Digital 4 Business
Evolving your digital future

AI

Introduction to AI and its history

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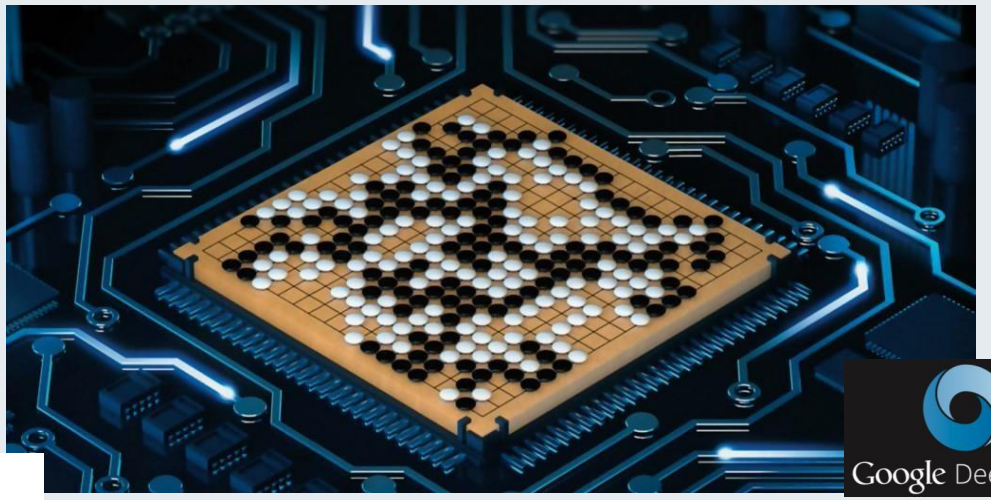
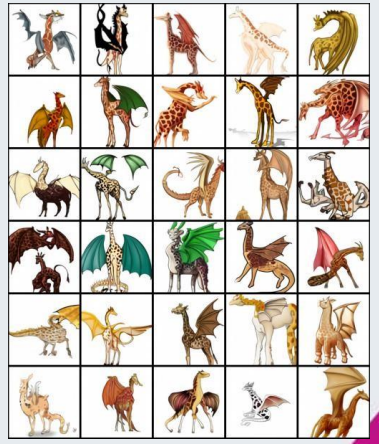


AI



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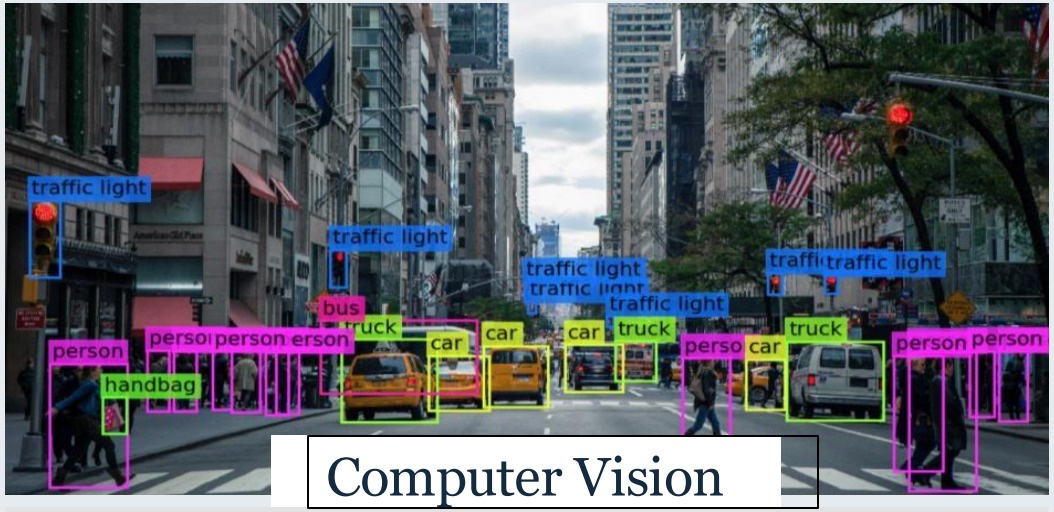
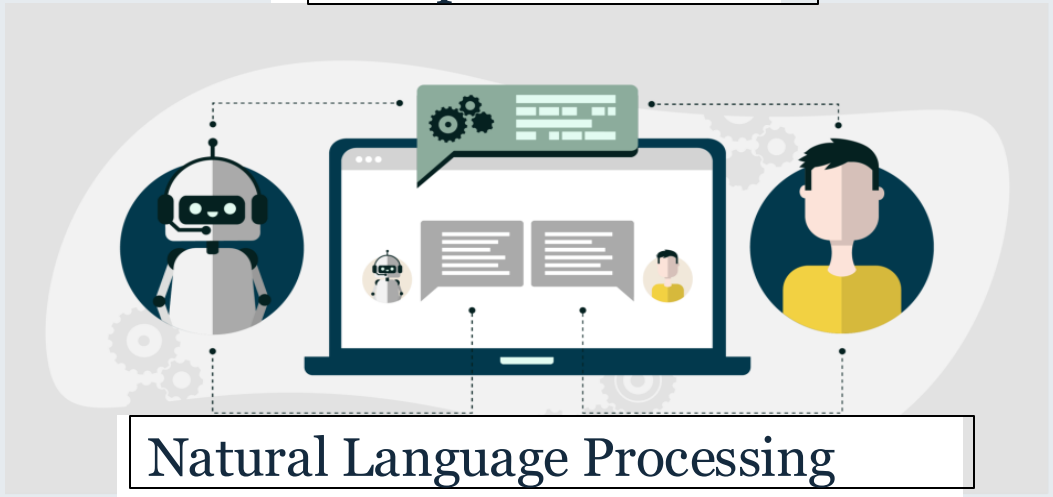
Applications of AI

