

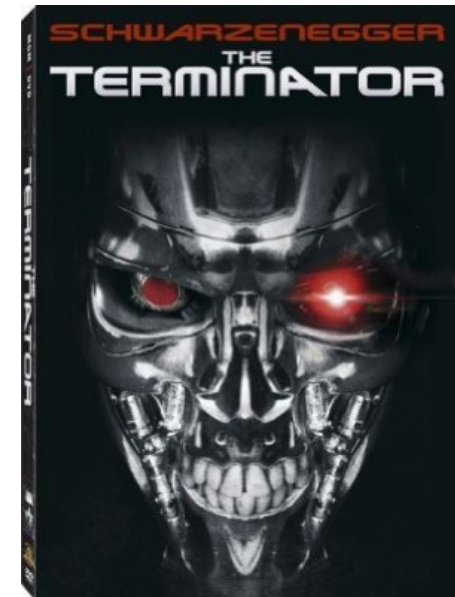
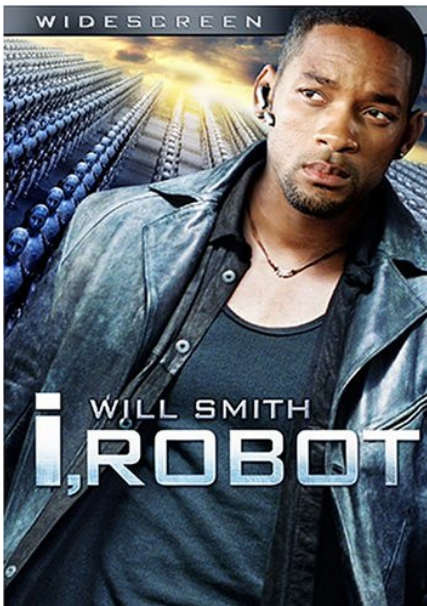
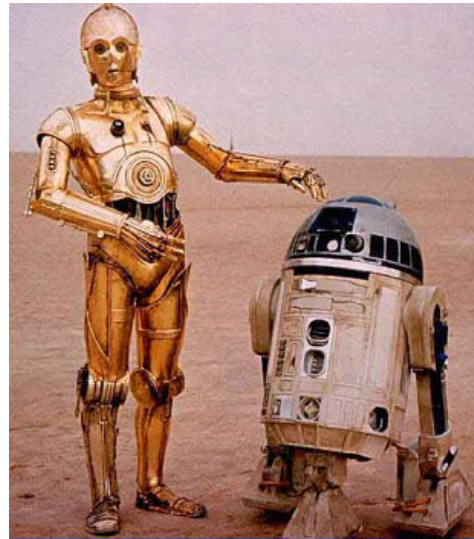
What is Artificial Intelligence?

CPSC 322 - Intro 1

January 5, 2011

Textbook §1.1 - 1.3

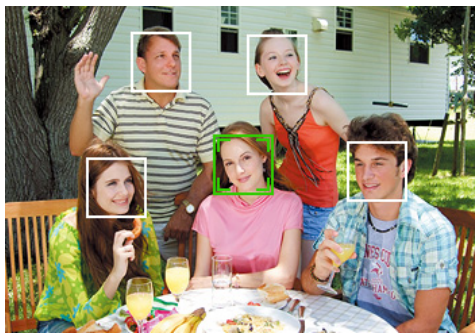
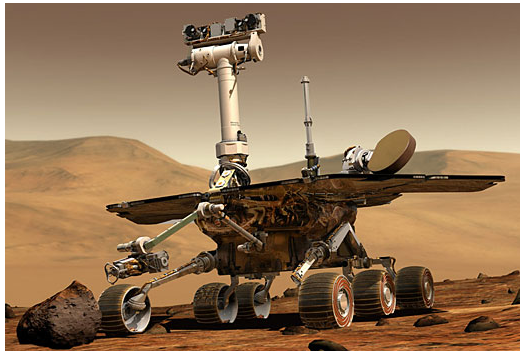
Artificial Intelligence in the Movies



Artificial Intelligence in Real Life

A young science (≈ 50 years old)

