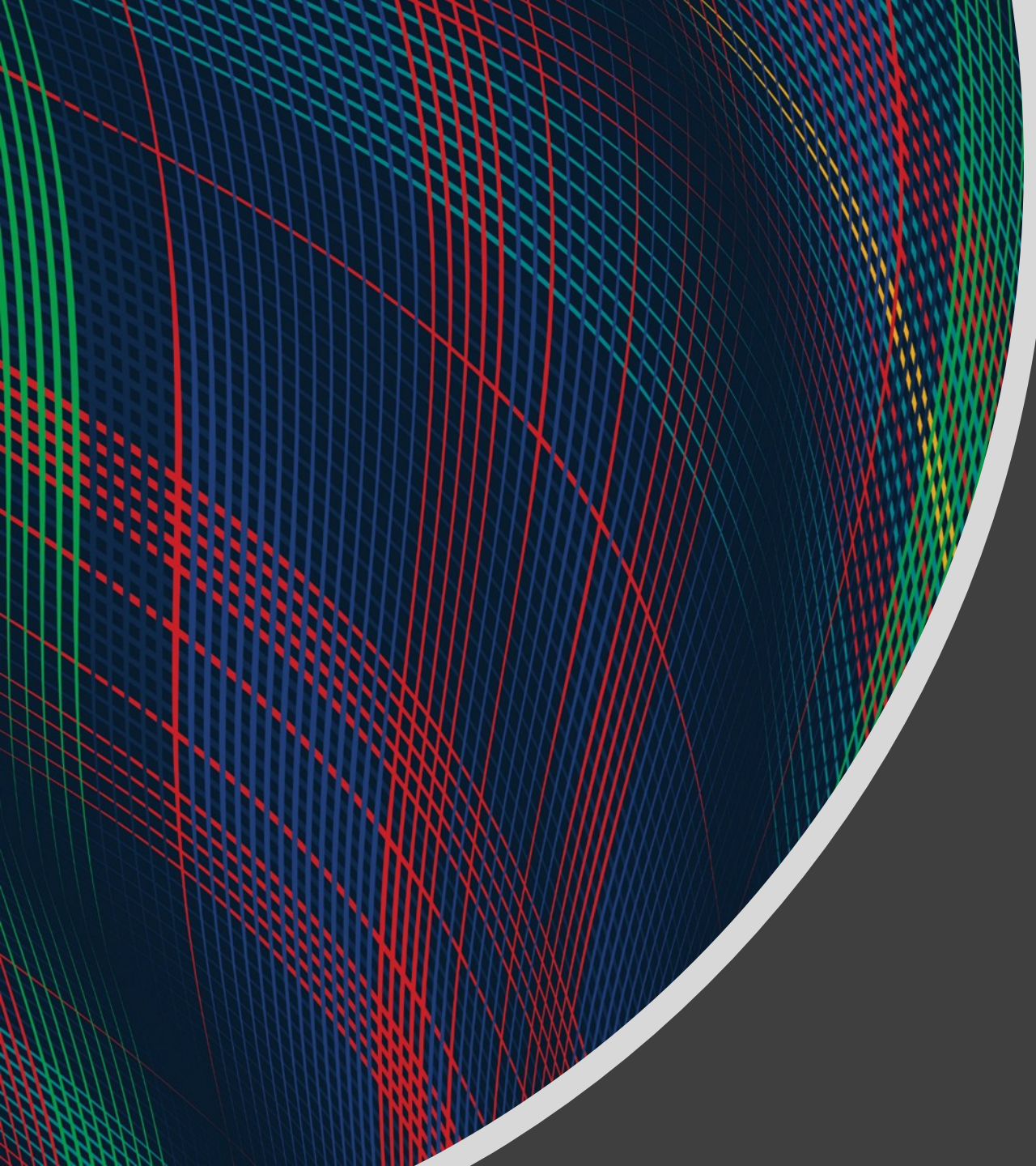


An abstract graphic on the left side of the slide, featuring a sphere-like shape composed of a dense grid of intersecting red, green, and blue lines. The lines are curved and follow the contours of the sphere, creating a complex, woven pattern. The sphere is set against a dark gray background.

