

What is Artificial Intelligence?

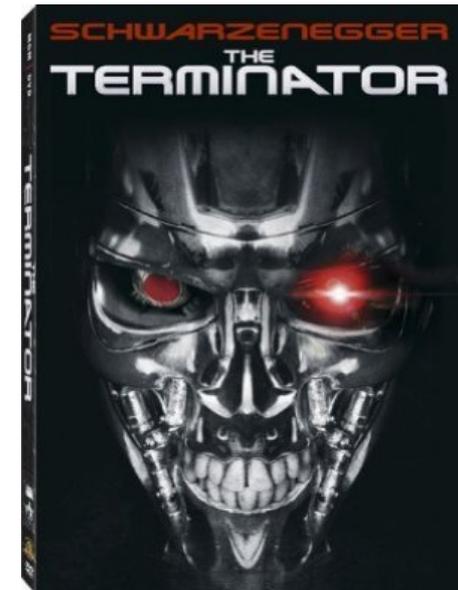
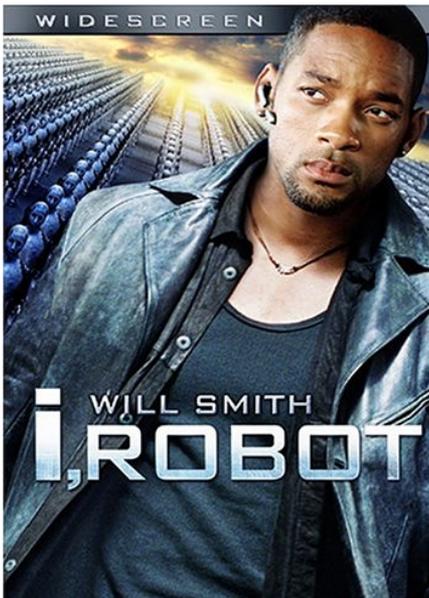
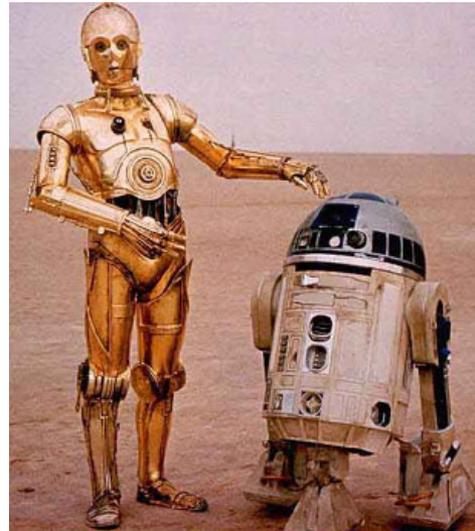
Alan Mackworth

CPSC 322 - Intro 1

January 2, 2013

Textbook §1.1 - 1.3

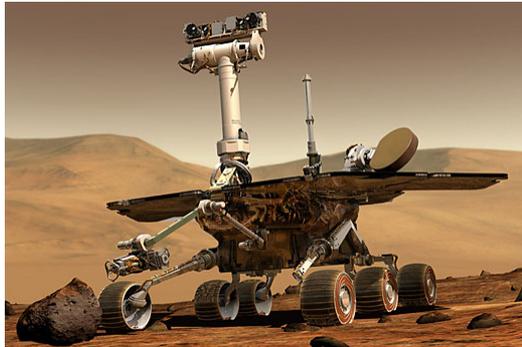
Artificial Intelligence in the Movies



Artificial Intelligence in Real Life

A young science (≈ 60 years old)

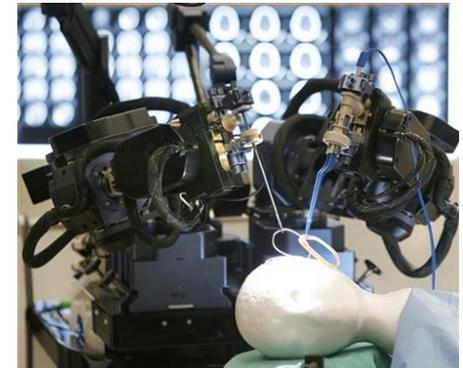
- Exciting and dynamic field, lots of uncharted territory left
- Impressive success stories
- “Intelligent” in specialized domains
- Many application areas



Face detection



Formal verification



This Course

Foundations of artificial intelligence

- Focus on **core concepts**
 - Apply to wide variety of applications
 - Will mention example applications but without the gory details
- 422 covers applications in more detail
- There are many specialized subfields
 - Machine learning
 - Computer vision
 - Natural language processing
 - Robotics
 - ...
- Each of them is a separate course (often graduate course)

Today's Lecture

Logistics

- What is AI?
- What is an Intelligent Agent?