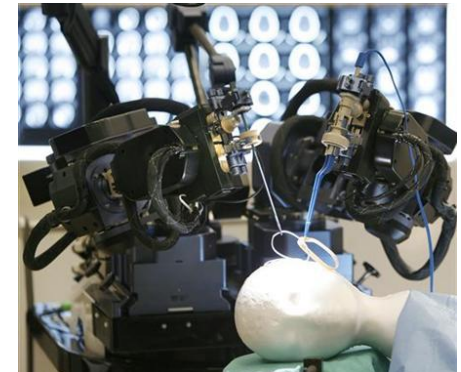
- Exciting and dynamic field, lots of uncharted territory left
- Impressive success stories
- “Intelligent” in specialized domains
- Many application areas



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: Frank Hutter (hutter@cs.ubc.ca)
 - Postdoctoral research fellow
 - Finished PhD in Artificial Intelligence in 2009
 - Office: Beta lab, ICICS X560
- Teaching Assistants: all graduate students doing AI
 - Simona Radu (sradu@cs.ubc.ca)
 - Vasanth Rajendran (vasanthr@cs.ubc.ca)
 - Mike Chiang (mchc@cs.ubc.ca)

Course Materials (1)

- Main Textbook
 - Artificial Intelligence: Foundations of Computational Agents. By Poole and Mackworth. (P&M)
 - Available electronically (free) <http://artint.info/html/ArtInt.html>
 - We will cover Chapters: 1, 3, 4, 5, 6, 8, 9
- Website: <http://www.ugrad.cs.ubc.ca/~cs322>
 - Course syllabus
 - Lecture slides
 - I'll (try to) post a draft of each lecture by the night before (2am)
 - This 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!



- WebCT
 - Assignments posted there
 - **Practice exercises** (ungraded), some using Alspace
 - Learning goals
 - **Discussion board**
 - **Check it often**

How to Get Help?

- WebCT Discussion Board
 - Post questions on course material
 - 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
 - Frank: after every class, at least half an hour
 - TAs: TBA
 - Can schedule by appointment if you have a class conflict with the official office hours

Evaluation

- Final exam (50%)
- 1 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 zero” (already on WebCT)
 - They will not necessarily be weighted equally
 - Submit electronically via Handin by 3pm on the due date
- 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 WebCT
 - To be done **alone** (this is the only assignment without partner)
 - Due in a week (Wednesday, Jan 12, 3pm)
 - Submission via 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.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
 - Able to solve problems
 - Infer new knowledge from existing knowledge
 - Able to adapt to new environments
 - Self-awareness
 - Intentionality

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**
 - Rather than thinking about what intelligence ought to mean in various domains

Acting Like Humans

- Turing test (1950)
 - **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:
 - Go where humans can't go (dangerous/impossible for humans)
 - Do unpleasant work (tedious/boring)
 - Higher efficiency
 - Complex problems that have to be solved quickly
 - Entertainment
 - More accurate simulation and predictions of human behaviour
 - E.g. predictions of what people will do during an earth quake
 - Perform a task autonomously

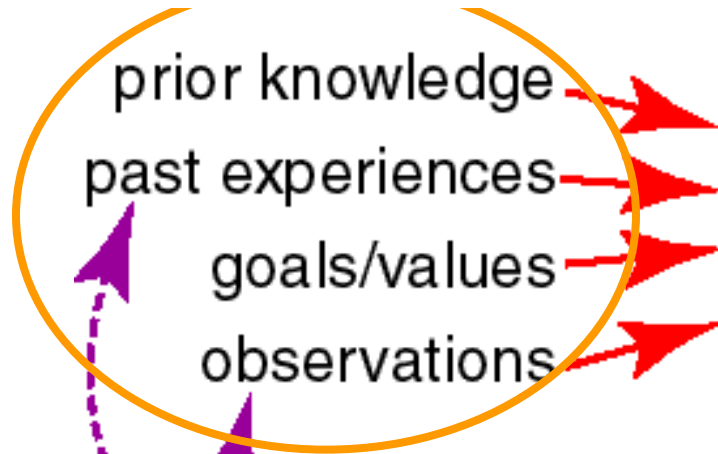
Robots vs. Other Intelligent Agents

- 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



Agent

**Reasoning +
Decision Theory**

Actions

**Natural Language
Generation**

**Natural Language
Understanding**

+

**Computer Vision
Speech Recognition**

+

**Physiological Sensing
Mining of Interaction Logs**



Environment

+

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.ugrad.cs.ubc.ca/~cs322>
- TODOs
 - For Friday: read Sections 1.4 - 1.5
 - For next Wednesday: Assignment 0
 - Available on WebCT
 - Submit via handin (a single PDF or text file, please!)