07-380 AI & ML II Introduction

Instructors:
Pat Virtue &
Mohammad Salameh

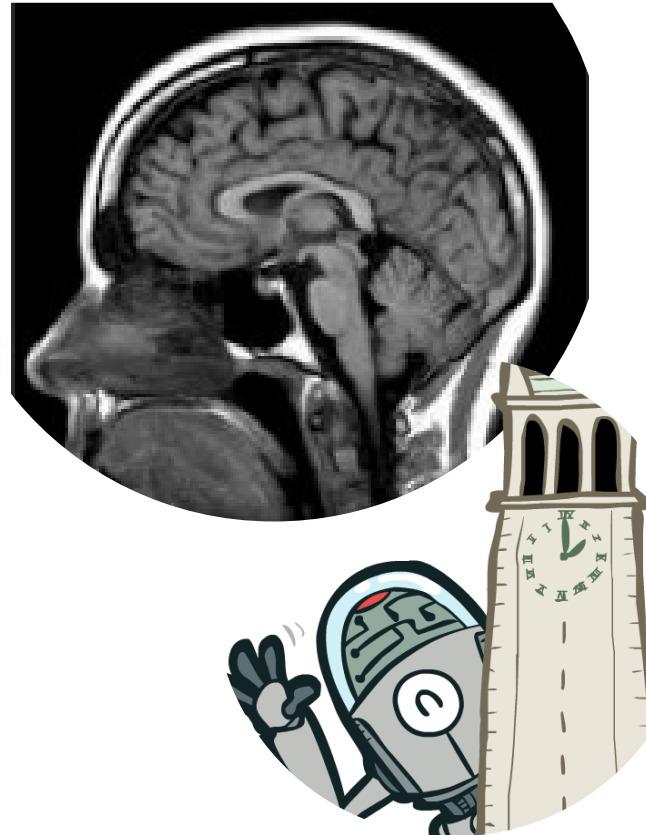
Pat Virtue

From Medical Imaging background to AI Education Outreach

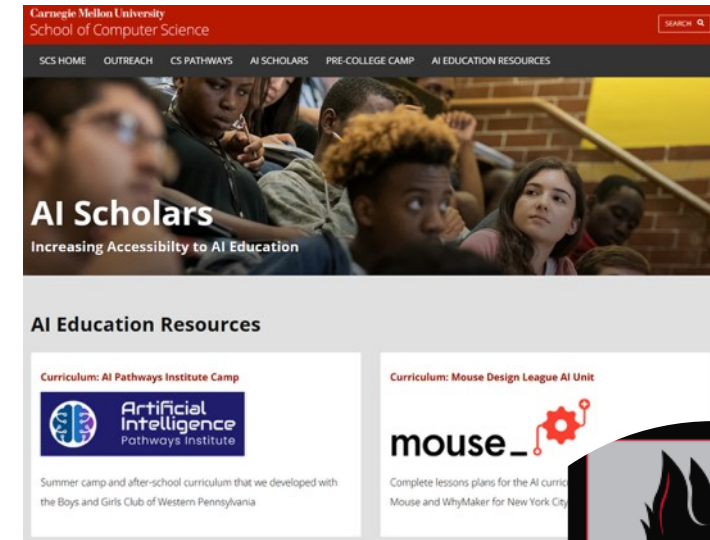
GE Healthcare



UC Berkeley



Carnegie Mellon University



Mohammad Salameh

Visiting AI Faculty from CMU Qatar!

- Assistant Teaching Professor at Carnegie Mellon University in Qatar (CMU-Q).
- Previously, Principal Researcher and Team Lead at Huawei Technologies Canada
- Ph.D. in Computing Science from the University of Alberta, Canada, in 2016.
- BS and MS from the Lebanese American University, Lebanon



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Research Interests

- Optimizing deep learning models for devices with limited computing resources
- Software-hardware co-design
- Neural architecture search
- Computer vision
- Natural language processing (NLP)
- Autonomous driving

Course Team

Instructors



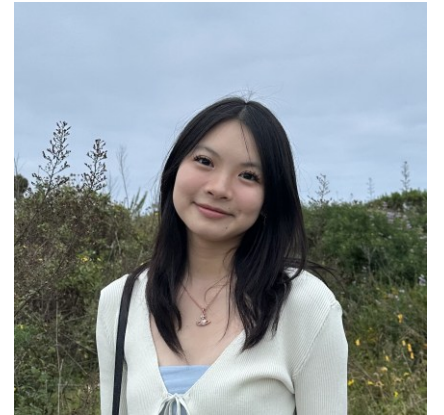
Pat
Virtue



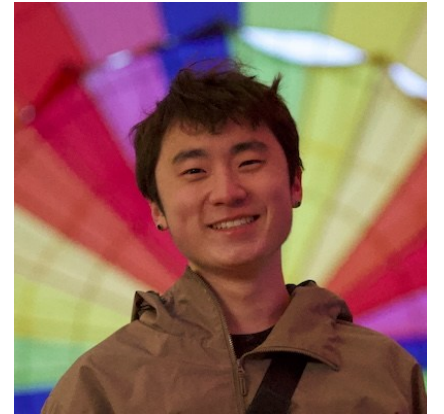
Mohammad
Salameh

Teaching Assistants

Ellyse
Lai



Steven
Yang



Arnav
Pallem



Why are we here? – CMU version

Good Will Hunting



<https://youtu.be/hldsJNGCGz4?si=ggWBp-NE5u-I3IA6&t=78>

Question: Why are we here?

Why CMU and not just a \$1.50 in late charges at the public library?
(or \$20 on Claude?)

Course Team

We're here for the people

Yeah, instructors and TAs, but mostly other students

07-380

- Peer Instruction
- Programming partners (pairs)
- Group project (teams of 3)

Peer Instruction: Ten years of experience and results

Catherine H. Crouch and Eric Mazur^{a)}

Department of Physics, Harvard University, Cambridge, Massachusetts 02138

(Received 21

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A Multi-institutional Study of Peer Instruction in Introductory Computing

Leo Porter¹, Dennis Bouvier², Quintin Cutts³, Scott Grissom⁴, Cynthia Lee⁵,
Robert McCartney⁶, Daniel Zingaro⁷, and Beth Simon¹

¹University of California, San Diego

²Southern Illinois University Edwardsville

³University of Glasgow

⁴Grand Valley State University

⁵Stanford University

⁶University of Connecticut

⁷University of Toronto Mississauga

https://www.researchgate.net/publication/216743159_Peer_Instruction_Engaging_students_one-on-one_all_at_once
<https://dl.acm.org/doi/10.1145/2839509.2844642>

Course Information

Website: <https://www.cs.cmu.edu/~07380>

Communication:

piazza

<https://piazza.com/>

Piazza for all communication

Important posts!

