Computer Sciences, CS, CUNY

CSc 74011 Artificial Intelligence (3 hours; 3 credits)

Syllabus - Full 2019

Instructor: Sos Agaian, Ph.D. (Math) and Ph.D. (Engineering Sciences), Distinguished Professor

Office Hours: Monday -3:00pm–4:30pm or by appointment. If you do need to reach me, the best way is to come to my office hours. The next best way is by e-mail. On the other hand, please be aware that I receive a large volume of student e-mails, so I will not be able to respond right away)

Lecture: Monday 4:30pm–6:30pm

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Rationale

Artificial intelligence (AI) is a research field that studies how to realize intelligent human behaviors on a computer. The fundamental goal of AI is to make a computer that can learn, plan, and solve problems independently. This course aims to give an overview of some basic AI algorithms and an understanding of the possibilities and limitations of AI.

Course description

This is an introductory, graduate-level course on artificial intelligence. It emphasizes fast and smart search heuristics, thoughtful ways to represent knowledge, and incisive techniques that support rational decision-making. Application areas will include computer vision, natural language processing, and robotics. Other topics will be covered as time permits.

Prerequisites

Students are expected to have a solid background in the analysis of algorithms, proofs in propositional and first-order logic, discrete mathematics, and elementary probability.

Learning Objectives and Outcomes

The primary purpose of this course is to provide the most fundamental knowledge to the students so that they can understand what the AI is and how to use it in practice.

Students who complete this course will be able to:

- Discuss the agent paradigm as the goal of an intelligent machine.
- Formulate search problems and implement search algorithms using admissible heuristics.
- Describe state-space search as a mechanism for problem-solving, including optimal solutions and their complexity.
- Explain the role of caching, reactivity, heuristics, and planning in state-space search.
- Define machine learning and describe the specifics of several prominent machine-learning methods (e.g., k-Nearest Neighbor SVMs, decision trees, Bayes nets, and artificial neural networks)
- Describe and illustrate the role of constraint satisfaction in AI, with appropriate examples.
- Evaluate the complexity of an approach to a specific problem and its real impact.

- Apply selected basic AI techniques; judge applicability of more advanced techniques.
- Design, implement and evaluate a computer-based system, process, component, or program to meet desired needs
- Describe and illustrate the role of constraint satisfaction in AI, with appropriate examples (Natural Language Processing, and Robotics/Vision)
- Get hands-on experience by solving real-world AI problems.

Course reading: Stuart Russell and Peter Norvig, Artificial Intelligence: A Modern Approach, Third Edition 2010. Pearson Education, Inc. ISBN: 978-0-13-604259-4 (http://aima.cs.berkeley.edu/).

Students will also be required to read a wide variety of assigned papers and summarize and react to their content.

Assessment

Grades will be based on:

- Class participation 10%
- Assignments 60%
- Term project (presentation and report) 30%

Students must complete several projects. Projects will include hands-on application of basic AI techniques as well as the selection of appropriate technologies for a given problem. In a final/capstone project, groups of students will participate in the creation of an AI-based application to solve real-world issues including, search, computer vision, machine learning, logic, and constraint satisfaction problems. The project grade will be based on three aspects: capstone project concepts and results; presentation quality, and report quality. A capstone project will allow you to implement the skills you learned in the masters of AI.