

What is Artificial Intelligence?

UNDERSTANDING ARTIFICIAL INTELLIGENCE



Iván Palomares Carrascosa

Senior Data Science & AI Manager

What is AI?

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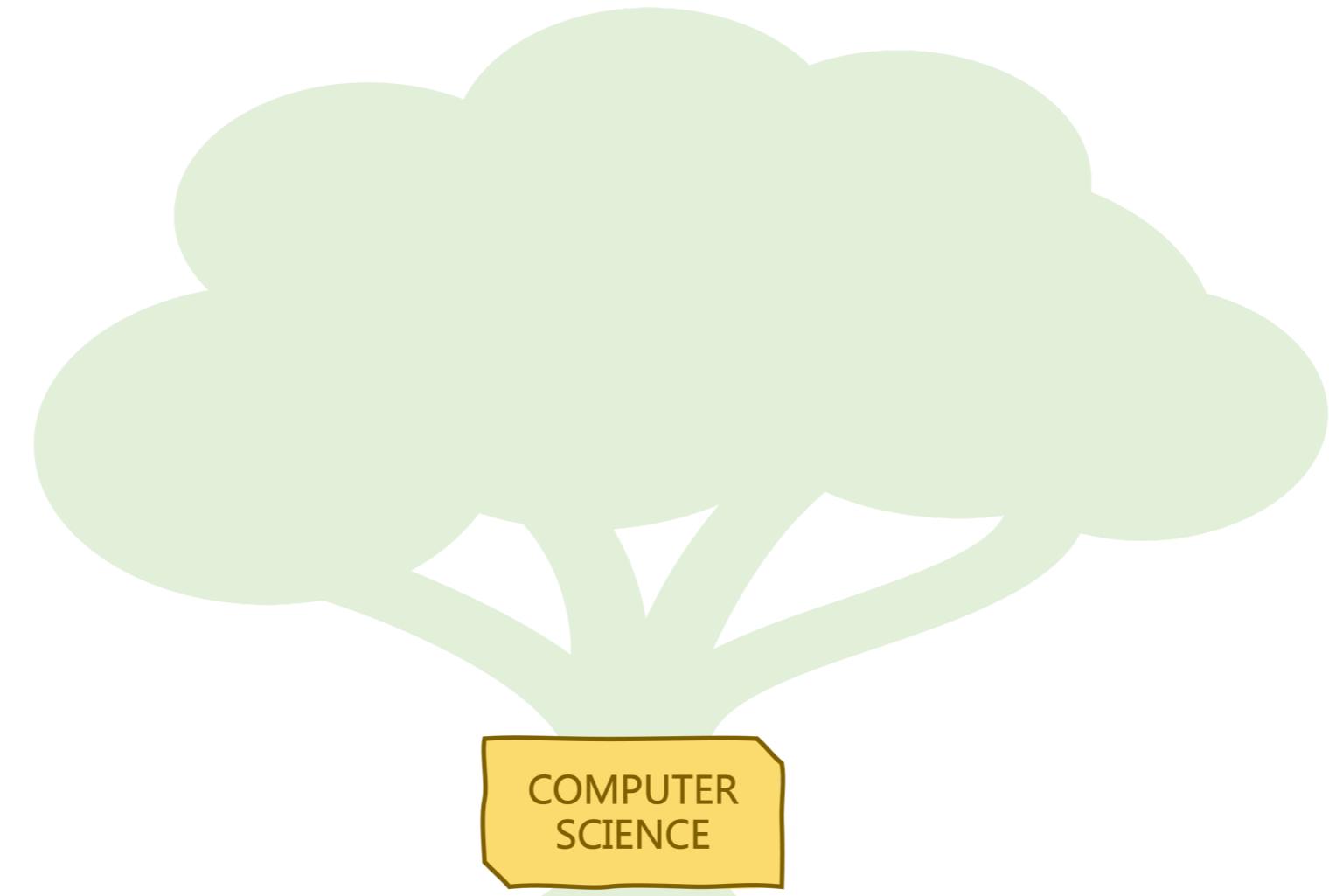
Stuart Russell, 2015