- Course Infrastructure
- Pre-reading (due Tue)
- Lec Preview & Poll Links

Coming soon

- HW1 (out Fri)

Poll 1

When is the first pre-reading checkpoint due?

- A. Tonight
- B. Tomorrow
- C. Sunday night
- D. Before class next Monday

Poll 2

How many OH appointment slots does Pat have available this week?

Today

Why are we here? CMU-version

Course team

Quick course info

(Another) Discussion of Intelligence

Why are we here? 07-380-version

- 07-380 design considerations
- Runthrough of 380 topics (as time permits)



DALL-E: “Logo of a Scotty dog with a red collar whose brain is made of circuits”

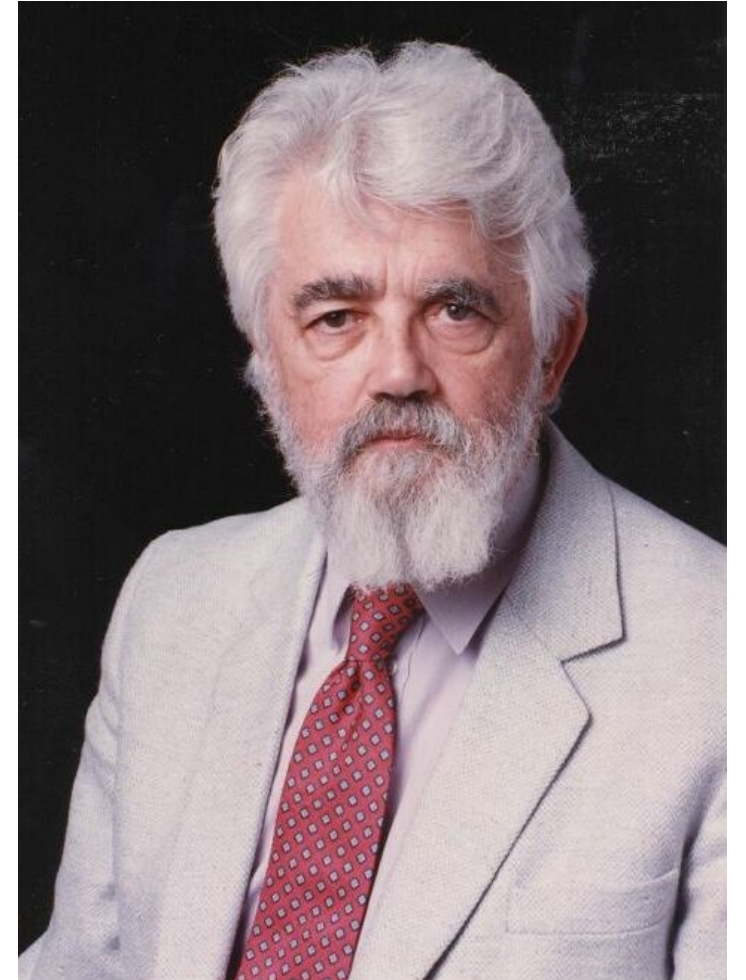
Reminder: AI Definition by John McCarthy

What is artificial intelligence

- It is the science and engineering of making intelligent machines, especially intelligent computer programs

