CS 4100/5100 - Foundations of Artificial Intelligence

Fall 2012

Course Information

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Lecture: Thursdays 6 – 9pm, West Village H Room 110

Course website: http://www.ccs.neu.edu/course/cs5100f12
Piazza: https://piazza.com/northeastern/fall2012/cs41005100/home

Course Description

Introduces the fundamental problems, theories, and algorithms of the artificial intelligence field. Topics include heuristic search and game trees, knowledge representation using predicate calculus, automated deduction and its applications, problem solving and planning, and introduction to machine learning. Required course work includes the creation of working programs that solve problems, reason logically, and/or improve their own performance. A group final project will allow students to apply the techniques learned in class to an area that is personally interesting to them.

Reading

The **required** textbook for this course is: Artificial Intelligence: A Modern Approach, 3rd Edition, by Stuart Russell and Peter Norvig. **It is very important that you get the 3rd Edition.** The 3rd edition is significantly different from prior editions and **much** better.

Lectures may also have accompanying readings in addition to the textbook reading. You should prepare a **single page written response** to these readings and turn it in by noon on the day of class. This will help you come to class prepared to discuss the reading.

Course Participation and Attendance

Please notify the instructor as soon as possible if you know you will be missing a class. Participation in discussions is an important aspect on the class, and contributes towards 10% of your grade. Participation on the Piazza discussion forums (asking and answering questions about assignments, discussing readings, midterm review) and the written responses to readings also count towards this grade.

Collaboration Policy

We learn best through collaboration with others. I **strongly encourage** collaboration on assignments, understanding the readings, and studying for the midterm. However, **all work that you turn in to me with your name on it must be your own.** Feel free to discuss general strategies, but any written work or code should be your own, in your own words/style. If you have collaborated on ideas leading up to the final solution, give each other credit on what you turn in, **clearly** labeling who contributed what ideas. Individuals should be able to explain the function of **every** aspect of group-produced work. **Do not abuse this policy or you will make your instructor very sad.** If you have any doubts whatsoever about whether you are breaking the rules – ask!

Plagiarism is strictly forbidden; no excuses, no exceptions. Plagiarism and copying will result in official University disciplinary review.

Assignment Late Policy

Assignments are due as marked on the schedule **at the beginning of class**. Late assignments will receive a 10% deduction for each full day they are late.

Each student has a total of 5 "late days" that can be used as desired to avoid the late penalty. If turning in an assignment late, make sure you clearly state how many late days you are electing to use. Late days can be used for any reason you want, you don't need to explain yourself. But please note that the late days exist for helping **you** with time management—if you have a cold and need to rest instead of work, then that's a late day. If you have three assignments due on the same day and need more time, then that's a late day. If you want to go to a concert with friends, then that's also a late day. Budget your time wisely.

Any exceptions to this policy (e.g. long-term illness or family emergencies) must be approved by the instructor.

Grading

35% - Final Project
35% - Assignments
20% - Midterm
10% - Class participation

Schedule

September 6th – Course introduction, What is AI?, knowledge representation/logic & reasoning
Reading: RN chapter 1

September 13th – Guest lecture: Magy Seif El-Nasr
Additional Reading: TBA
Assignment 1 out

September 20th – knowledge representation/logic & reasoning (part 2), First order logic, prolog
Textbook: RN chapters 2, 7.1 – 7.5, 8-9 *[note that this is two weeks worth of reading]*
Additional Reading: "The Further Exploits of AARON, Painter" by Harold Cohen

September 27th – Scheduling, constraint solving, answer set programming
Textbook: RN chapter 6
Additional Reading: "Answer Set Programming for Procedural Content Generation: A Design Space Approach", by Adam M. Smith and Michael Mateas
Assignment 1 due
Assignment 2 out

October 4th – Ontology design and development
Textbook: RN chapter 12
Additional Reading: "ConceptNet – A Practical Commonsense Reasoning Tool-Kit" by H Liu and P Singh
Final project pitches due

October 11th - Planning (STRIPS, HTN)
Textbook: RN chapter 10
Additional Reading: Selections from Lucy Suchman's "Plans and Situated Actions"
Assignment 2 due
Assignment 3 out

October 18th – MIDTERM
Final project proposals due

October 25th – Search problems
Textbook: RN chapters 3 and 5
Additional Reading: "Evolving Virtual Creatures" by Karl Sims

November 1st – Probabilistic inference
Textbook: RN Chapters 13, 14.1-14.3
Assignment 3 due
Assignment 4 out

November 8th – Bayesian networks
Textbook: RN 14.4 and 14.7
Additional Reading: TBD

November 15th – Decision trees
Textbook: RN 18.1 – 18.4
Assignment 4 due
Assignment 5 out

November 22nd – *Happy Thanksgiving!*

November 29th – Final Project Presentations

December 6th – Final Project Presentations
Assignment 5 due

December 13th – Final Project Reports Due