"Machine intelligence is the last invention that humanity will ever need to make"

Nick Bostrom, 2015

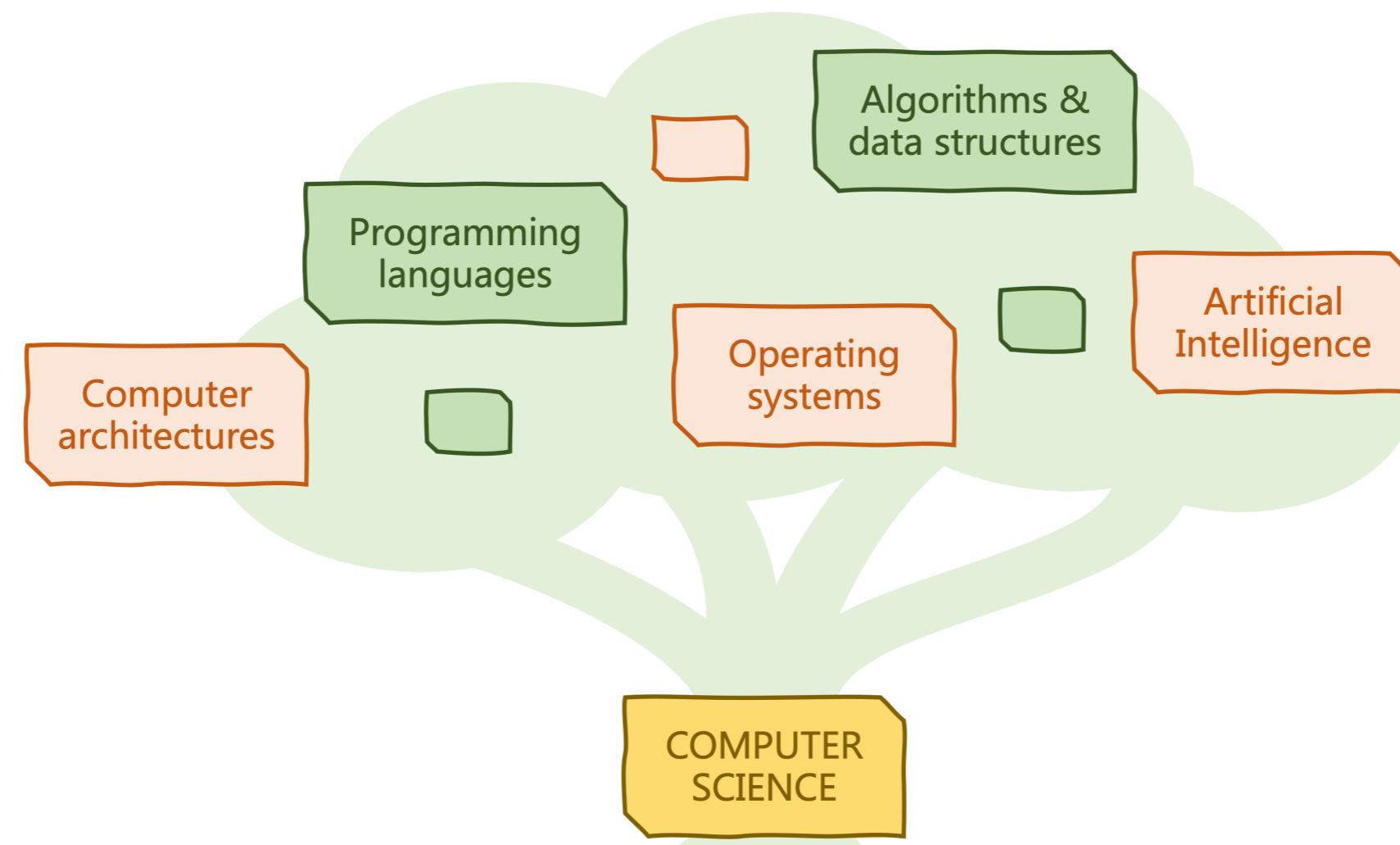
First things first: Computer Science

The group of technical knowledge needed for the **automatic processing of information by computers**: hardware, software, data, networks, ...