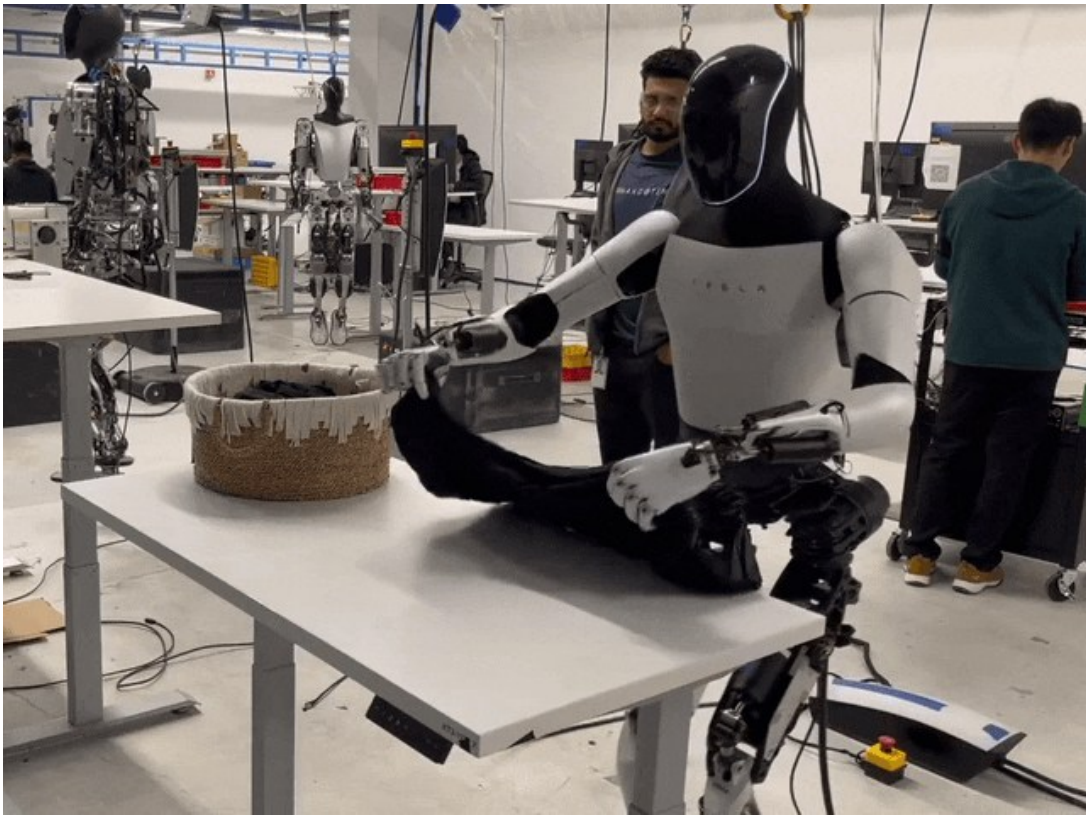
What is intelligence

- Intelligence is the computational part of the ability to achieve goals in the world



Reminder: What is artificial Intelligence?

Why is folding clothes a research problem while robots are actively being used to assemble cars in factories?



Reminder: AI Definition (Pat's Version)

What is intelligence

- Intelligence is the ability to perform well on a task that involves uncertainty

Intelligence is not binary

- How **well** an agent performs and how much **uncertainty** is involved will determine how intelligent we consider the agent to be



Intelligence and Uncertainty

Another way to think about intelligence is to consider how much **uncertainty** is involved

Uncertainty comes into play whenever it is not feasible to determine exact information

Uncertainty requires decisions to be made

Intelligence and Uncertainty

Uncertainty can have lots of sources, including anything we attribute to random chance

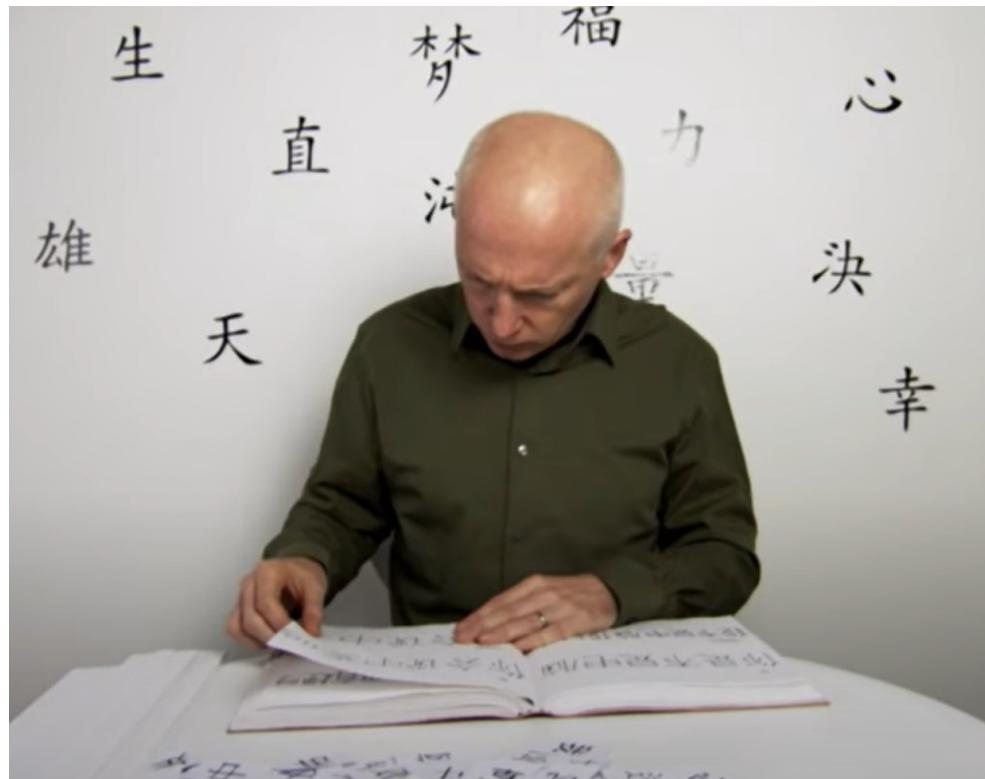
- Hidden information
 - Cards in another player's hand
- Noise
 - Sensor noise
- Way too complicated to model
 - Leaves blowing in the wind
- Infinite number of possible configurations
- More possibilities than any computer can compute in a reasonable time
 - Tic-tac-toe → Checkers → Chess

What is Intelligence?

