Lecture 1 - CS486 Introduction

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Readings: Poole & Mackworth 1.1
People, books, web

- **People:**
  - Jesse Hoey (Instructor)
  - TAs:
    - Shushant Agarwal
    - Ehsan Ganjidoost
    - Joshua Jung
    - Charupriya Sharma
    - Kyle Tilbury
    - Ethan Ward
    - Allen Wang

- **Lectures:**
  - Section 001: T/Th 4:00pm-5:20pm in MC-2038
  - Section 002: T/Th 11:30am-12:50am in RCH-307

- **Office hours:** Mondays 1pm-2pm in DC2584 (CHIL)
- **Office hours (TA):** near assignment due dates
Assignments, etc

- **CS486 (undergrad students)**
  - 4 Assignments (40%: 10% each)
  - 1 midterm exam (15%) (Feb 7th, 630pm in M3-1006)
  - 1 final exam (45%) (must pass to pass course)
  - optional project (5% bonus, proposal at midterm)

- **CS686 (grad students)**
  - 4 Assignments (25%: 6.25% each)
  - 1 midterm exam (10%) (Feb 7th, 630pm in M3-1006)
  - 1 final exam (35%)
  - 1 project report (30%, proposal due at midterm)

- **Students wishing to write a project (and all CS686 students)**
  - **must** submit a project proposal.
Projects

- Optional for CS486 students (5% bonus)
- Mandatory for CS686 students (30% of grade)
- you must submit a correctly constructed and formatted proposal by the midterm - will be pass/fail with no mark
- Final project due before the final exam
- Individual project (CS686)
- Group project (up to 3 members, CS486):
  - must be substantially more involved than individual projects,
  - each team members contributions must be clearly and specifically described
  - there must be more papers referenced and discussed for team projects (3 more per team member)
Textbooks, websites

- Textbook: David Poole and Alan Mackworth
  *Artificial Intelligence: Foundations of Computational Agents.*
  available online at artint.info

- Secondary textbooks:
  - Russell and Norvig
    *Artificial Intelligence* aimacs.berkeley.edu/
  - Ian Goodfellow and Yoshua Bengio and Aaron Courville
    *Deep Learning* - deeplearningbook.org/

- Website:
  https://cs.uwaterloo.ca/~jhoey/teaching/cs486/index.html

- Discussion forum and email: Piazza
  piazza.com/uwaterloo.ca/winter2020/cs486686/home

- assignments handed in and returned, grades, on LEARN
Current Research In A.I.

Organizations:
- Waterloo AI institute waterloo.ai
- Assoc. for the Advancement of A.I. (AAAI) aaai.org
- European Association for A.I. (EurAI) eurai.org
- Canadian A.I. Association caiac.ca
- Intl. Machine Learning Society machinelearning.org
- Association for Affective Computing (AAAC) emotion-research.net

Journals
- Artificial Intelligence journals.elsevier.com/artificial-intelligence/
- Journal of AI Research jair.org
- Journal of Machine Learning Research jmlr.org
- arXiv AI https://arxiv.org/list/cs.AI/recent

Conferences
- International Joint Conferences on A.I. ijcai-18.org
- AAAI 2018 aaai.org/Conferences/AAAI-18
- Neural Information Processing Systems neurips.cc
- International Conf. on Machine Learning icml.cc
Overview of the Course

Lectures:

- Introduction
- Agents and AI
- Representation and Reasoning
  - States and Searching
  - Features and Constraints (CSPs)
  - Logical inference
  - Uncertainty (Bayesian probability)
- Learning
  - Supervised learning (Regression)
  - Neural Networks and Deep Learning (Stochastic gradient descent)
  - Bayesian learning (learning Bayes Nets)
  - Unsupervised learning (Expectation-Maximization)
- Planning
  - deterministic (under certainty)
  - with uncertainty (Markov decision processes)
  - reinforcement learning
- Topics (time permitting)
Integrity, Intellectual Property

- See official course outline at https://cs.uwaterloo.ca/~jhoey/teaching/cs486/W20CS486Outline.html

- Property of UW:
  - Lecture content, spoken and written (and any audio/video recording thereof);
  - Lecture handouts, presentations, and other materials prepared for the course (e.g., PowerPoint slides);
  - Questions or solution sets from various types of assessments (e.g., assignments, quizzes, tests, final exams); and
  - Work protected by copyright (e.g., any work authored by the instructor or TA or used by the instructor or TA with permission of the copyright owner).

- Sharing intellectual property without the intellectual property owner’s permission is a violation of intellectual property rights.
What is Artificial Intelligence (AI)?
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The synthesis and analysis of computational agents that act intelligently.

An agent acts *intelligently* when

- what it does is appropriate for its circumstances and its goals, taking into account the short-term and long-term consequences of its actions
- it is flexible to changing environments and changing goals
- it learns from experience
- it makes appropriate choices given its perceptual and computational limitations
Next:

- What is AI? (Poole & Mackworth chapter 1.2-1.10, 2.1-2.3)
- Search (Poole & Mackworth chapter 3)