Course Announcement for Fall 1999

CSCE 496/896: Special Topics—Machine Learning

Instructor: Stephen Scott, Ferguson 305, 472-6994
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Meeting Time: Monday/Wednesday/Friday 11:30–12:20, Ferguson 112

Credits: 3 units

Prerequisites: The only prerequisite is CSCE 310. STAT 380 is useful, but not required (we will review all necessary material from probability & statistics).

Textbook: *Machine Learning* by Tom M. Mitchell, McGraw-Hill, 1997

Course Description: Building machines that learn from experience is an important research goal of artificial intelligence (AI). The field of *machine learning* is a subarea of AI that is concerned with the question of how to construct computer programs that automatically improve with experience. In recent years many successful machine learning applications have been developed, ranging from data-mining programs that learn to detect fraudulent credit card transactions, to information-filtering systems that learn users' reading preferences, to autonomous vehicles that learn to drive on public highways. At the same time, there have been important advances in the theory and algorithms that form the foundations of this field.

The goal of this course is to present the key algorithms and theory that form the core of machine learning. Machine learning draws on concepts and results from many fields, including statistics, artificial intelligence, philosophy, information theory, biology, cognitive science, computational complexity, algorithm design and analysis, and control theory. In this course we will review the field of machine learning in these contexts and work to understand the problem settings, algorithms, and assumptions that underlie each.

The topics the course will cover include decision trees, neural networks, hypothesis testing, Bayesian learning, computational learning theory, instance-based learning, genetic algorithms, reinforcement learning, and learning sets of rules. This course differs from the courses on neural networks, genetic algorithms, and artificial intelligence currently offered in that it gives a broad overview of machine learning rather than going deep into a single topic. At the end of the course, the students will sufficiently understand the fundamentals of these areas of machine learning to begin basic research in the area and to understand the ideas of technical papers in machine learning.

Grades in this course will be based on homework exercises, exams, and a project.