COMPSCI 390 A

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Moodle → Recordings

→ Assignments

→ Course Page

→ Zoom link.

Course Page: Syllabus
Readings / lecture notes
Assignments.

Lecture 1
- Syllabus
- What is ML?
- Course Overview

Russell & Norvig

What is Machine Learning?

- Subfield of Artificial Intelligence (AI).
- AI is a <u>field</u> concerned with <u>intelligent behavior</u> in <u>ar~~tif~~acts</u>. agent
    —Nilsson 1998.
- AI is not a <u>thing</u>.
- The thing using AI methods is called an <u>agent</u>.
- Agent: Something that acts, from Latin agere which means "to do".
    - Typically robot or software program.

- Field-like math, physics, theology.

Intelligent Behavior: No agreed upon definition.

    — How do we know when we have created an ~~AI~~? agent

    — How do we know whether a topic belongs in the AI field?

        — Consensus

        — <u>Not</u> always obvious or intuitive.

Program 1:

  Input: Source Code (easy to read)

  Output: Source code (fast to run).

```
value = value + (value mod 10)

while (value < 100)
    item = 10
    value = value + item

while (value < 100)
    value = value + 10
```
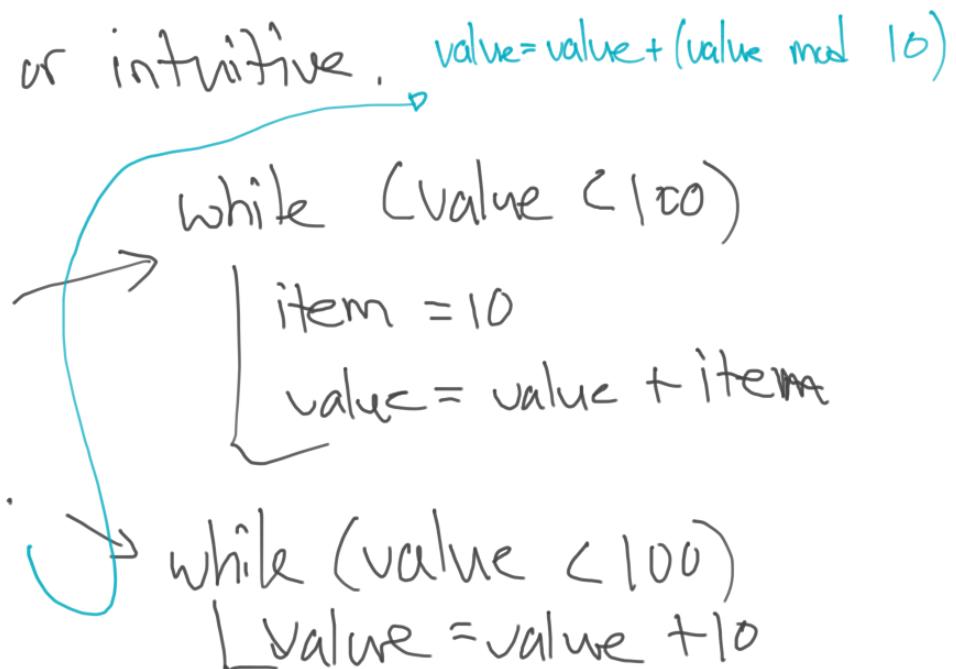
Program 2:

Input: Graph (V, E)
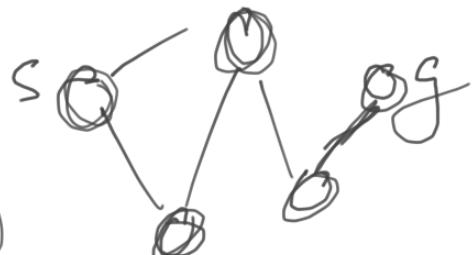
      Node S (start)

      Node G (goal)

Output: Yes or no, does there exist a path from s to g.

~ This **is** AI → "Search"

- Rule of thumb: be inclusive.