Chinese room experiment

John Searle

<https://www.youtube.com/watch?v=D0MD4sRHj1M>

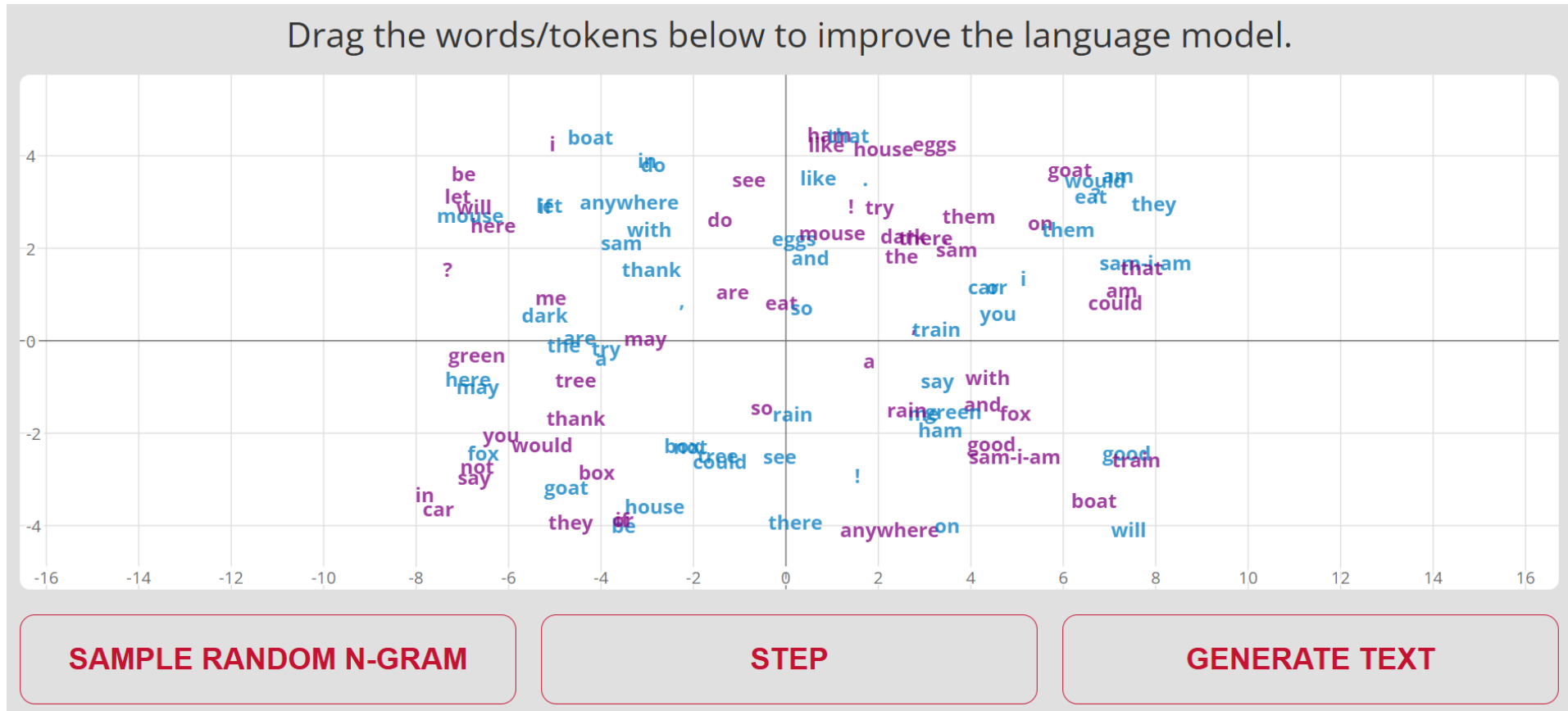


Poll 3

Is the "Chinese room" intelligent?

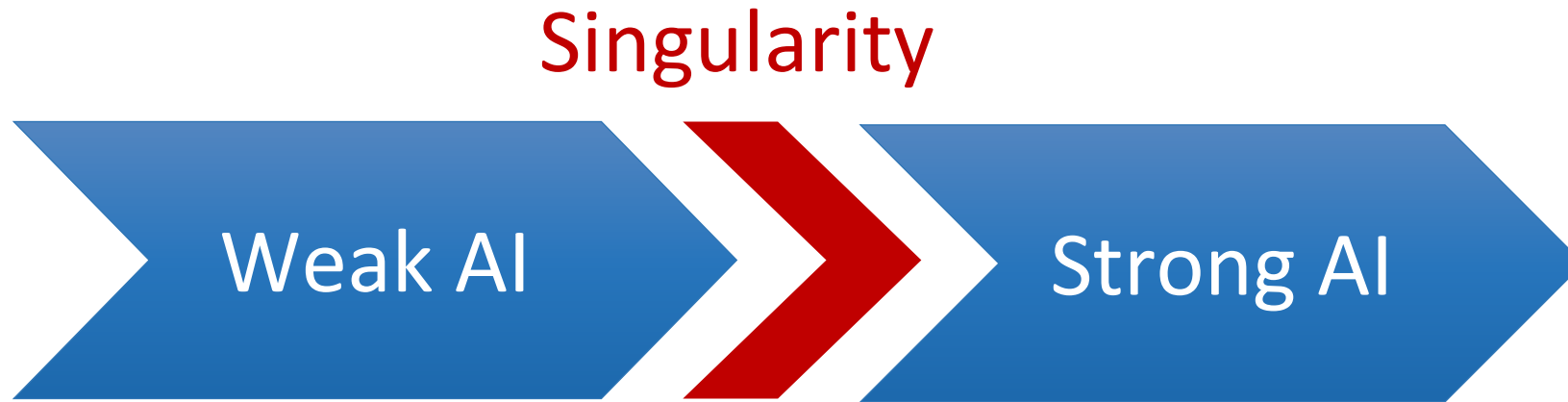
- A. ---
- B. Yes
- C. No
- D. ---

LLM Embeddings



<https://www.cs.cmu.edu/~pvirtue/AIS/word-embeddings/word-embeddings.html>

Weak AI vs AGI



- Narrow AI
- Limited number of applications

- Artificial General Intelligence (AGI)
- Recursive self-improvement
- Beyond human control

Poll 4

Are AI tools already AGI?