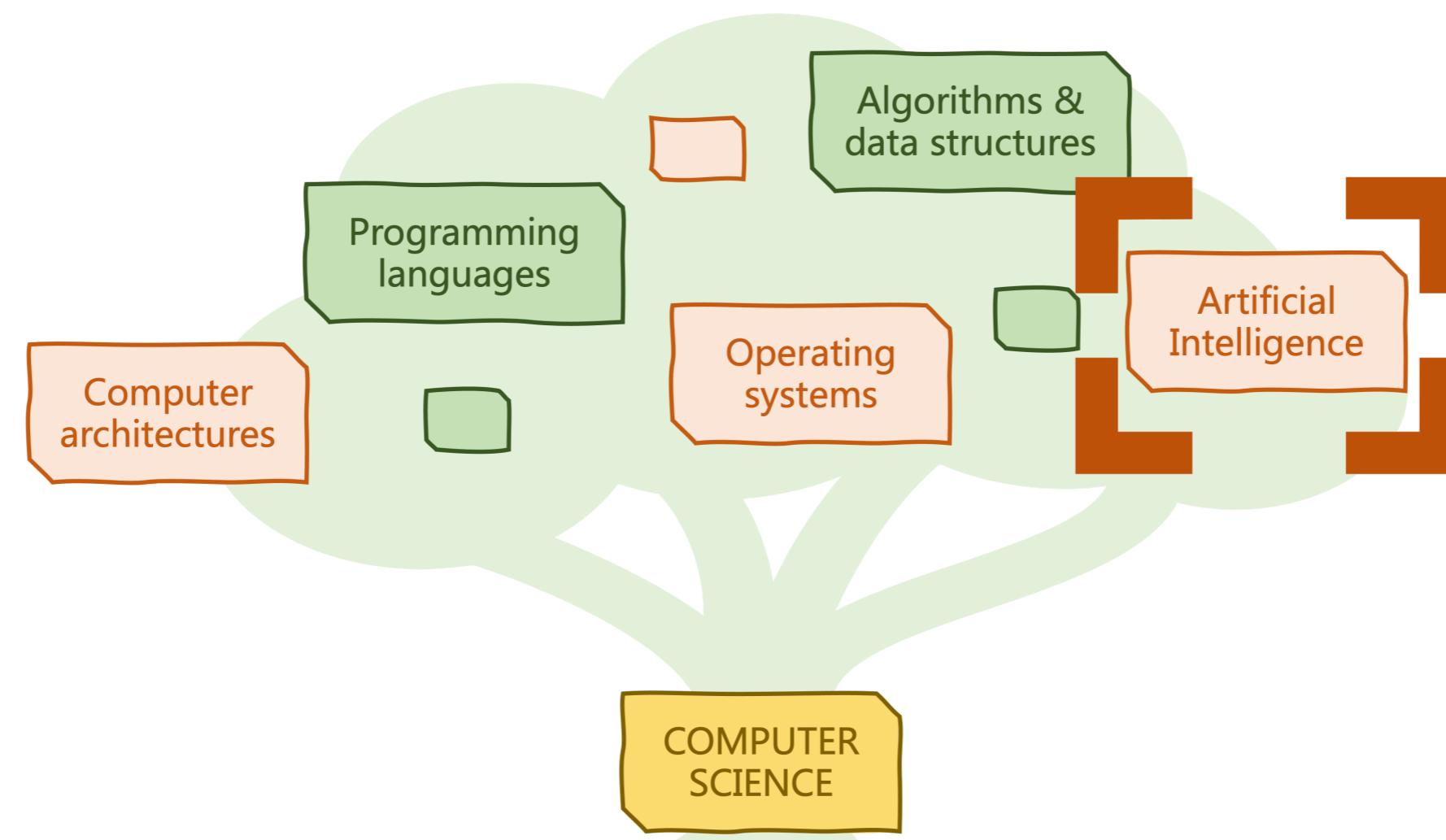
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Artificial Intelligence (AI)

