CS 380:
ARTIFICIAL INTELLIGENCE

INTRODUCTION

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https://www.cs.drexel.edu/~santi/teaching/2013/CS380/intro.html

CS 380

- Focus:
  - Introduction to AI: basic concepts and algorithms.

- Topics:
  - What is AI?
  - Problem Solving and Heuristic Search
  - Adversarial Search/Game Playing
  - Knowledge Representation and Logic
  - Introduction to Machine Learning

Outline

- Course Structure
- Schedule
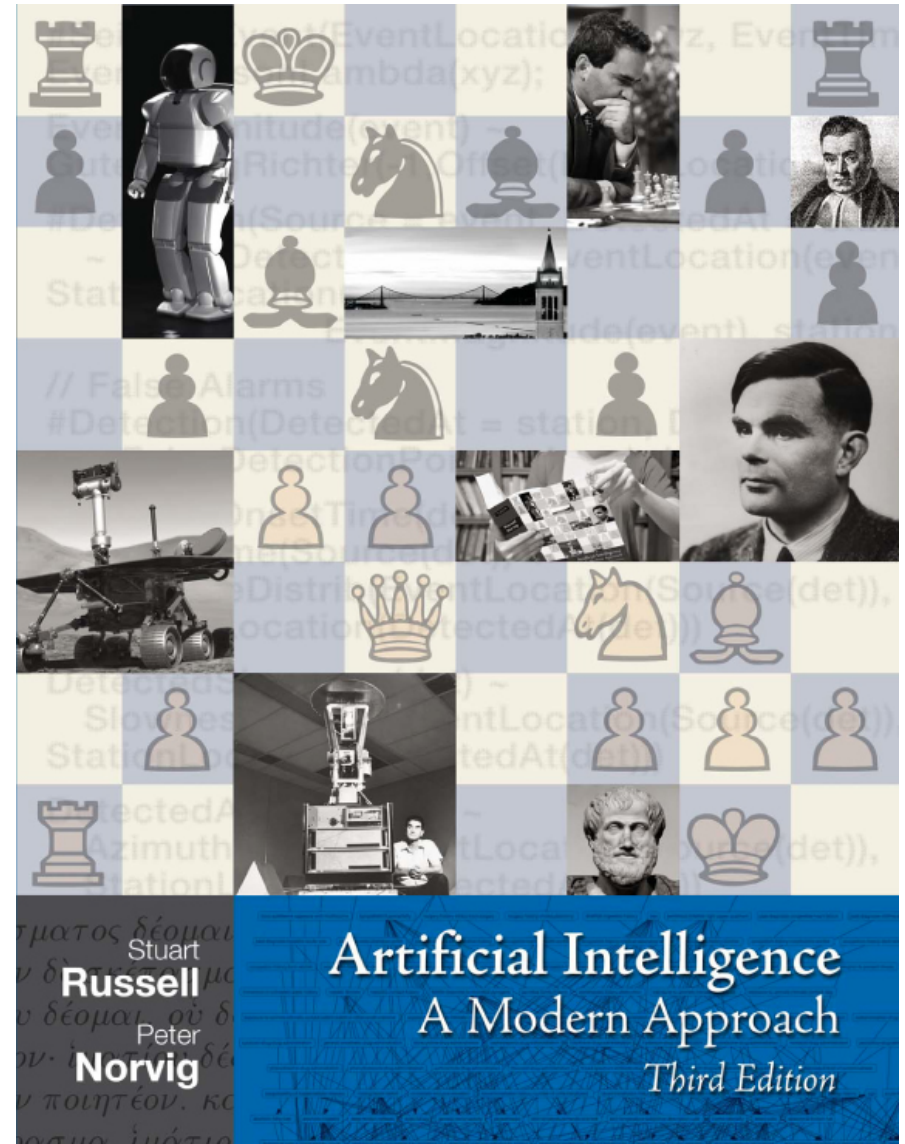- Assignments
- Introduction to AI

Outline

- **Course Structure**
- Schedule
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- Introduction to AI

Course Structure: Evaluation

- Class Attendance and participation: 10%

- Homework and programming assignments: 50%
  - To be done individually

- Midterm: 20%

- Final exam: 20%

Text Book

- Russell & Norvig
- 3rd edition

- Most likely will be your text book in upcoming AI classes.