S   G

comp sci

Systems   Theory   AI

PL

Compilers

Compiler optimization

search

planning

unsupervised

ML

Supervised   Reinforcement
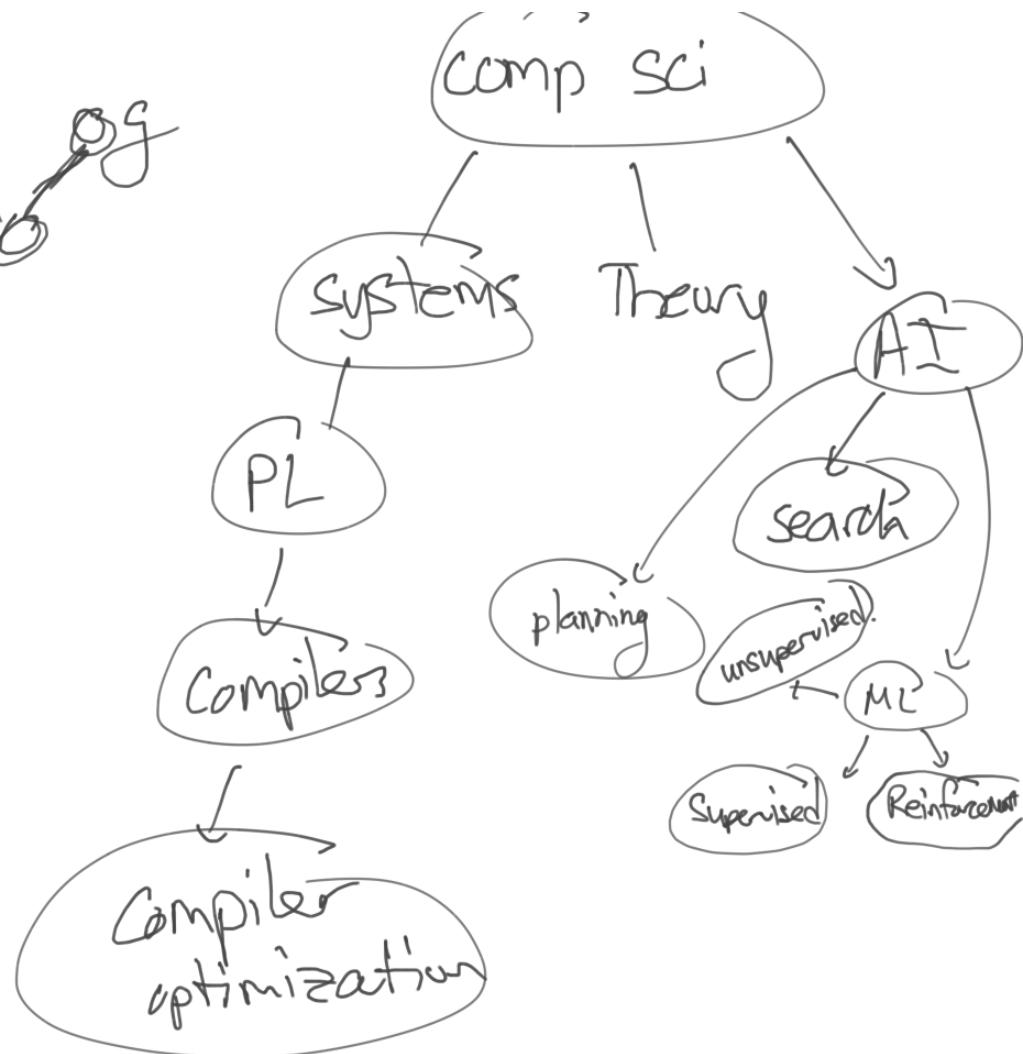
AI & ML

1950s – 1980s   2000 – Present

AI   AI
      ∘ ML   (ML)

- ML is a subfield of AI "concerned with the question of how to construct computer programs that automatically improve with experience." – Tom Mitchell, 1997
  learn from data.
  - Experience ≈ data.

Program 3:

Data: Images of hand written letters with labels.

Input: An image of a letter.

Output: Prediction of the label for the input letter.

Example: **Data:**

letter	label
✶	wolf
†	seax
⊤	pacul
✳	wolf
⊤	pacul
⊥	seax

Input:	Output
✶	wolf
(sword)	seax
(axe)	pacul
+	?

Summary:

AI : Field concerned with agents that are "intelligent"

ML : Subfield of AI concerned with agents that learn.

Artificial General Intelligence (AGI)

- An agent (thing) that can understand or learn any intellectual task that a human can.
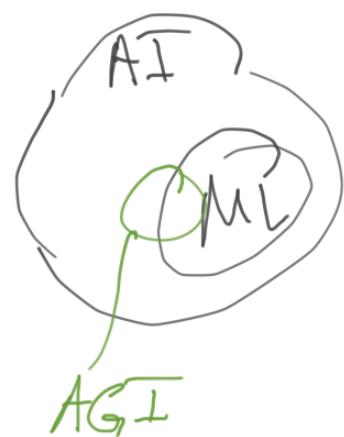
Course Overview:

1/3 1) Supervised learning.
- learning from labeled data.

1/3 2) Reinforcement learning (RL)
- learning from rewards or penalties.

1/3 3) other topics.
- Safety, fairness, ethics.
- Relation to other fields.

rounding error 4) Survey of advanced topics.