Combining Introductory Computer Science and Artificial Intelligence

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Abstract

Introductory Artificial Intelligence is a particularly challenging course to teach. It is difficult to present a picture of AI that is both broad and detailed. It is difficult to represent the varying viewpoints within the AI community. Additional challenges arise when an AI course is intended to be a student's introduction to Computer Science. I am in the process of designing such a course.

Background and Issues

I am in the process of creating an Introductory AI course. This course will be unusual—and thus challenging—in that it is to be both an Introductory Computer Science course and an AI course. It is *not* an *advanced* Introduction to AI that assumes the student has a fair amount of background in Computer Science.

The following are my goals for the course:

- Teach about AI.
- Teach programming principles; give the students interesting and challenging programming assignments.[1]
- Make the course sufficiently exciting that the students would be interested in continuing in Computer Science.
- Give the course the illusion of being not particularly technical so that students who generally shy away from technical courses will not be scared away before they even begin.

The fundamental issue driving this course is that enrollments in Computer Science have been declining. Our desire is to create a course that will be intriguing to students from all disciplines, that will encourage them to continue in Computer Science, and that will also adequately prepare them to take additional courses successfully. The intention is *not* to create an interesting but easy course that would give the students a false sense of the rigors of Computer Science.

[1] This course is not intended to be an "AI for poets" type of course.

The faculty at Williams College have already developed a graphics course that satisfies these goals. We are now interested in trying this with AI.

Questions and Options for Course Design

The creation of the course described above is obviously challenging. We must deal with the content and curricular issues that arise in creating any Introductory AI course. In addition, however, I have been grappling with the following issues and questions.

Programming options

This course must expose the students to programming and to good programming principles. Many of the students will not have had any previous programming experience.

One possibility is to teach a programming language in parallel with general AI concepts. Some obvious language choices are Lisp and Scheme. Will this approach require too much time, however? Will the students be able to learn enough during the course to actually write programs that stretch their AI knowldge? Is it advantageous to start the students in Logo which would allow them to write interesting programs quickly? or is this too far removed from the usual Computer Science curriculum?

Another possibility is to get the students up to speed by having them read and modify existing programs. Will this confuse the students more than help them? Is there an existing program library that is sufficiently well-written as to exhibit the programming principles one would like the students to learn?

Selecting AI topics that are both fundamental and fun

This course must teach the students fundamental areas of AI such as knowledge representation and search, for example. However, it must be intriguing and fun. Games are one area that combine these criteria. Is this a reasonable focus topic? How far can it be stretched? Can it be the basis of half a course, for instance? Just a short topic?

Are existing programs like ELIZA (Weizenbaum 1966) detrimental in an introductory course such as this one? On one hand it has the appearance of doing interesting things and can be modified and played with early in a course. On the other hand, it is not indicative of "what AI really is" today.

Selecting readings

Are there any good novels/light reading that one can assign? In the early days of the course I will be spending a fair amount of time getting the students familiar with the computing facilities in the lab. Is there some reading they can be doing that is not too intensive, yet not a waste of their time. Ideally I would like to find something that would be intriguing, and would also identify real AI issues.

What type of text book is appropriate for such a course? Many rigorous AI texts are geared toward advanced undergraduate and/or early graduate level students. Can these textbooks be used for smart students in an introductory Computer Science course?

Summary

Introductory Artificial Intelligence is a difficult course to teach for the many reasons indicated in the description of this symposium. This becomes even more challenging when the course is to be an Introductory Computer Science course as well, rather than one where the students have fair Computer Science background. Our challenge is to create a course that is rigorous, and we must therefore be concerned with the issues raised by the symposium description. Yet we must address additional challenges since we cannot assume any Comptuer Science background and must teach fundamental Computer Science principles as well as AI.

References

Weizenbaum, J. 1966. ELIZA—A computer program for the study of natural language communication between man and machine. *CACM* 9:36-45.