"The science and engineering of making intelligent machines" (McCarthy, 1955)



Machines that learn to mimic reasoning, decision-making, and in general exhibit some degree of human-like intelligence to solve a problem.

EU Commission, 2019:

"Systems that, given a goal, perceive their environment, interpret the collected data, reason to derive knowledge, and decide the best action(s) to achieve the goal".

AI vs Artificial General Intelligence

AI

AGI

Artificial Intelligence (AI)

- Perceives, interprets and learns from data.
- Reasons and makes decisions
- Excels at solving specific tasks

Artificial General Intelligence (AGI)

- Equals or exceeds average human intelligence
- Solves a breadth of tasks intelligently

AI vs Artificial General Intelligence

AI

AGI

Examples of AI

- Voice assistants
- Facial recognition
- Personalized recommendations
- Autonomous industrial robots

"Halfway" examples towards AGI

- Self-driving cars
- AlphaGo
- **Generative AI:** Language Models (e.g. GPT)

Let's practice!

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What AI can -and cannot- do?

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Things AI can do

Predictions and
inference

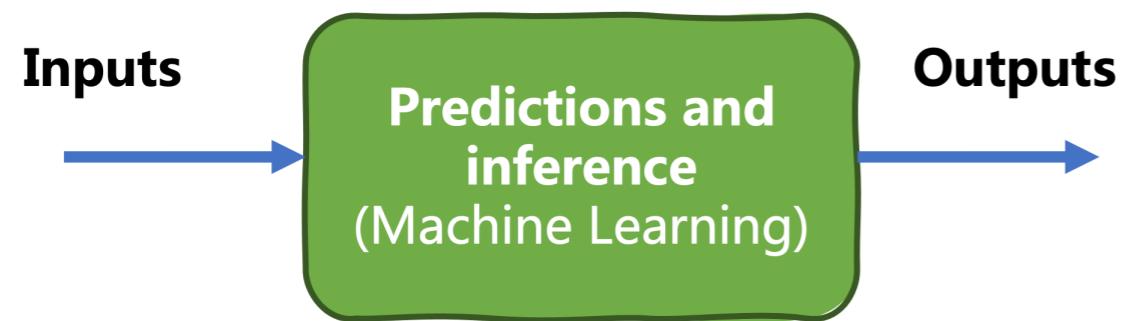
Pattern
recognition

Optimization

Automation

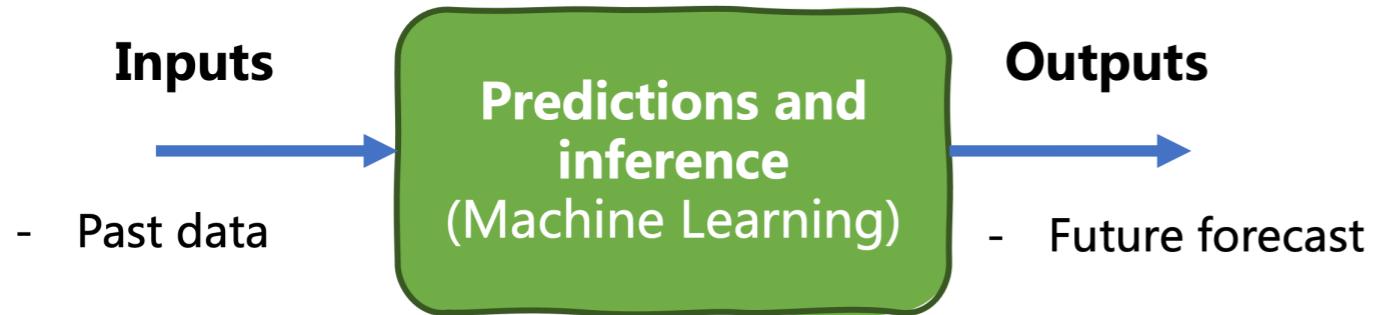
Predictions and inference

Machine Learning: Learn from **data** how to make predictions or inferences.