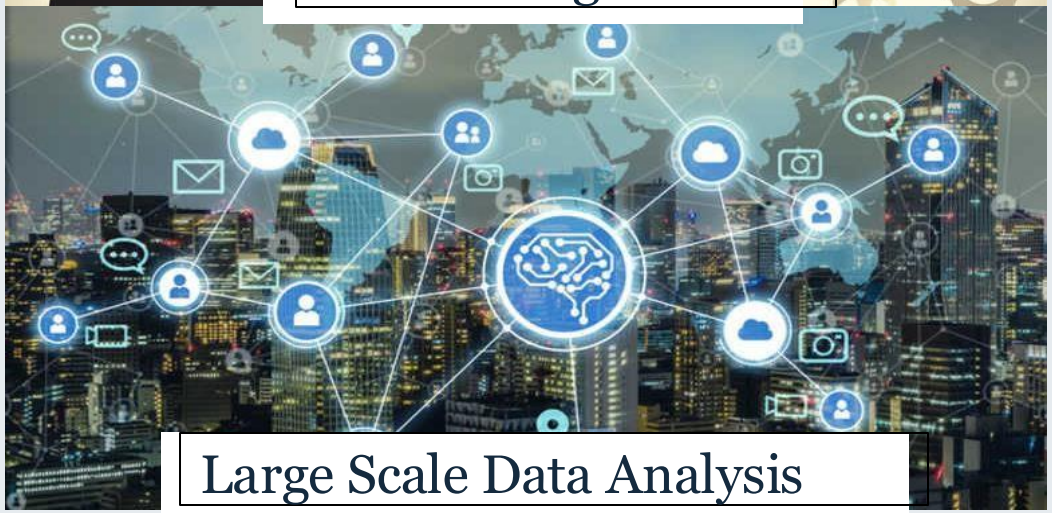


Computer Vision

Voice Recognition



Natural Language Processing



Large Scale Data Analysis

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SWEDISH ARTIFICIAL INTELLIGENCE SOCIETY

Artificial Intelligence – What is it? – Definitions

"Artificial Intelligence is the science and engineering of making intelligent machines, especially intelligent computer programs."
- John McCarthy, Stanford

- "Artificial intelligence (AI) refers to systems that display intelligent behaviour by analysing their environment and taking actions – with some degree of autonomy – to achieve specific goals."
- - EU Communication 25 April 2018

"the scientific understanding of the mechanisms underlying thought and intelligent behavior and their embodiment in machines."
- AAAI

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What is intelligence?