A.

B.

C.

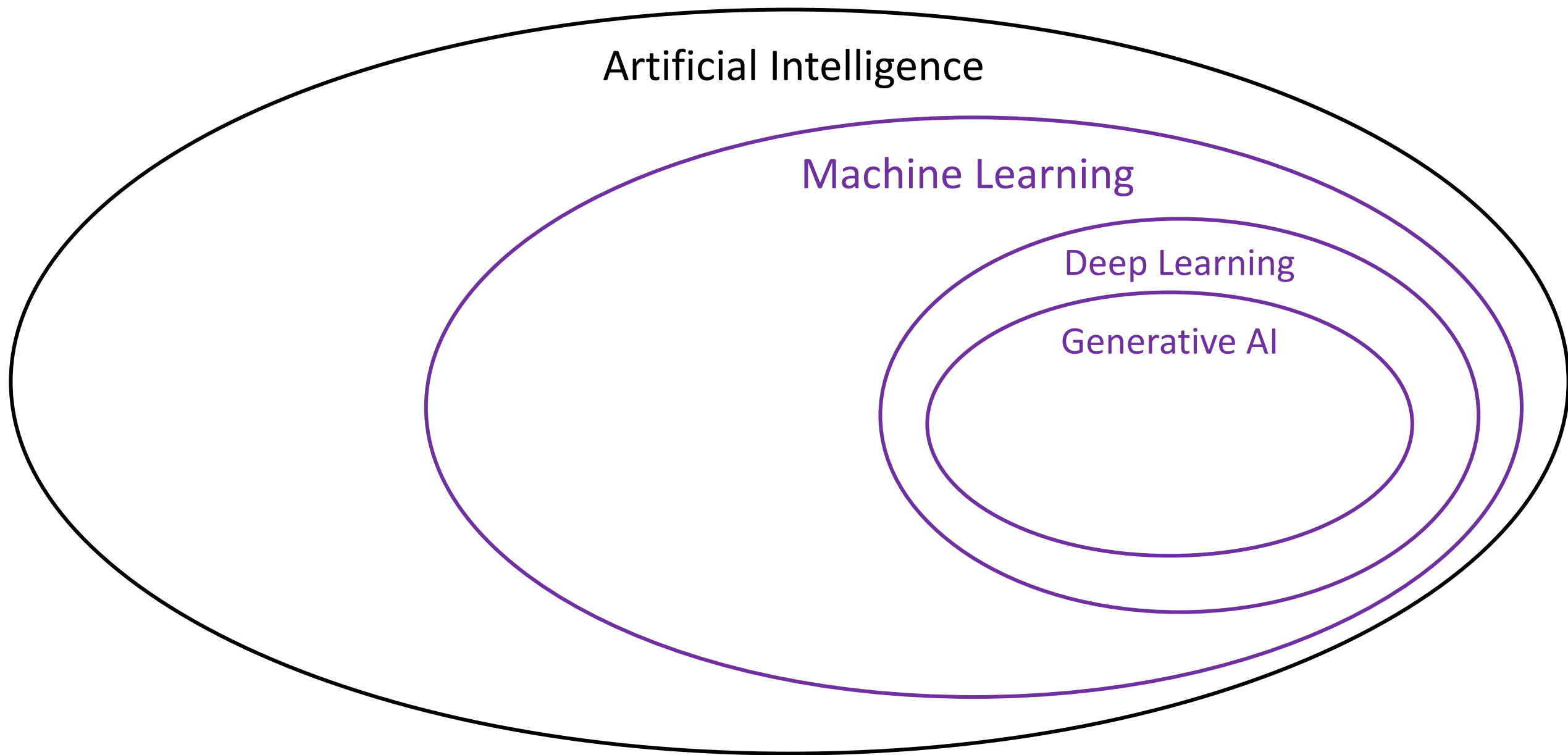
D.