Predictions and inference

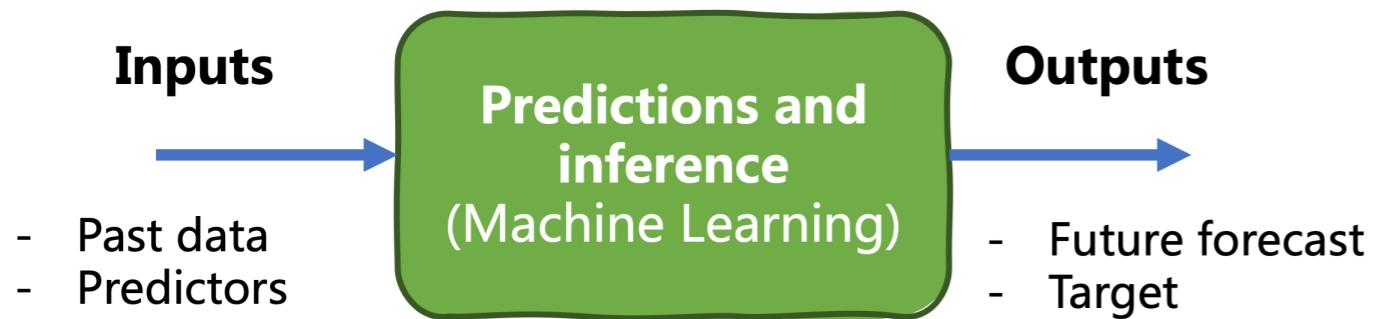
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- *Predictions:* forecasting what will happen in the *future*, e.g. weather forecast.

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- *Predictions:* forecasting what will happen in the *future*, e.g. weather forecast.
- *Inference:* determine *output* based on data *inputs* (predictors), e.g. books you may like.



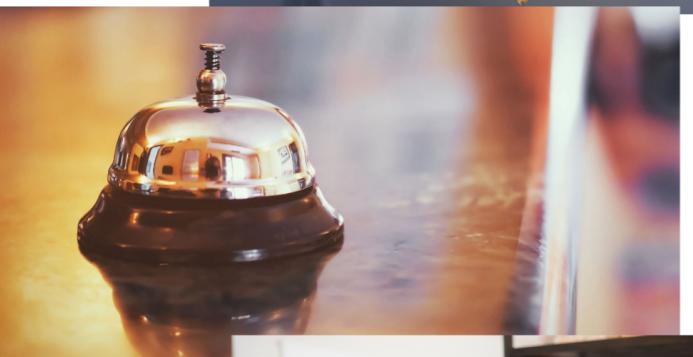
Pattern recognition

Identify patterns in the **data** to help make decisions:

- Predictions and inference
- Clustering (*segmentation*)
- Anomaly detection
- Data generation (*Generative AI*)