People

- Instructor: [Alan Mackworth](mailto:mack@cs.ubc.ca) mack@cs.ubc.ca
 - Professor
 - Office: ICCS 121
- Teaching Assistants: all graduate students doing AI
 - [Pooyan Fazli](mailto:pooyanf@cs.ubc.ca) pooyanf@cs.ubc.ca
 - [Shafiq Joty](mailto:rjoty@cs.ubc.ca) rjoty@cs.ubc.ca
 - Mehran Kazemi smkazemi@cs.ubc.ca

Course Materials (1)

- Main Textbook
 - *Artificial Intelligence: Foundations of Computational Agents* (2010)
David Poole and Alan Mackworth. (P&M)
 - Available in the bookstore
 - And electronically (free as in beer!) <http://artint.info/html/ArtInt.html>
 - We will cover Chapters: 1, 3, 4, 5, 6, 8, 9
- Website: READ IT!
 - <http://www.cs.ubc.ca/~mack/CS322/>
 - <http://www.ugrad.cs.ubc.ca/~cs322>
 - Course syllabus:
 - shows text sections required for each lecture: read before lecture!
 - Lecture slides
 - I'll (try to) post a draft of each lecture before 11 pm the night before
 - That may not be the final version
(in which case I'll post the final version when I post the next lecture)

Course Materials (2)

- Alspace: online tools for learning Artificial Intelligence

<http://aispace.org/>

- Developed here at UBC - used worldwide



- Connect <http://elearning.ubc.ca/connect/>

- **Assignments** (and solutions) posted there
- **Practice exercises** (ungraded), some using Alspace. Use them.
- **Learning goals** for each course module. Use them.
- **Discussion boards** for each assignment and the course overall
- Check it often

How to Get Help?

- Connect Discussion Board
 - PLEASE post questions on course material (don't be shy)
 - Answer others' questions - if you know the answer ;-)
 - Learn from others' questions and answers
- Use email for personal questions
 - E.g. grade inquiries or health problems
- Office hours
 - Alan: Monday 4-4:30 pm, Wednesday 4-4:30pm (longer if needed)
 - TAs in Demco Learning Lab:
 - Shafiq: Mon. 1pm; Mehran: Wed. 11am; Pooyan: Fri. 12am
 - Can schedule by appointment with TAs or me if you have a class conflict with the official office hours

Evaluation

- Final exam (50%)
- One midterm exam (30%)
- Assignments (20%)
- Practice Exercises (0%)

- But, if your final grade is 20% higher than your midterm grade:
 - Midterm: 15% ↓
 - Final: 65% ↑

- **To pass:** at least 50% in both
 - your overall grade and
 - your final exam grade

Assignments

- There will be **five** assignments in total
 - Counting “Assignment 0” (already on Connect)
 - Submit electronically via handin and on paper in the box by 1 pm on the due date. Date stamp paper if late.
- You get four late days 😊
 - To allow you the flexibility to manage unexpected issues
 - **Additional late days will not be granted** except under truly exceptional circumstances
 - If you've used up all your late days, **you lose 20% per day** (see details on course website)
 - Only for assignments, not for midterm or final

Missing Assignments / Midterm / Final

- Hopefully late days will cover almost all the reasons you'll be late in submitting assignments
 - However, something more serious may occur (extended illness etc)
- For all such cases:
 - you'll need to **provide a note** from your doctor, psychiatrist, academic advisor, etc.
- If you have serious reasons to miss:
 - **an assignment**, your score will be reweighted to exclude that assignment
 - **the midterm**, those grades will be shifted to the final.
(Thus, total grade = 80% final, 20% assignments)
 - **the final**, you'll have to write a make-up final as soon as possible

Collaboration on Assignments

- You **may** work with **one** other student
 - That student must also be a CPSC 322 student this term
 - You will have to officially declare that you have collaborated with this student when submitting your assignment
- **You may not work with or copy work from anyone else**
 - May talk about solution approaches on high level with others
 - **May not** look at another student's solution, or previous sample solutions
 - **May not** give others your solutions
- Does not apply to Assignment 0

Assignment 0

- This assignment asks you to
 - describe an AI agent from fiction, and to
 - explain some high-level details about how it works
- Already available on Connect
 - To be done **alone** (this is the only assignment without possible partner)
 - Due next Friday, January 11, 1 pm
 - Submission via handin and on paper
 - For handin submit a **single PDF** or **text file**
 - List your **name** and **student id** in the text

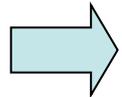
Summary

All course logistics are described on the course website:

- <http://www.cs.ubc.ca/~mack/CS322/>
- <http://www.ugrad.cs.ubc.ca/~cs322>
- Make sure to read it and that you agree with the rules before deciding to take the course
- Questions about logistics?

Overview

- Logistics

 What is AI?

- What is an Intelligent Agent?

What is Intelligence?

- Responses from the class

What is Artificial Intelligence?

- Some definitions that have been proposed
 1. Systems that think like humans
 2. Systems that act like humans
 3. Systems that think rationally
 4. Systems that act rationally

Thinking Like Humans

Model the cognitive functions and behaviours of humans

- Human beings are our best example of intelligence
- We should use that example!