- Legg and Hutter made a survey of 71 different definitions of intelligence in 2007.
- Commonly occurring features:
- Is a property that an individual agent has as it interacts with its
- environment or environments.
- Is related to the agent's ability to succeed or profit with respect to
- some goal or objective.
- Depends on how able the agent is to adapt to different objectives and
- environments
- Based on this, they came up with: "Intelligence measures an agent's ability to achieve goals in a wide range of environments."

HTTPS://ARXIV.ORG/PDF/0706.3639.PDF%20A%20COLLECTION%20OF%

20DEFINITIONS%20OF%20INTELLIGENCE

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Artificial Intelligence – Four Views

	Empirical Sciences Fidelity to human performance **Human-Centered**	Mathematics/Engineering Ideal concept of Intelligence **Rationality-Centered**
Thought Processes Reasoning	Systems that think like humans	Systems that think rationally
	"The exciting new effort to make computers think. . .machines with minds, in the full and literal sense." (Haugeland, 1985) "[The automation of] activities that we associate with human thinking, activities such as decision-making, problem solving, learning..."(Bellman, 1978)	"The study of mental faculties through the use of computational models." (Charniak and McDermott, 1985) "The study of computations that make it possible to perceive, reason, and act." (Winston, 1992)
Behavior	Systems that act like humans	Systems that act rationally
	"The art of creating machines that perform functions that require intelligence when performed by people." (Kurzweil, 1990) "The study of how to make computers do things at which, at the moment, people are better." (Rich and Knight, 1991)	"Computational Intelligence is the study of the design of intelligent agents." (Poole et al., 1998) "AI . . . Is concerned with intelligent behavior in artifacts." (Nilsson, 1998)

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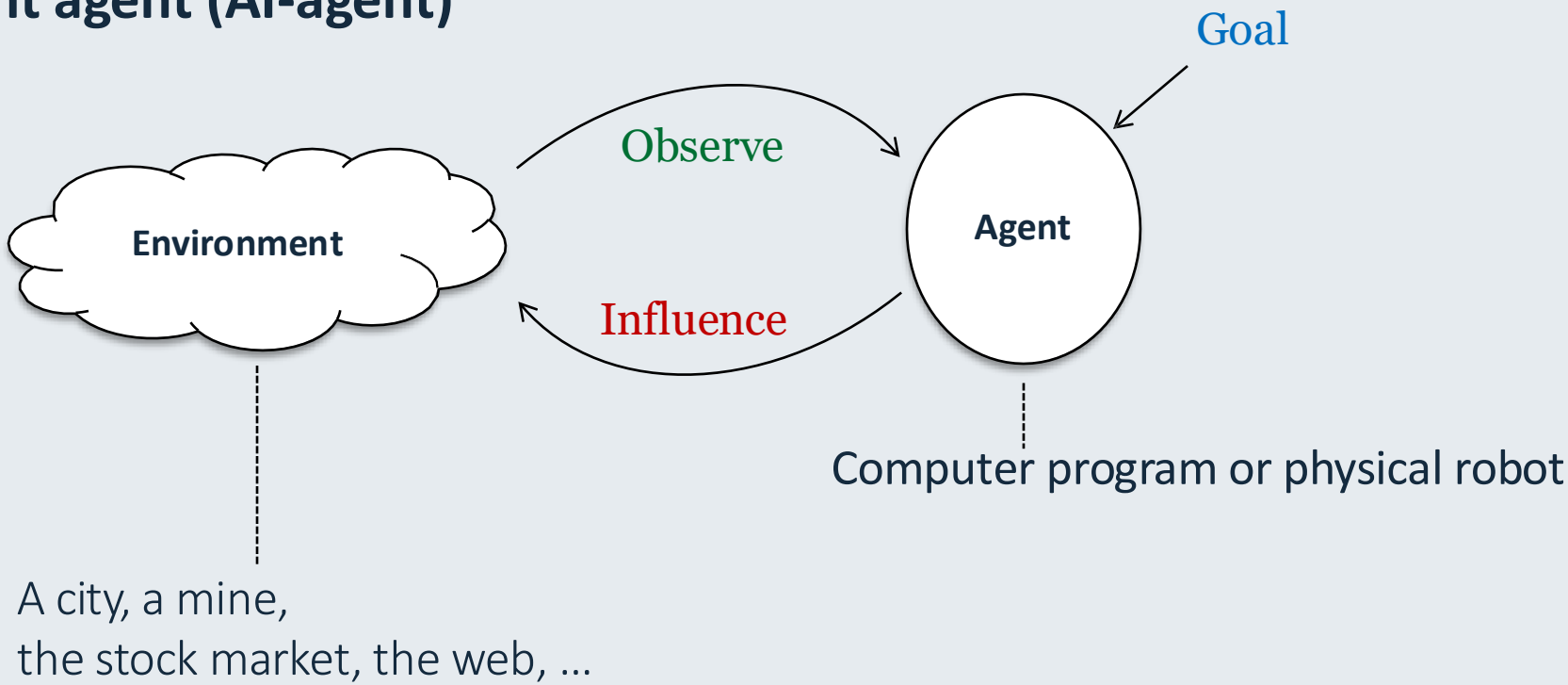
Artificial Intelligence – The Intelligent Agent Paradigm