Why are we here? – 07-380 version

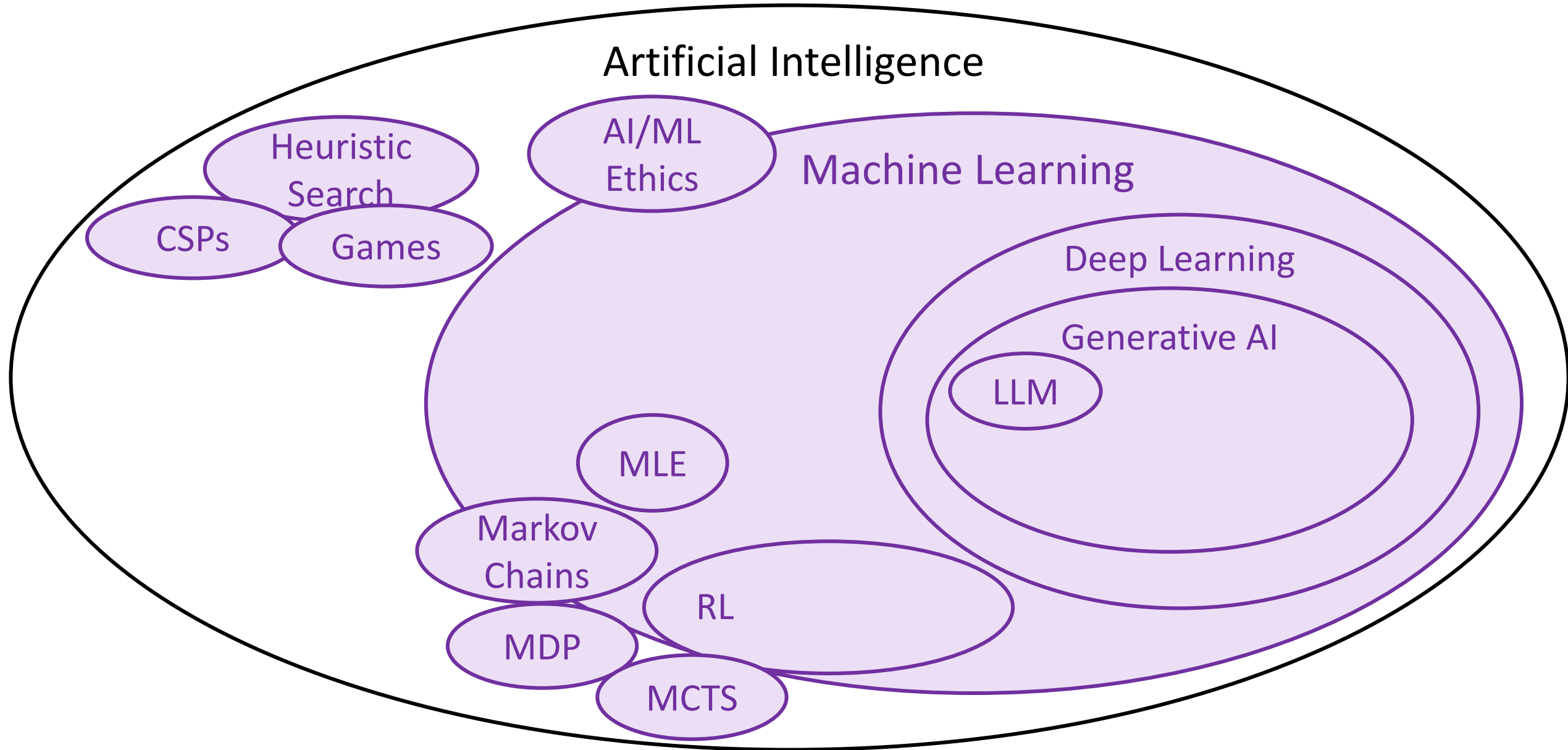
What were we considering when designing 07-380?

- Building **breadth** and **depth** of AI and ML
- What do we want to make sure all **AI majors/minors** learn, regardless of which electives they choose?
- Which components are the **building blocks**?
 - Giving students the language to learn more
- Which components are more **difficult to learn** outside of university?
 - (Math)
- Learn more about the **state-of-the-art**
- Prepare students for critical AI/ML **challenges in practice**

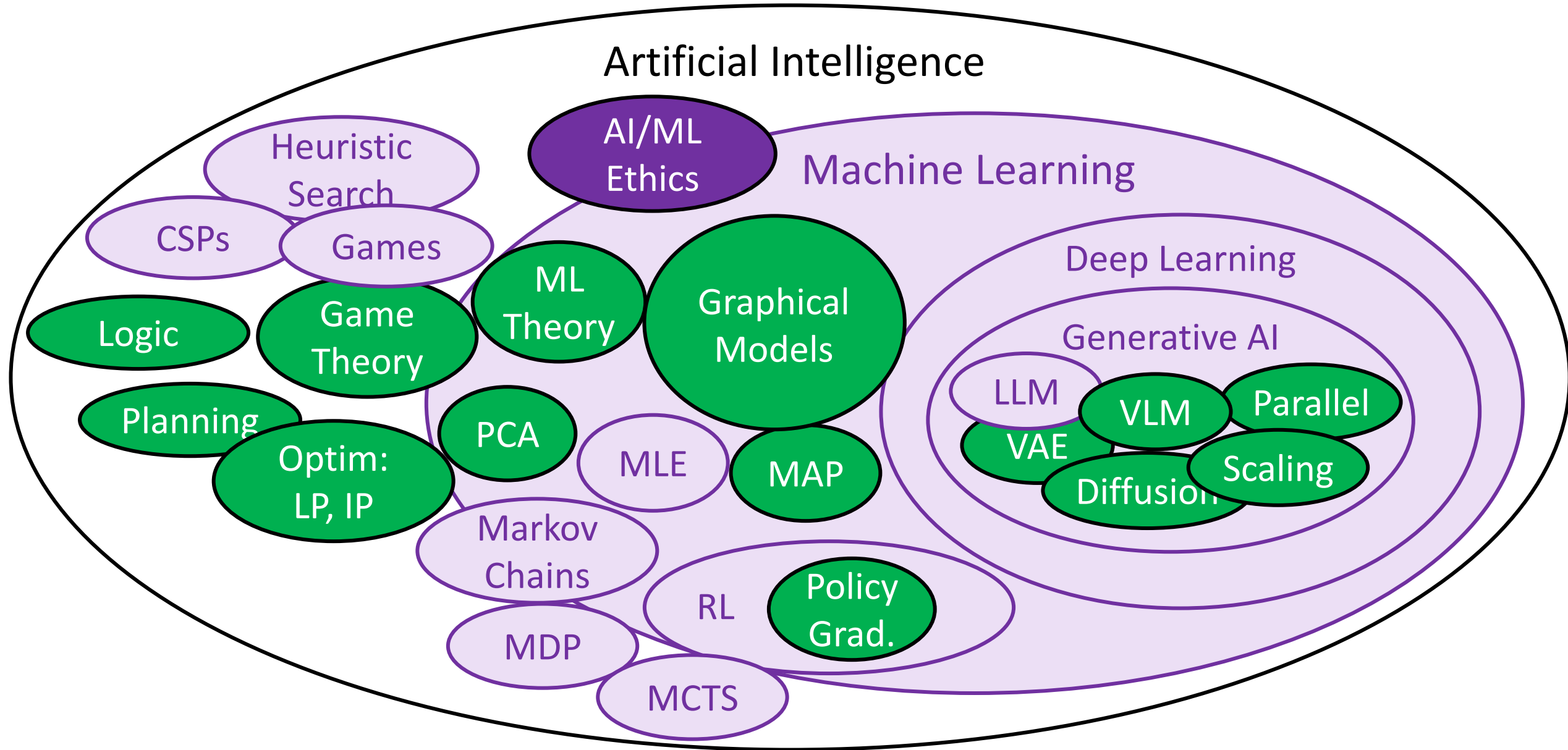
Artificial Intelligence vs Machine Learning?



