

Machine Learning Laboratory Experiences for Introducing Undergraduates to Artificial Intelligence

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It is generally recognized that an introductory Artificial Intelligence (AI) course is challenging to teach. This is, in part, due to the diverse and seemingly disconnected core AI topics that are typically covered. Recently, work has been done to address the diversity of topics covered in the course and to create a theme-based approach. Our work incorporates machine learning as a unifying theme to teach fundamental concepts typically covered in the introductory Artificial Intelligence courses. Machine learning is inherently connected with the AI core topics and provides methodology and technology to enhance real-world applications within many of these topics. Machine learning also provides a bridge between AI technology and modern software engineering. Machine learning is now considered as a technology for both software development (especially suitable for difficult-to-program applications or for customizing software) and building intelligent software (i.e., a tool for AI programming).

The difficulties mentioned above associated with the introductory AI course, combined with the increasingly important role of machine learning in computer science in general and software development in particular, are the motivating factors for this NSF funded project. Our project adapts exemplary work in machine learning with the specific objectives listed below:

- Enhance the student learning experience in the AI course by implementing a unifying theme of machine learning to tie together the diverse topics in the AI course.
- Increase student interest and motivation to learn AI by providing a framework for the presentation of the major AI topics that emphasizes the strong connection between AI and computer science.
- Highlight the bridge that machine learning provides between AI technology and modern software engineering.
- Introduce students to an increasingly important research area, thus motivating them to pursue more advanced courses in machine learning and to pursue undergraduate research projects in this area.

These objectives are accomplished through the development of an adaptable framework for the presentation of core AI topics. Our work involves the development, implementation, and testing of a suite of adaptable, hands-on laboratory projects that can be closely integrated into the AI course. Through the design and implementation of learning systems that enhance commonly-deployed applications, our model acknowledges that intelligent systems are best taught through their application to challenging problems.

This is a collaborative project among three faculty members of computer science departments spanning a large public university, a mid-size comprehensive private university, and a small liberal arts college. The target audience is juniors and seniors in Computer Science, Computer Engineering, and Computer Information Systems enrolled in an introductory Artificial Intelligence course. A broader impact of this project is achieved through the collaborative development and separate testing of these labs at the three participating institutions, and through effective dissemination of this material to 21 other participating faculty members from academic institutions around the country who have committed to disseminating and testing these projects in their introductory AI courses. The effectiveness of this project is being evaluated with the assistance of internal and external evaluators through a multi-tier evaluation system involving faculty, students, and an advisory board.

Project details can be found at <http://uhaweb.hartford.edu/compsci/ccli>