Lecture 1 - CS486 Introduction

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Readings: Poole & Mackworth 1.1

People, books, web

People:
▶ Jesse Hoey (Instructor)
▶ (TA)

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: TBA
Office hours (TA): near assignment due dates

Assignments, etc

- CS486 (undergrad students)
  ▶ 4 Assignments (40%: 10% each)
  ▶ 1 midterm exam (15%) (Feb 8th, 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 8th, 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.

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 aima.cs.berkeley.edu/
  ▶ Ian Goodfellow and Yoshua Bengio and Aaron Courville
  Deep Learning - deeplearningbook.org/
- Website: www.student.cs.uwaterloo.ca/~cs486
- 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) aaaa.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 aaaa.org/Conferences/AAAI-18
  ▶ Neural Information Processing Systems nips.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
- Learning and Planning
  ▶ Supervised learning
  ▶ Unsupervised learning
  ▶ Reinforcement learning
  ▶ Machine Learning
  ▶ Neural Networks and Deep Learning
  ▶ Planning (with certainty and uncertainty)
- Topics (time permitting)
  ▶ Affective (emotional) computing
  ▶ Robotics
  ▶ Natural Language Processing
What is Artificial Intelligence (AI)?

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)