- We'll cover chapters 1 – 9 and 13,14 (but schedule might change during the quarter)

Outline

- Course Structure
- **Schedule**
- Assignments
- Introduction to AI

Class Schedule

https://www.cs.drexel.edu/~santi/teaching/2013/CS380/intro.html

Week	Topic
W1	Introduction
W2	Uninformed Search (Problem Solving)
W3	Heuristic Search (Problem Solving)
W4	Local Search (Problem Solving)
W5	Adversarial Search (Game Playing)
W6	Adversarial Search (Game Playing)	← Midterm (W6)
W7	Knowledge Representation (Logic)
W8	Knowledge Representation (Logic)
W9	Machine Learning
W10	Other AI Topics

← Final exam (W11)

Class Schedule

- Check the class schedule regularly:
  - https://www.cs.drexel.edu/~santi/teaching/2013/CS380/schedule.html

- It might be subject to change, depending on the performance of students in assignments and midterm.

Outline

- Course Structure
- Schedule
- **Assignments**
- Introduction to AI

Homework and Programming Assignments

- 5 assignments:
  - Assignment 1 due end of week 3
  - Assignment 2 due end of week 5
  - Assignment 3 due end of week 7
  - Assignment 4 due end of week 9
  - Assignment 5 due end of week 10(11) (continuation of Assignment 4)

- Each assignment has:
  - Written part (problems to solve by hand)
  - Programming assignment

- For each assignment, you have to turn in:
  - A PDF document with your answers to the written part (do NOT send us MS Word files!)
  - A ZIP file with the source code of the programming assignment

Homework and Programming Assignments

- Programming assignments:
  - You can choose the programming language you want, but…

  - In class, I will be using Lisp to illustrate the different concepts we learn (I'll give a quick introduction to Lisp the first week)

  - Do NOT choose any language for which we need to install any software that is not installed by default in Tux:
    - C, C++, Java, Lisp, Python, etc. are fine.
    - Flash, obscure versions of Lisp, etc. are not fine.

  - Comment your code!
    - We need to understand what you wrote and why, to properly give you credit for what you did.

Homework and Programming Assignments

- The first assignment is already up, you can find it in the course website:
  - https://www.cs.drexel.edu/~santi/teaching/2013/CS380/assignments.html

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- Course Structure
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- Assignments
- **Introduction to AI**

What is Artificial Intelligence?

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Origins (John McCarthy 1956):

We propose that a 2 month, 10 man study of artificial intelligence be carried out during the summer of 1956 at Dartmouth College in Hanover, New Hampshire. The study is to proceed on the basis of the conjecture that every aspect of learning or any other feature of intelligence can in principle be so precisely described that a machine can be made to simulate it. An attempt will be made to find how to make machines use language, form abstractions and concepts, solve kinds of problems now reserved for humans, and improve themselves. We think that a significant advance can be made in one or more of these problems if a carefully selected group of scientists work on it together for a summer.

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- So, what is "intelligence"?
  - Hard to define concept.
  - Any definition would be arbitrary:
    - We could features of intelligence, such as: learning, language, knowledge, reasoning, understanding, etc. But any such list leaves things out.
  - Many have been proposed:
    - Check this paper out, if you are curious:
      - http://www.vetta.org/documents/A-Collection-of-Definitions-of-Intelligence.pdf

- **Intelligence is simply a term that we use to describe certain behaviors that we observe in humans and not in other entities.**

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> The **moving frontier** definition: AI is the study of how to make machines do what we do not yet know how to make them do.

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- Turing Test:

An AI system passes the Turing test if it can convince a human that the system is a human. They can only interact via written messages.

If you are curious, check: **Loebner Prize**

What is Artificial Intelligence?

- In reality, AI is a research field that encompasses research concerning computational techniques to replicate any aspect of intelligence:
  - Automated reasoning
  - Knowledge representation
  - Learning
  - Natural language generation/understanding
  - Problem solving
  - Planning
  - Vision/Perception
  - Action

- AI draws on the fields of computer science, mathematics, philosophy, economics, psychology, neuroscience, linguistics, or control theory among others.

Brief History of AI

1943	McCulloch & Pitts: Boolean circuit model of the brain
1950s-60s	Tremendous progress (early excitement)
1950	Turing's "Computing Machinery and Intelligence"
1950s	Early AI programs (before term existed): Samuel's checkers, Logic Theorist, etc.
1956	**Dartmouth meeting: AI is born**
1970s	The Problems (AI winter):

Computational Complexity

Common Sense

Moravec's Paradox

The Frame Problem

1980s	Expert Systems Boom
	Soon after, Expert Systems burst (second AI winter)
1990s	Probability, Agents (neural networks are back)
2000s	Human-level AI back in the agenda

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(from Russell & Norvig)

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Next Class

- Intelligent Agents