Lecture 1 - CS486 Introduction

Jesse Hoey
School of Computer Science
University of Waterloo

December 20, 2019

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 - deplearningbook.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) 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 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)?
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)