- **Intelligent agent (AI-agent)**



- Intelligent capabilities through integration of AI techniques

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From Peter Norvig, Google

Computer Science:

Doing the right thing, efficiently, when you can define what that means in advance.

Artificial intelligence:

Doing the right thing, efficiently, when you don't know what

that means in advance.

Shifting from design-time to run-time.

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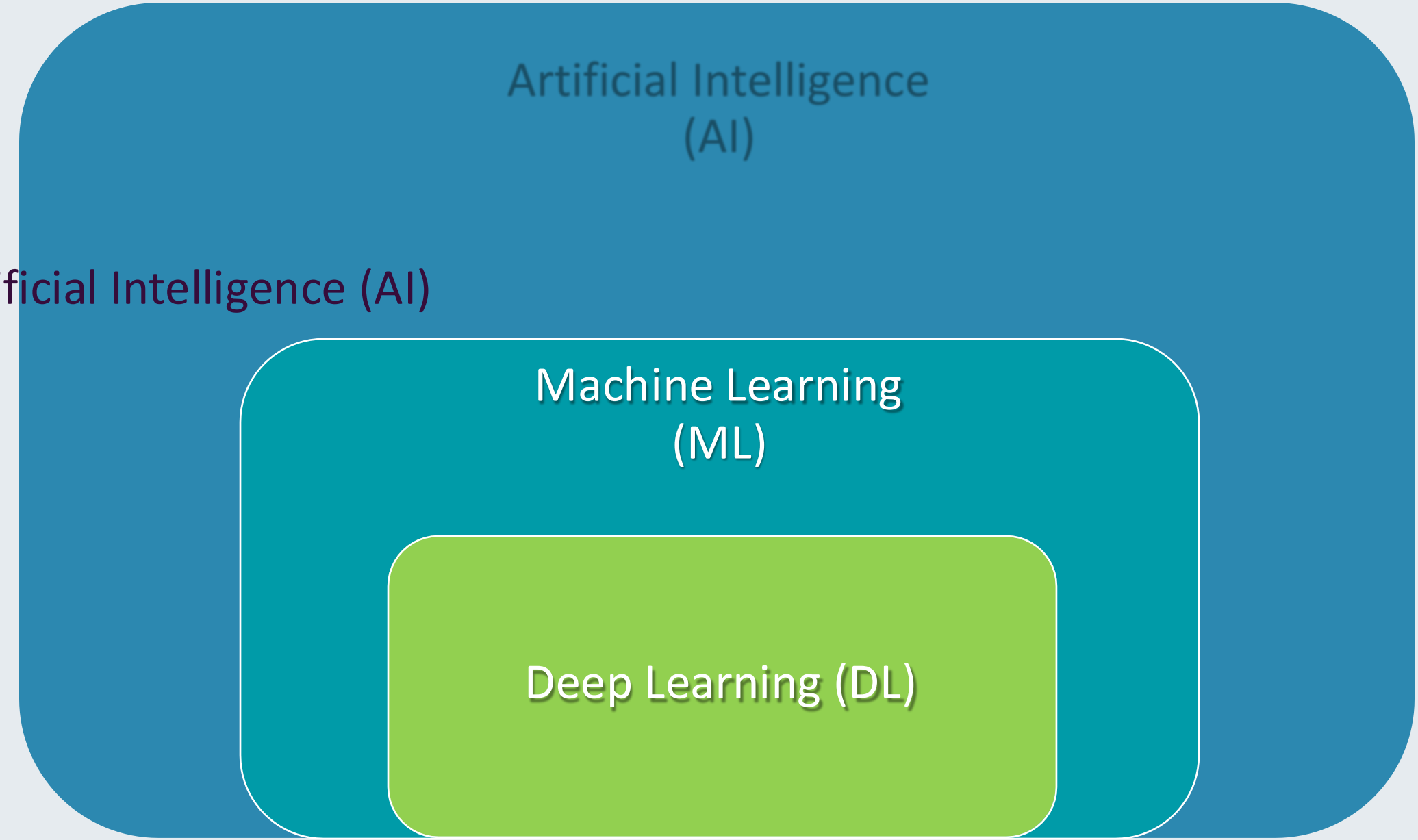
Artificial Intelligence (AI)



