Course syllabus

Department of Civil Engineering, Indian Institute of Technology Madras

CE6051-Machine learning

Credit Distribution: C:9 L:3 T:0 P:0 E:0 O:6 TH:9

Course Type: Theory

Description: Introduce machine learning techniques and develop skills to apply them to solve civil engineering problems.

Course Content: Introduction to machine learning, application to civil engineering, Formalizing the learning task, Basic mathematics for machine learning, Classification of learning algorithms and tasks. Rote Learning: Rule based systems and Case Based Reasoning (CBR) Selected statistical learning techniques, Clustering, PCA and Kernel PCA, Inductive learning, Search, exploration, and discovery, Artificial Neural Networks, Support Vector Machines Application examples, Case studies in structural engineering, Case studies in construction engineering, Case studies in construction management.

***Note: Lab sessions will be conducted in computer labs using software tools developed in MATLAB, or other languages.**

Text Books: Raphael, B. and I.F.C. Smith, 2013, Engineering Informatics: Fundamentals of computer aided engineering, second edition, John Wiley.

Reference Books:

1.Christopher M. Bishop, 2006, Pattern recognition and machine learning, Springer.

2.Bernhard Scholkopf, and J Smola Alexander, 2002, Learning with kernels: support vector machines, regularization, optimization, and beyond, MIT press.

3.Tom Michael Mitchell, 1998, Machine Learning, McGraw-Hill Education.

4.John Shawe-Taylor & Nello Cristianini, 2000. Support Vector Machines and other kernel-based learning methods, Cambridge University Press.

Prerequisites: Nil