

# What is Artificial Intelligence?

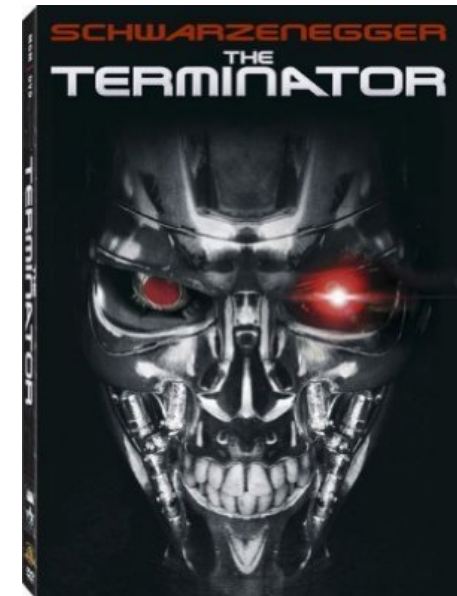
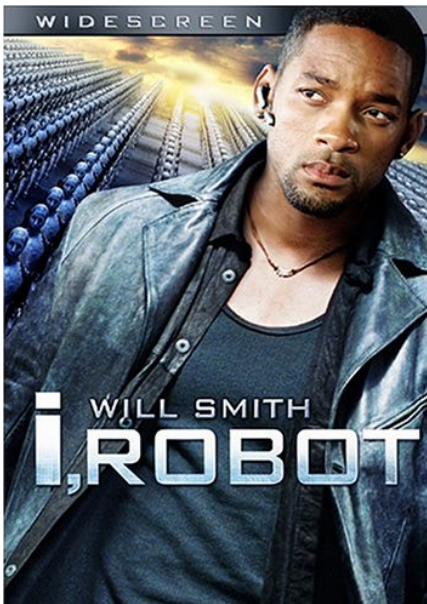
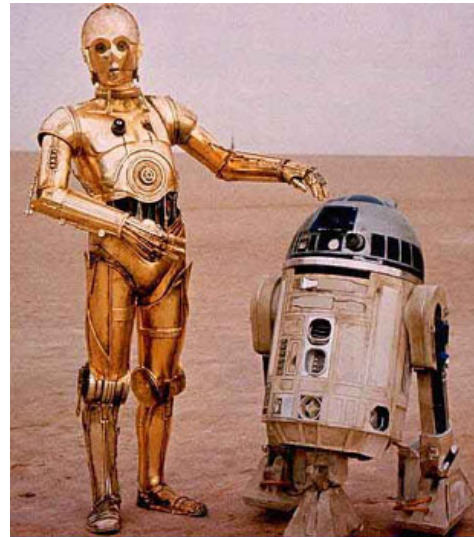
Alan Mackworth

CPSC 322 - Intro 1

January 2, 2013

Textbook §1.1 - 1.3

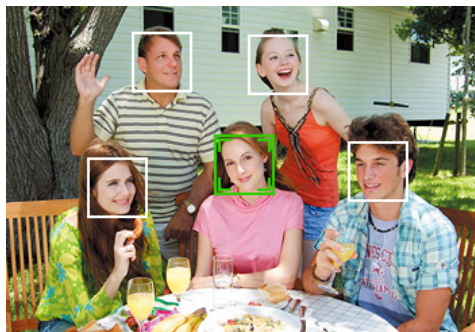
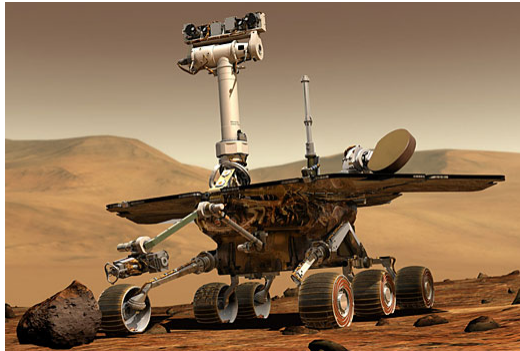
# Artificial Intelligence in the Movies



# Artificial Intelligence in Real Life

A young science ( $\approx 60$  years old)

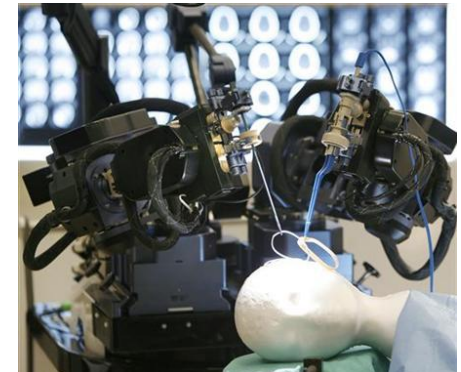
- Exciting and dynamic field, lots of uncharted territory left
- Impressive success stories
- “Intelligent” in specialized domains
- Many application areas



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](mailto: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](mailto:pooyanf@cs.ubc.ca)
  - [Shafiq Joty](mailto:rjoty@cs.ubc.ca) [rjoty@cs.ubc.ca](mailto:rjoty@cs.ubc.ca)
  - Mehran Kazemi [smkazemi@cs.ubc.ca](mailto: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](http://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:

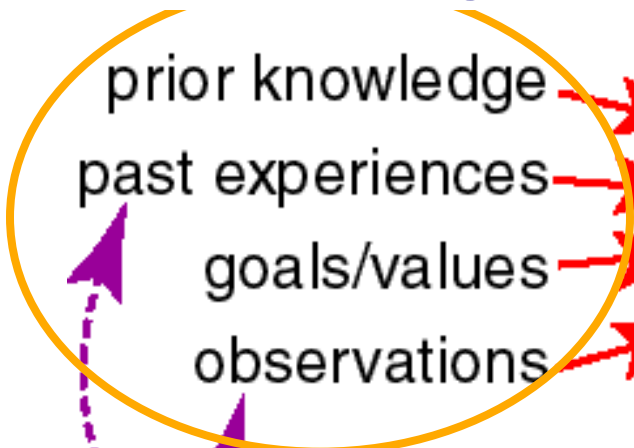
# Robots vs. Other Intelligent Agents

- 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