CSCE 420-500 AI: Spring 2020

Syllabus

NEWS: *1/17/20, 02:47PM (Fri)*

- [01/14/20] Course web site goes online!

Read-Only Bulletin Board.: 1/12/20, 12:59PM (Sun)

Page last modified: 1/17/20, 02:47PM Friday.

General Information Resources Weekly Schedule Credits Lecture Notes Example Code Read-Only Board

I. General Information

Instructor:

Dr. Yoonsuck Choe
Email: choe@tamu.edu
Office: HRBB 322B
Phone: 979-845-5466
Hours: Tue/Thu 11:00pm-12:00pm (2020 Spring)

TA:

Qing Wan
Email: frankwan (at) email.tamu.edu
Office: HRBB 339
Office hours: Mon/Wed 2:30pm-3:30pm.

Grader:

Kunping Huang
Email: kun150kun (at) tamu.edu
* Grader does not hold office hours.

Prerequisite/Restrictions:

CSCE 221 (Data Structure and Algorithms); Junior or Senior Classification or approval of the instructor.

Lectures:

Tue/Thu 3:55pm-5:10pm, ZACH 350 (2020 Spring)

Goals:

To understand the problems in AI and to learn how to solve them:

1. traditional methods in AI (search, pattern matching, logical inference, theorem proving, planning, etc.).
2. modern approaches in AI (learning, probabilistic approaches, etc.).

Learning Outcomes:

1. Understand the basic techniques for creating intelligent programs. This will be measured by homeworks and exams.
2. Create a successful program illustrating the operation of these methods. This will be measured by the programming assignments.
3. Apply the right programming language or technique to the right problem and be able to

evaluate a proposed AI application for likelihood of success. This will be measured by programming assignments.

Textbook:

Stuart Russell and Peter Norvig, *Artificial Intelligence: A Modern Approach* (AIMA, hereafter), **3rd Edition**, Prentice Hall, New Jersey, 2010.
Book Homepage

Note: The 4th edition is coming soon, but it will not be out until later in this semester, so we will have to stick with the 3rd edition.

Henry Brighton and Howard Selina, *Introducing Artificial Intelligence: A Graphic Guide*, Icon Books, 2010.
Book web page

Note: Earlier print of this book under the title "Introducing Artificial Intelligence" is the same in its content. Original publishing year is 2003.

Computer Accounts and Usage:

1. Computer accounts: if you do not have a unix account, ask for one on the CS web page. We will be using the CMU Common Lisp as our main language. You may use a different language but example code will only be made available in Lisp.
2. CMU Common Lisp:
   - Carnegie Mellon U. Common Lisp homepage
   - Departmental linux machines will have these installed soon. In the meanwhile, you can download and run a local binary version from https://www.cons.org/cmucl/download.html (Linux, MacOS X, FreeBSD, ...)

Topics to be covered:

See the Weekly Schedule section for more details.

1. Introduction
2. LISP
3. Search
4. Game playing, alpha-beta pruning
5. Propositional Logic, first-order logic, theorem proving
6. Planning
7. Uncertainty, probabilistic approaches
8. Learning
9. Advanced topics (including DeepLearning)

Grading:

1. Exams: 50% (midterm: 20%, final: 30%)

   Make up exams:
   - Only cases allowed under "Excused Absences" under TAMU Student Rules, Rule 7. Attendance will be eligible for make up exams. See 7.2 Absences and 7.3 Absence Documentation and Verification. Please read this very carefully. (For example, non-acute medical service does not constitute an excused absence, and it is the student's responsibility to provide documentation substantiating the reason for absence.)
   - There will be no make up exam for those who do not show up for the exam without prior notice.
   - **Make up exams will be different from the original exams although the difficuly will be adjusted to be comparable.**

Exam rules

- All exams will be closed book. Put all books, notes (exception below), cell phones, calculators, or any information containing media in your bag.
- You may bring a 1-sheet hand-written note (US letter paper; you can use both sides). Write your full name on the top left corner of page 1. A4 or any other sized paper, two pages glued together, photocopied or printed notes, name not written or not written in the exact location specified are all in violation of this rule, and this will result in a 10-point penalty.
- (Depending on the classroom) If you're right handed, sit in a right-handed seat. If you're left handed, sit in a left-handed seat.
- Bring your student ID or Texas driver's license. You will not allowed to take the exam without an ID.
- Aggie honor code will be strictly enforced.

2. Homeworks: 20% (about 4, 5% each)
3. Programming Assignments: 30% (about 3: 10% each)

There will be no curving. The cutoff for an `A' will be 90% of total score, 80% for a `B', 70% for a `C', 60% for a `D', and below 60% for an 'F'.

Late penalty: 1 point (out of 100) per hour. Late submissions will not be accepted 4 days after the deadline and/or after the solution has been posted.

Academic Integrity Statement:

AGGIE HONOR CODE: An Aggie does not lie, cheat, or steal or tolerate those who do.

Upon accepting admission to Texas A&M University, a student immediately assumes a commitment to uphold the Honor Code, to accept responsibility for learning, and to follow the philosophy and rules of the Honor System. Students will be required to state their commitment on examinations, research papers, and other academic work. Ignorance of the rules does not exclude any member of the TAMU community from the requirements or the processes of the Honor System.

