Computer Science 687: Advanced Artificial Intelligence

George Mason University

Spring 2021

Instructor: Sanmay Das
email: sanmay at gmu dot edu
Class times: Fridays from 10:30-1:10, online synchronous (via Zoom)
Office: ENGR 3619
Office hours: TBA and by appointment.
Textbooks: Russell and Norvig *AI: A Modern Approoach* (3rd or 4th edition), supplemented by additional readings that will be provided. Communication and Class Link: Piazza: `http://piazza.com/gmu/spring2021/cs687`
Teaching Assistant: Anzal Zia Khan
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1 Course Description

1.1 Overview

This course will cover several advanced topics in Artificial Intelligence beyond those covered in CS 580. These topics will extend existing knowledge about search, machine learning, reasoning and situated action.Topics will include planning, probabilistic reasoning, reinforcement learning, neural networks, natural language processing, bayesian networks, robotics, vision and intelligent multiagent systems. AI is a breadth-oriented field, and the goal of this course is to provide the student with sufficient breadth beyond CS580 to act as a well-versed AI researcher.

1.2 Prerequisites

CS 580, CS480 Artificial Intelligence. Students taking the class should be comfortable with linear algebra, calculus and probability, in addition to programming.

1.3 Format

Class sessions will be synchronous, online lectures, but they will also involve in-class activities and quizzes. In addition to the textbook, other material may also be discussed, in which case pointers to appropriate reading will be provided. Grading will be based on homework assignments, the quizzes, and a project.

In this class, you are allowed to collaborate on assignments to the following extent. You are welcome to discuss problems with each other and to take your own notes during these discussions. However, you must write up solutions on your own. You must write, on the assignment,

the names of students you discussed each problem with, and any external sources you used in a significant manner in solving the problem. Lack of citation of a source is a serious violation of this policy. You may not give or receive help from other students in the class on quizzes.

If you have any questions about the level of collaboration permitted, or any other aspect of this policy, please speak with the instructor or TA about it before handing in the assignment! Any deviation from this policy will be considered a violation of the GMU Honor Code.

1.4 Preliminary Topics

This preliminary list of topics may change based on time constraints, the prior knowledge of the class, or other factors. The list is not necessarily in the order in which topics will be covered.

- Knowledge representation and reasoning
- Planning
- Supervised learning: Foundations, neural networks, and deep learning
- Advanced topics in probabilistic reasoning
- Temporal models
- Markov decision processes and reinforcement learning
- Topics in multiagent systems: Game theory, mechanism design, assignment and matching

2 Policies

2.1 Assessment and Course Grade

Your overall course score will be determined (on a curve) using the following weights. There is no absolute correspondence of scores to grades.

1. Homework assignments: 50%
2. Quizzes: 15%
3. Final project (video) presentation: 10%
4. Final project writeup: 25%

Homeworks will be submitted on Gradescope. Every student will have a budget of five late days they can use. These are intended to cover circumstances like specially busy weeks, minor illnesses, etc. Additional extensions will not be given.

2.2 Make-Up Quizzes

We will not provide make-up quizzes. In general quizzes will be announced a week in advance.

2.3 Academic Integrity and GMU Honor Code

As stated above, collaboration in thinking through problems can be highly beneficial, and is allowed in this class. However, you may not share or look at any written material (code, answers to problems) that will be part of your or another student's submission. Please make sure you are cognizant of the GMU Honor Code: `http://oai.gmu.edu/the-mason-honor-code-2/`.

2.4 Accommodations and resources for disabilities

If you have a documented learning disability or other condition that may affect academic performance you should: 1) make sure this documentation is on file with the Office of Disability Services (SUB I, Rm. 222; 993-2474; `http://www.gmu.edu/student/drc` to determine the accommodations you need; and 2) talk with me to discuss your accommodation needs.