Artificial Intelligence vs Machine Learning?



Artificial Intelligence vs Machine Learning?



Why are we here? – 07-380 version

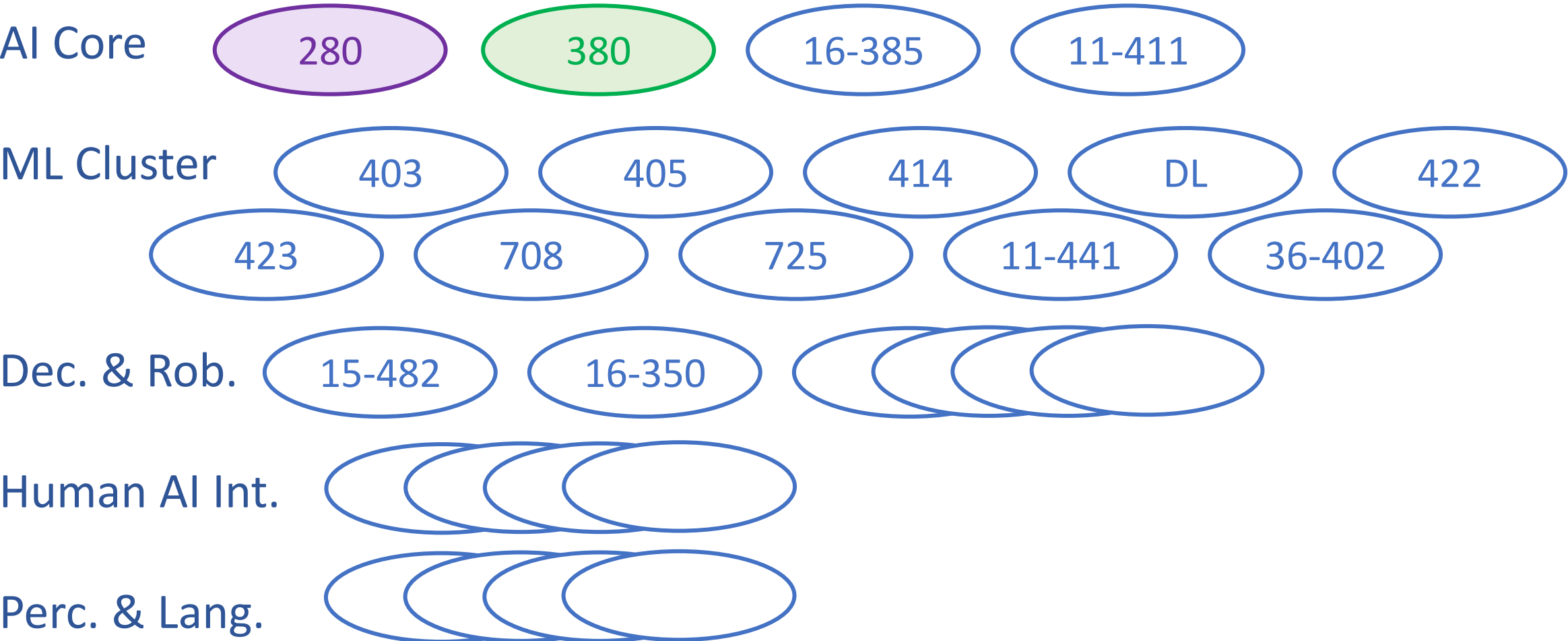
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Courses in AI Major & AI Minor

AI Ethics, Cognitive Studies, Humanities, Sci/Eng, SCS Electives

Math core, CS core



Why are we here? – 07-380 version

What were we considering when designing 07-380?

- Building **breadth** and **depth** of AI and ML
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