For additional information please visit: http://aggiehonor.tamu.edu/

Local Course Policy:

- All work should be done **individually** and **on your own** unless otherwise allowed by the instructor.
- Discussion is only allowed immediately before, during, or immediately after the class, or during the instructor's office hours.
- If you find solutions to homeworks or programming assignments on the web (or in a book, etc.), please check with the instructor if you can use it.

Students with Disabilities:

Texas A&M University is committed to providing equitable access to learning opportunities for all students. If you experience barriers to your education due to a disability or think you may have a disability, please contact Disability Resources in the Student Services Building or at (979) 845-1637 or visit http://disability.tamu.edu. Disabilities may include, but are not limited to attentional, learning, mental health, sensory, physical, or chronic health conditions. All students are encouraged to discuss their disability related needs with Disability Resources and their instructors as soon as possible.

II. Resources

1. **CMU Common Lisp** (This one will be used in the class.)

III. Weekly Schedule and Class Notes

- **Lecture notes (in PDF format)**: all notes will be uploaded in this directory.
- It is **your responsibility** to download, print, and bring the notes to the class. Notes will be available 24 hours before each class.
- See the **TAMU Calendar** for breaks, etc.
- When reading the chapters, you do not have to memorize everything. A separate list of terms you need to know will be handed out prior to each exam.
- All reading material below refers to the AIMA book 3rd edition.
- More detail will be available as we go along.

Week	Date	Topic	Reading	Assignments	Notices and Dues	Notes
1	1/14	Introduction	Chapter 1		First day of class	slide01.pdf
1	1/16	Introduction LISP	Chapter 26 26.1 and 26.2		1/17: Last day to add/drop	slide01.pdf slide02.pdf
2	1/21	Symbolic Differentiation				slide02.pdf
2	1/23	Uninformed Search (BFS,DFS,DLS,IDS)	Chapter 3.1-3.6			TBA 03
3	1/28	Informed Search (BestFS,Greedy,A*)	Chapter 4.1-4.3 (4.4 optional)	Homework 1 TBA: Search and Game Playing See eCampus.		TBA 03
3	1/30	IDA*,Heuristic Search, Simulated Annealing, Constraint Satisfaction, etc.	Chapter 4, Chapter 6.1	Program 1: Search and Game Playing		TBA 03
4	2/4	Game playing Min-Max, Alpha-Beta	Chapter 5			TBA 03
4	2/6	Game playing wrap up; Representation, logic, frames	Chapter 5 Chapter 7	Homework 2 TBA: Propositional Logic	Homework 1 due (2/8 Sat)	TBA 03 TBA 04
5	2/11	**TBA**				
5	2/13	Propositional Logic	Chapter 7	Homework 3 TBA: First-order Logic	Program 1 due (2/15 Sat)	TBA 04
6	2/18	Theorem proving First order logic (FOL)	Chapter 8; Chapter 9			TBA 04
6	2/20	Theorem proving for FOL	Chapter 8; Chapter 9		Homework 2 due (2/22 Sat)	TBA 04
7	2/25	**Midterm Exam**	In class		3/2: Mid-semester	

					Grades due	
7	2/27	Inference for FOL	Chapter 9	Program 2 TBA: Theorem Prover		TBA 04
8	3/3	Uncertainty	Chapter 13		Homework 3 due	TBA 05
8	3/5	Uncertainty: Decision theory, Bayes rule	Chapter 13, Chapter 14			TBA 05
9	3/10	**Spring Break**: 3/9-3/13				
9	3/12	**Spring Break**: 3/9-3/13				
10	3/17	Uncertainty: Belief network	Chapter 13, Chapter 14			TBA 05
10	3/19	Planning, Machine Learning Intro	Chapter 7.2, 7.7, 10.4.2, 11		Program 2 due (3/18 Wed)	TBA -planning TBA ml3
11	3/24	Learning: Inductive learning, Decision trees, Perceptrons	Chapter 14, Chapter 18			TBA 07
11	3/26	Learning: Perceptrons, Multilayer networks	Chapter 18, Chapter 20	Combined Homework 4 / Program 3 TBA: Uncertainty, Probabilistic Reasoning, Learning		TBA 07
12	3/31	Learning: Backpropagation	Chapter 18, Chapter 20			TBA 07
12	4/2	Learning: Unsupervised learning, Self-organizing maps	Chapter 18, Chapter 20			TBA 07
13	4/7	Learning: Recurrent networks, Genetic algorithms	Chapter 18, Chapter 20			TBA 07
13	4/9	Advanced topic: Neuroevolution				TBA 06
14	4/14	Advanced topic: Deep learning			Last day to Q-drop (4/14)	TBA -dl
14	4/16	Advanced topic: Deep learning			Combined Homework 4 / Program	TBA -dl

			3 due
15	4/21	Advanced topic: AI in the industry	
15	4/23	[Last day of class: 4/23] Advanced topic: Topic TBA	PICA evaluation ends 4/29
16	**5/4(Monday)**	**Final exam: May 4 (Monday): 1-3pm, in ZACH 350**	Degree candidate grades due 5/6

IV. Credits

Many ideas and example codes were borrowed from Gordon Novak's AI Course and Risto Miikkulainen's AI Course at the University of Texas at Austin (Course number CS381K).