- But ... how do we measure thought?
 - We would have to spend most of our effort on studying **how people's minds operate** (e.g. IQ tests cover very narrow range of ability)
 - Rather than thinking about what intelligence ought to mean in various domains

Acting Like Humans

- Turing test (1950) “Computing Machinery and Intelligence”
 - operational definition of intelligent behavior
 - Can a human interrogator tell whether (written) responses to her (written) questions come from a human or a machine?
- No system has yet passed the test
 - Yearly competition: <http://www.loebner.net/Prizef/loebner-prize.html>
 - Can play with best entry from 2008: Chatbot Elbot (www.elbot.com)
- Is acting like humans really what we want?
 - Humans often think/act in ways we don't consider intelligent

Thinking Rationally

- **Rationality**: an **abstract ideal of intelligence**, rather than “whatever humans think/do”
 - Ancient Greeks invented **sylogisms**: argument structures that always yield correct conclusions given correct premises
 - This led to **logic** and **probabilistic reasoning** which we'll discuss in this course
- Is rational **thought** enough?
 - A system that only thinks and doesn't do anything is quite useless
 - Any means of communication would already be an **action**
 - And it is hard to measure thought in the first place ...

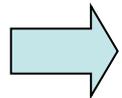
Acting Rationally

We will emphasize this view of AI

- Rationality is **more cleanly defined** than human behaviour, so
 - it's a better design objective
 - in cases where human behaviour is not rational, often we'd prefer rationality
 - Example: you wouldn't want a shopping agent to make impulsive purchases!
- It's easier to define rational action than rational thought

Overview

- Logistics
- What is AI?

 What is an Intelligent Agent?

AI as Study and Design of Intelligent Agents

- AI aims to build **intelligent agents**:
 - **Artifacts that act rationally in their environments**
 - they act appropriately given goals and circumstances
 - they are flexible to changing environments and goals
 - they learn from experience
 - they make appropriate choices given perceptual and computational limitations
- This definition **drops the constraint of cognitive plausibility**
 - “Is this system really intelligent?”
 - “Can airplanes really fly?”
 - Understanding general principles of flying (aerodynamics) vs. reproducing how birds fly

Why do we need intelligent agents?

- Groups of 3
 - Trade contact information
 - Come up with at least 3 reasons
- Responses from class:

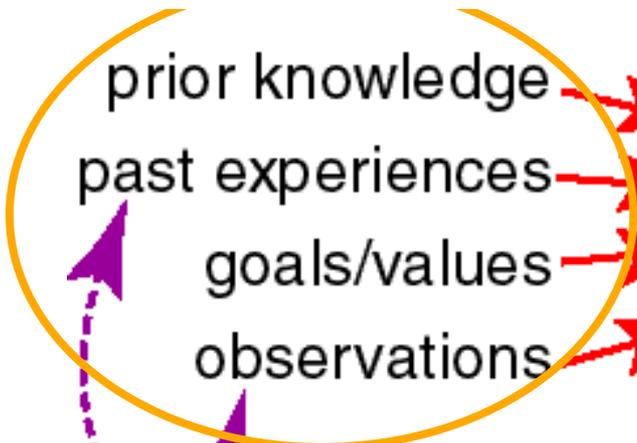
Robots vs. Other Intelligent Agents

- In AI, artificial agents that have a physical presence in the world are usually known as **robots**
 - Robotics is the field primarily concerned with the implementation of the physical aspects of a robot
 - I.e., perception of and action in the physical environment
 - Sensors and actuators
- Agents without a physical presence: **software agents**
 - E.g. diagnostic assistant, decision support system, web crawler, text-based translation system, intelligent tutoring systems, etc.
 - They also interact with an environment, but not the physical world
- Software agents and robots
 - differ in their interaction with the environment
 - share all other fundamental components of intelligent behavior

Intelligent Agents in the World

Knowledge Representation
Machine Learning

abilities



**Reasoning +
Decision Theory**

Actions

**Natural Language
Understanding**

+

**Computer Vision
Speech Recognition**

+

**Physiological Sensing
Mining of Interaction Logs**



**Natural Language
Generation**

+

Robotics

+

**Human Computer
/Robot
Interaction**

Wrap-up

- What did we discuss?
 - This course is about the **foundations** of AI
 - Defined artificial intelligence as **acting rationally**
 - Discussed **intelligent agents** situated in the world
- Course website:
 - <http://www.cs.ubc.ca/~mack/CS322/>
 - <http://www.ugrad.cs.ubc.ca/~cs322>
- For You To Do:
 - For today: read the P&M text Sections 1.1 - 1.3
 - For Friday: read the P&M text Sections 1.4 - 1.5
 - By next Friday: Do Assignment 0 - start now
 - Available on Connect
 - Submit via handin (a single PDF or text file) and on paper