Optimization



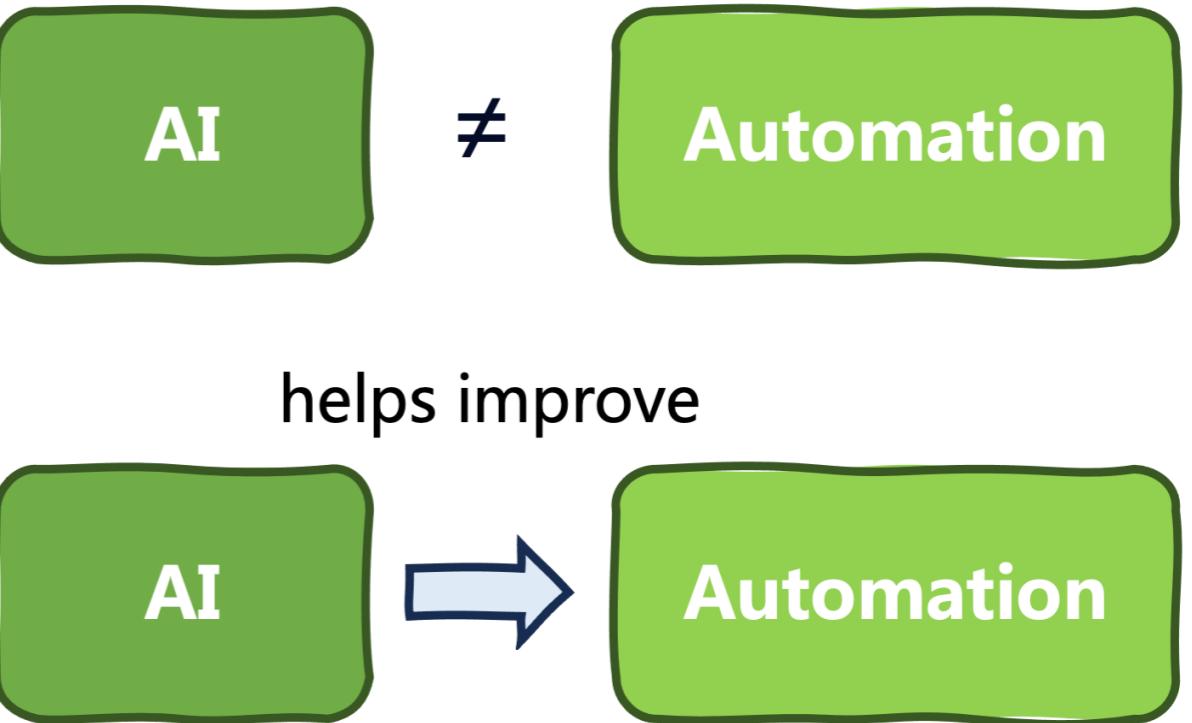
Find the *best* possible solution for a problem at a minimum cost, under constraints.

- **Logistics and delivery:** smart routing
- **Energy:** Power grid operation and control
- **Tourism:** flights and hotel pricing
- **Marketing:** maximum-revenue campaigns

Automation

Automation: follow set of rules to perform (usually repetitive) tasks.

- Classifying documents, photos, etc.
- Job application screening
- Parcel management robots

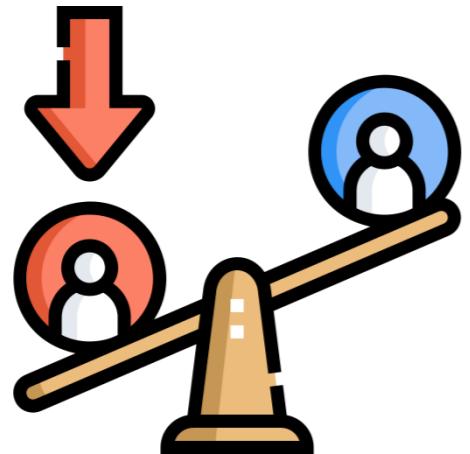


Limitations of AI

Social skills: emotional intelligence, empathy



Bias: making unfair decisions to some groups



New, unseen situations, e.g. new items to recommend



Data ...

0110
1001
1010

Let's practice!