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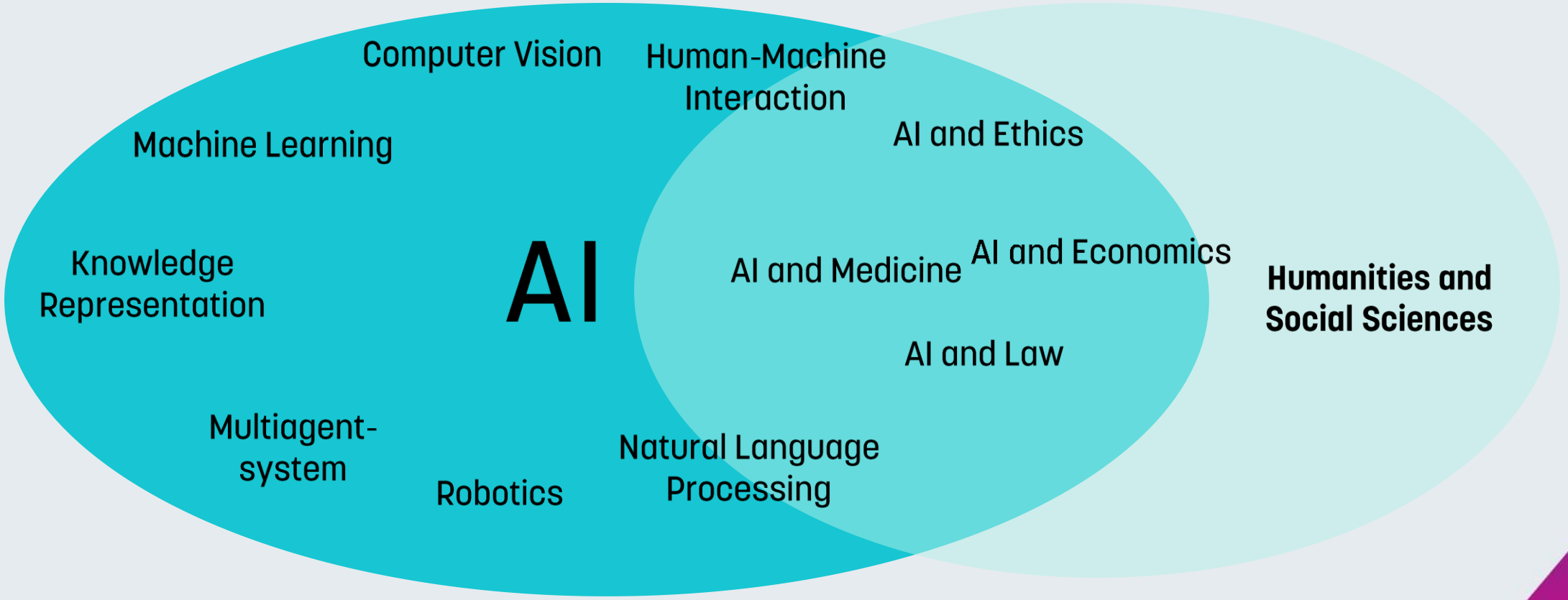
Topics within Artificial Intelligence



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Pure Logic **Pure Learning**

