Advanced AI Topics (CSE 300), Spring 2004
Implementing AI Systems

Lecture: ITE 127, TTh 11:00-12:15

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Text: One of the following texts:

Artificial Intelligence: Theory and Practice
Thomas Dean, James Allen, and Yiannis Aloimonos
Benjamin/Cummings

or

Artificial Intelligence: A Modern Approach
Stuart Russell and Peter Norvig
Prentice Hall
(either edition)

Introduction

Artificial Intelligence is the design and study of computer programs that behave intelligently. (opening line of Dean et al., above)

This course will concentrate on the implementation of such programs. Artificial Intelligence programming received a good deal of attention in the 1980s; a number of books were written in which AI systems were written in various dialects of LISP. While LISP is still a viable choice, it is not the only choice—programming technology has changed in the last decade, and a good deal of AI programming is done using other languages.

The goal of this course is that each participant gain experience designing, implementing, and testing programs in three core areas of AI: logic, planning, and natural language understanding. By dealing with the specific, detailed issues of implementation, we will deal with the essence of what distinguishes AI programs from routine applications.

It is assumed that the students have some familiarity with AI areas. This course, rather, will concentrate on a small number of central problems. These problems will be examined from multiple perspectives: computational complexity, algorithmic efficiency, and modern software design principles.

What is expected of the participants? Good programming, analysis, and design skills, and the willingness to use them. Participation in class discussions. Persistence in designing, testing, and demonstrating programs that solve computationally difficult problems. Flexibility as well; this is a new course, subject to change in unpredictable directions.

Course Format

The lectures will present the underlying theory and algorithms in the topic areas. Interspersed in these discussions will be class discussions of design issues relating to the development and testing of systems that solve problems in these areas.
There will be a number of programming assignments. The languages and environments used will not be provided (nor, in general, dictated) by the instructor. There is one central rule, however: any implementations will be original work, not based on any other implementations that might be found. Other than the first assignment, there will be opportunity for collaboration within the class, as the scale of the assignments may be rather substantial.

In addition to the problems in the assigned topic area, there will be a project chosen from some other AI applications area. This project will be a substantial part of the course.

The text

There are two possible texts: Dean, Allen, & Aloimonos, which I recommend, and Russell & Norvig, which also provides good coverage of our topics. Both of these are also good general AI surveys. Both of these are available (either new or used) through a number of internet locations and bookstores. For either of these, we will be using a relatively small part of the book.

Grading and originality

Grades will be based on your assignments and project. These will include documentation, and (depending on the assignment) will also include things like a demo, complexity analysis, a description of how the program was tested, a discussion of any limitations, and so forth.

Anyone who submits work that makes use of other implementations (including books, articles, and code on internet sites) will receive a failing grade for the course: if you have any questions about whether something is legitimate, talk to the instructor before you use it in an assignment. It is generally legitimate to use other peoples’ algorithms as long as the source is cited.

Getting help

Robert’s office is ITE 255. For a quick question, drop by any time (although I may not be there, and I may be too busy at any particular time), for more extensive discussion schedule an appointment. Sending e-mail is the most reliable way to contact me, and allows me to give you a quick answer if possible.

Topic areas and assignments:

- Logic (Unification/Matcher; A Deductive Retriever)
- Planning (A Partial Order Planner)
- Language understanding (A parser for English)
- (alternative) Evolutionary Computation (A Genetic-Algorithm Optimizer)
- Project (You pick!)