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Areas and related disciplines of AI

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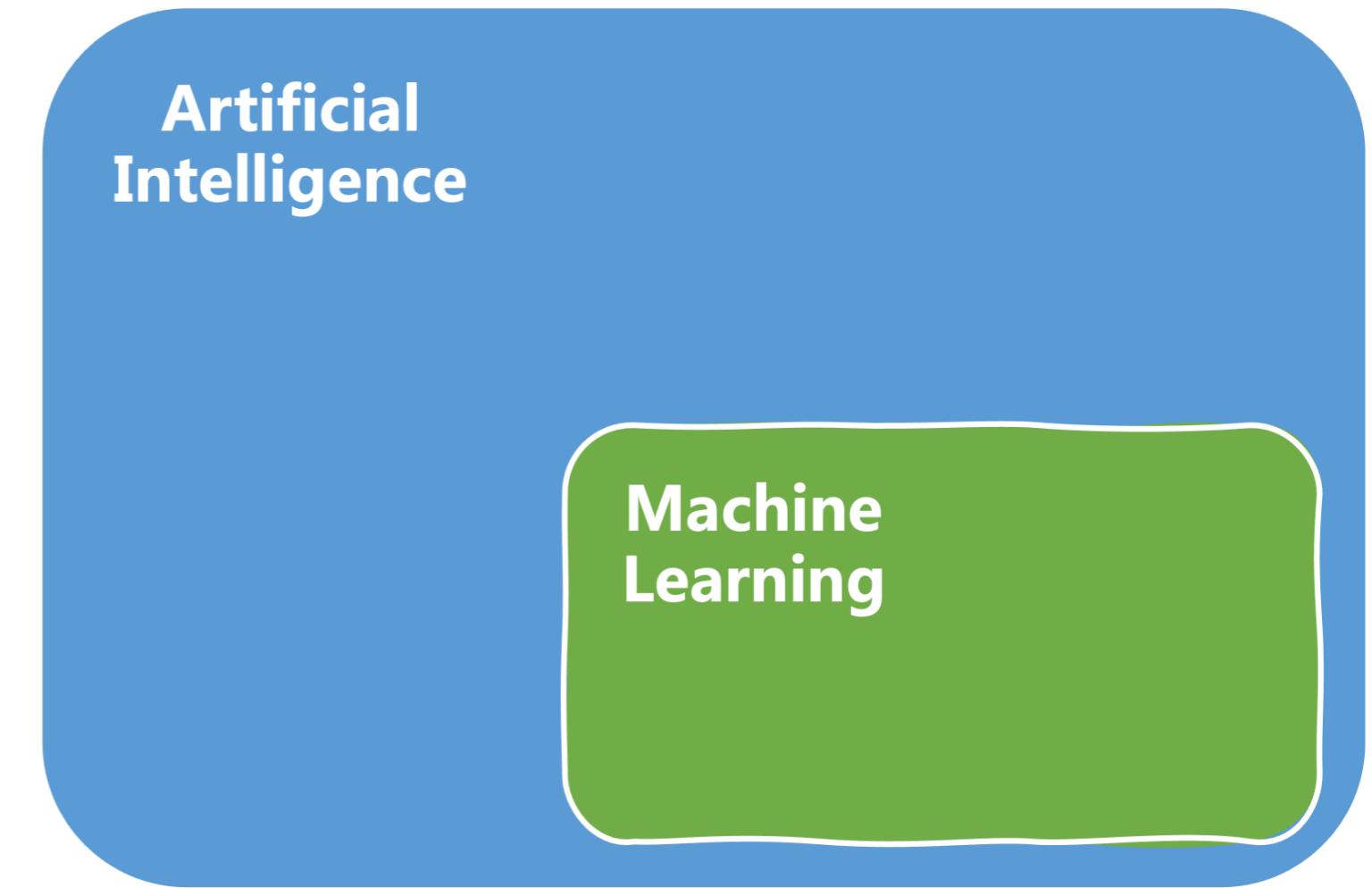
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Subdomains of Artificial Intelligence

