Course Handout/Lesson Plan

Course Name: Machine Learning		B.Sc. (Hons.) Computer Science				
Semester	Course Code	Course Title	Lecture (L)	Tutorial (T)	Practical (P)	Credit (C)
VI	32347607	DSE- 4 (BHCS18A) Machine Learning	4 credit-4	0	4 credit-2	6
Teacher/Instructor(s)		Uma Ojha				
Session		2021-22				

Course Objective:

The course aims at introducing the basic concepts and techniques of machine learning so that a student can apply machine-learning techniques to a problem at hand.

Course Learning Outcomes:

On successful completion of the course, students will be able to:

1. Differentiate between supervised and unsupervised learning tasks.
2. Differentiate between linear and non-linear classifiers.
3. Describe theoretical basis of SVM.
4. Implement various machine-learning algorithms learnt in the course.

Lesson Plan

Unit No.	Learning Objective	Week No.	Topics to be covered
I	Introduction and Bayes classifier	1	Basic definitions, Hypothesis space and inductive bias, Bayes optimal classifier and Bayes error, Occam's razor.
	Feature Scaling	2	Curse of dimensionality, dimensionality reduction, feature scaling, feature selection methods.
II	Regression	3	Linear regression with one variable, linear regression with multiple variables
		4-5	Gradient descent, logistic regression, over-fitting, regularization
		6	Performance evaluation metrics, validation methods.
III	Classification	7	Decision trees, Naive Bayes, k-nearest neighbor classifier.
		8-9	Perceptron, Multilayer perceptron, neural networks, back-propagation algorithm.
		10-11	Support Vector Machine (SVM), Kernel functions.
IV	Clustering	12	Approaches for clustering, distance metrics.
		13	K-means clustering, expectation maximization
		14	Hierarchical clustering
		15	Clustering validation methods, performance evaluation metrics

Evaluation Scheme:

No.	Component	Duration	Marks
1.	Internal Assessment		25
	• Quiz		
	• Class Test		
	• Attendance		
2.	• Assignment	3 hrs.	75
	End Semester Examination		

Details of the Course		
Unit	Contents	Contact Hours
I	Introduction: Basic definitions, Hypothesis space and inductive bias, Bayes optimal classifier and Bayes error, Occam's razor, Curse of dimensionality, dimensionality reduction, feature scaling, feature selection methods.	10
II	Regression: Linear regression with one variable, linear regression with multiple variables, gradient descent, logistic regression, over-fitting, regularization. Performance evaluation metrics, validation methods.	20
III	Classification: Decision trees, Naive Bayes classifier, k-nearest neighbor classifier, perceptron, multilayer perceptron, neural networks, back-propagation algorithm, Support Vector Machine (SVM), Kernel functions.	20
IV	Clustering: Approaches for clustering, distance metrics, K-means clustering, expectation maximization, hierarchical clustering, performance evaluation metrics, validation methods.	10
	Total	60

S. No.	Name of Authors/Books/Publishers	Year of Publication /Reprint
1.	Flach, P. (2015). Machine Learning: The Art and Science of Algorithms that Make Sense of Data. Cambridge University Press.	2015
2.	Mitchell, T.M. (2017). Machine Learning. McGraw Hill Education.	2017
3.	Christopher & Bishop, M. (2016). Pattern Recognition and Machine Learning. New York: Springer-Verlag	2016
Mode of Evaluation: Internal Assessment / End Semester Exam		