

Syllabus

Course

Code: *CSC-454*
Title: *Machine Learning*

Credits

3-0-0-3

Text Books

- C. M. Bishop, Pattern recognition and machine learning, Springer, 2006.

References

- Machine Learning, by Tom Mitchell, McGraw-Hill, 1997.

Prerequisite:

- CSC-321 Design and Analysis of Algorithms

Course Description

This course is intended as an introduction to the basics of machine learning. Its main goal is to provide students with an understanding of the methodologies, technologies, mathematics and algorithms currently used in the area. By the end of the course students should be able to apply a variety of machine learning methods to a given target problem. Topics covered include: supervised learning; unsupervised learning; learning theory; reinforcement learning and adaptive control.

Objectives:

- Define and explain the fundamental concepts and terminology of machine learning and of its main areas, including concept learning, decision tree learning, artificial neural networks, support vector machines, Bayesian learning, instance-based learning and genetic algorithms.
- Analyze and discuss a range of machine learning techniques and their theoretical background.
- Examine, explain and propose ways of dealing with the issues involved in the use of machine learning methods
- Evaluate the strengths and limitations of learning procedures and select an appropriate learning algorithm for a given problem.

- Be able to apply machine learning methods to particular target problems and evaluate and report the results appropriately.

Course Outline

<i>Week</i>	<i>Lecture Topics</i>
1	Introduction to Machine Learning
2	Concept Learning
3	Decision Tree Learning
4	Linear models for regression
5	Linear models for classification
6	Artificial neural networks
7	Artificial neural networks
8	Kernel methods
9	Sparse kernel machines
10	Genetic Algorithms
11	Genetic Algorithms
12	Mixture models and the EM algorithm
13	Evaluation
14	Evaluation
15	Combining multiple learners
16	Final exam

Grading

Assessment/Evaluation:

1. Class work.	(10%)
2. Quizzes (5)	(10%)
3. Midterm-1 Exam.	(20%)
4. Midterm-2 Exam.	(20%)
5. Final Exam.	(40%)
Total	(100%)