CS 483/683 Artificial Intelligence Programming

or

Game AI

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Description

483, 683 ARTIFICIAL INTELLIGENCE PROGRAMMING (3+0) 3 credits

Programming in an artificial intelligence language. Examples from intelligent agents, connectionist models, and expert systems **Prerequisite: CS482/CS682**, or consent of instructor.

This course introduces several Machine Learning (ML) techniques and applies these and other AI techniques to developing a game AI for a 3D computer strategy game. In addition to the material taught in the course (and textbook) you will be expected to read papers that I provide, as well as go out and find relevant resources (papers, code, systems) in order to complete the final project. In computer science and engineering, especially in AI, you must develop the ability to learn on your own. You will be using systems and code developed by others to complete your assignments and project. This should engender a critical appreciation of good design and recognition of both good and bad design. There is a strong lab component for this course and we will hold many classes

Figure 1: Lagoon: Our 3D Strategy game development system

in the game AI lab. The next few sections provide administrative details, course objectives and expected outcomes, a list of topics, and grading information.

Office Hours

- **Sushil:**

    - MW 2:30 - 3:30 p.m.
    - And by appointment (email sushil@cse.unr.edu for an appointment)

TextBook

- **Required:** Patrick H. Winston, *Artificial Intelligence,* 3rd Edition, Addison-Wesley.

- **Recommended:** Tom Mitchell, *Machine Learning,* McGraw-Hill Science/Engineering/Math

Objectives and Outcomes

Subject Objectives

A student completing cs484/683 will be able to:

1. Explain basic machine learning methods.

2. Assess the applicability, strengths, and weaknesses of basic machine learning methods in solving particular problems.

3. Develop machine learning systems by assembling solutions to concrete computational problems.

4. Appreciate the role of problem solving, learning, and perception in understanding human learning from a computational perspective.

    and many cs483/683 students will:

5. Develop an interest in the field sufficient to take more advanced subjects.

Preliminary Syllabus

1. Introduction

    (a) What is machine learning?
    (b) How is machine learning related to Data Mining?
    (c) How is machine learning related to recognizing regularities (patterns)

2. Approaches

    (a) Learning by managing multiple models (version spaces)
    (b) Learning by building identification trees (Decision trees)
    (c) Learning by training Neural Networks
    (d) Learning by evolving rules and rule sets (classifier systems)
    (e) Learning by demonstration (from robotics)

And, if there is time

    (f) Reinforcement learning

3. Applications to Lagoon our strategy game development environment

    (a) Learn to control two types of boats in Lagoon

    (b) Learn to coordinate control between two boats in Lagoon

    (c) Develop a game on the Lagoon platform and implement a game AI that learns to play competently (Final project).

Grading, Homework, and Exams

Students will be assigned letter grades using the +/- system. Your grade will be one of A, A-, B+, B, B-, C+, C, C-, D, or F.

There will be a number of programming assignments. No late assignments will be accepted. To work with Lagoon you will need to know C/C++ and Python. Other assignments may depend on tools written in Java. Otherwise, use whatever programming language you like. There will be one mid-term exam and a final project. You will need to form a group for the final project. The midterm will be held about 1/3 of the way through the course. The grades will be divided as shown in the table below. Assignments will be posted on the class web pages.

Midterm exam (20% each)	20%
Assignments	40%
Group Project	40%

Communications

If I need to communicate with the class as group I'll post a message on our web page. You are required to check the class web page and your email every day. I will use your computer science and engineering email address.

In addition to the textbook, there are number of resources available. Our class notes will be available on the WWW from

`http://www.cse.unr.edu/~sushil/`

(follow the Game AI Link). I will also point out various other places that contain material of interest to us.

Cheating

Cheating is not permitted and will result immediately in a grade of "F." and commencement of administrative proceedings. Please read the section on **Academic Standards** at
    `http://www.unr.edu/stsv/acdispol.html`.
That page defines cheating and specifies the consequences.