- Slow thinking: deliberative, cognitive, model-based, extrapolation
- Amazing achievements until this day
- "*Pure logic is brittle*"
  noise, uncertainty, incomplete knowledge, …

https://web.cs.ucla.edu/~guyvdb/slides/ComputersAndThought.pdf

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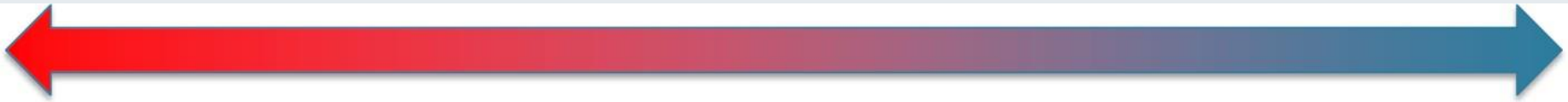

Pure Logic **Pure Learning**

- Fast thinking: instinctive, perceptive, model-free, interpolation
- Amazing achievements recently
- "*Pure learning is brittle*"

  bias, algorithmic fairness, interpretability, explainability, adversarial attacks, unknown unknowns, calibration, verification, missing features, missing labels, data efficiency, shift in distribution, general robustness and safety

  fails to incorporate a sensible model of the world

https://web.cs.ucla.edu/~guyvdb/slides/ComputersAndThought.pdf

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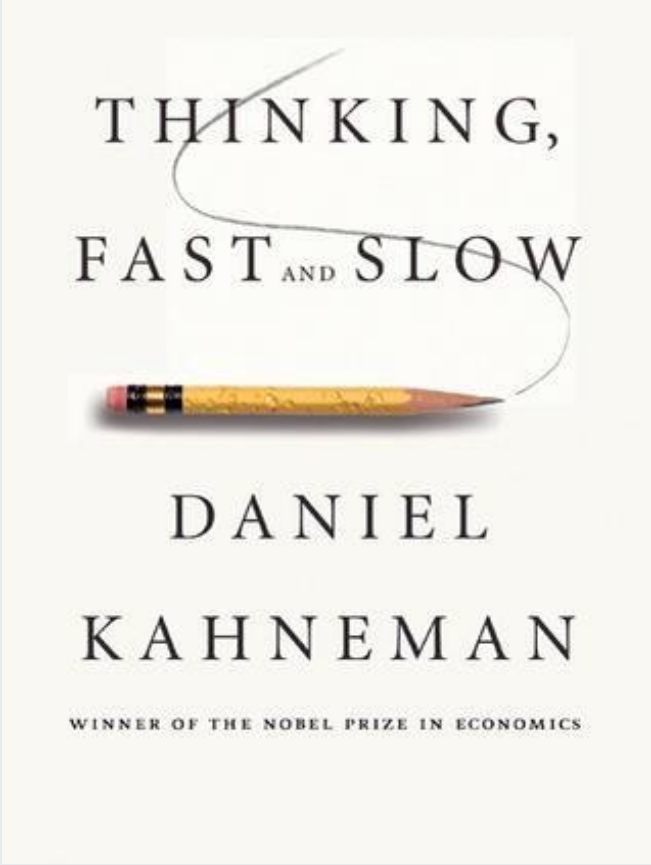
Human and Computational Thinking

Figure 1: A Comparison of System 1 and System 2 Thinking

System 1 "Fast"	System 2 "Slow"
DEFINING CHARACTERISTICS Unconscious Effortless Automatic	DEFINING CHARACTERISTICS Deliberate and conscious Effortful Controlled mental process
WITHOUT self-awareness or control	WITH self-awareness or control
"What you see is all there is."	Logical and skeptical
ROLE Assesses the situation Delivers updates	ROLE Seeks new/missing information Makes decisions



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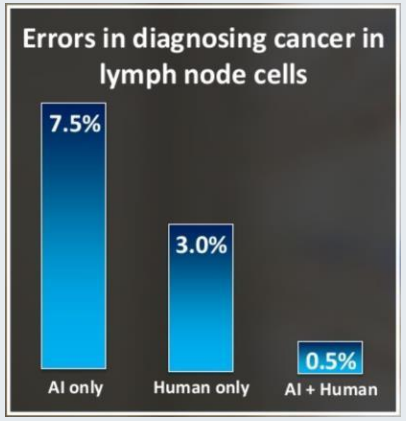

"Weak human + machine + superior process was greater than a strong computer and, remarkably, greater than a strong human + machine with inferior process."

Garry Kasparov

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