Artificial
Intelligence

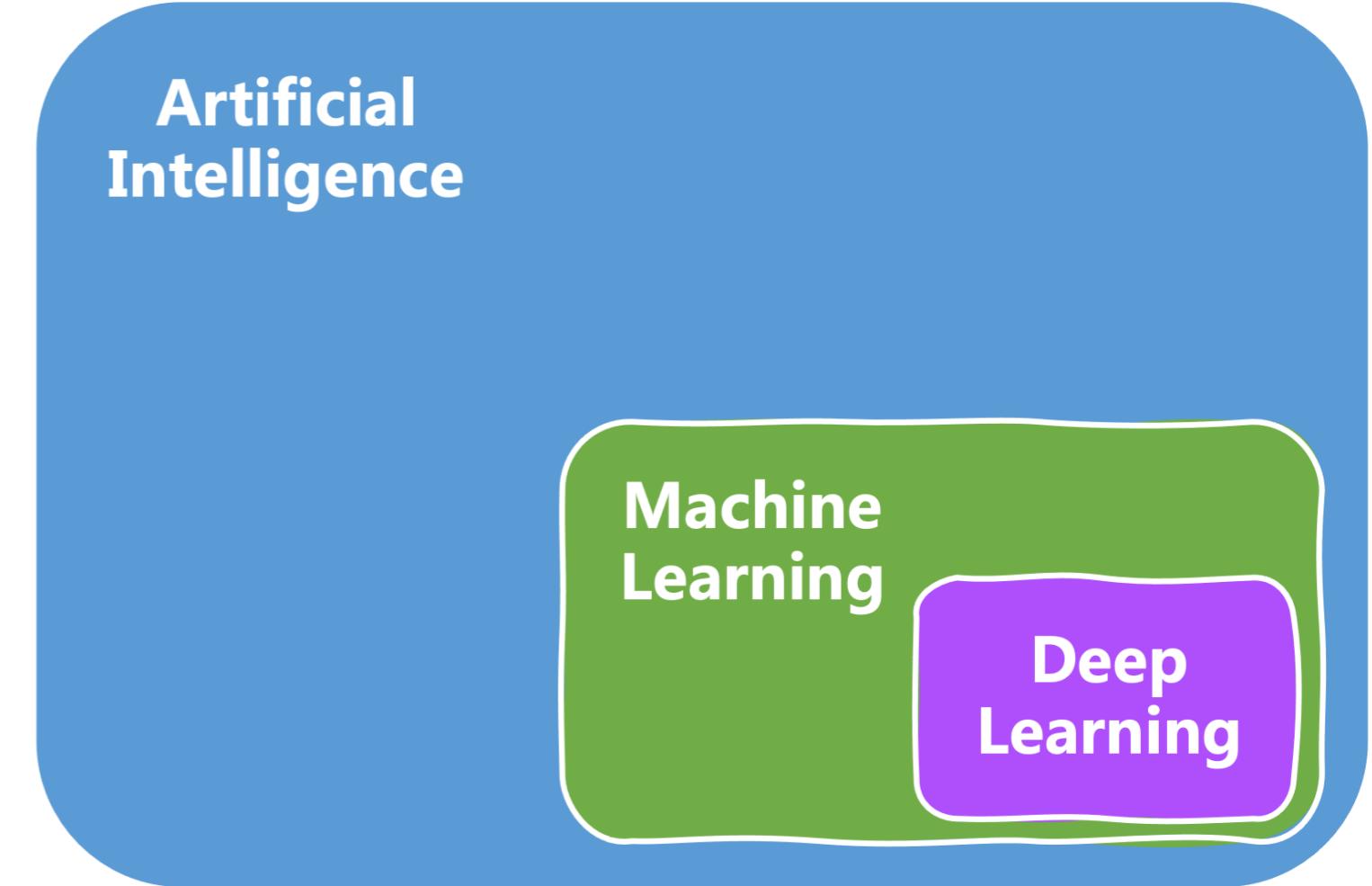
Subdomains of Artificial Intelligence

- **Machine Learning:** Learn from data; predictions, inference



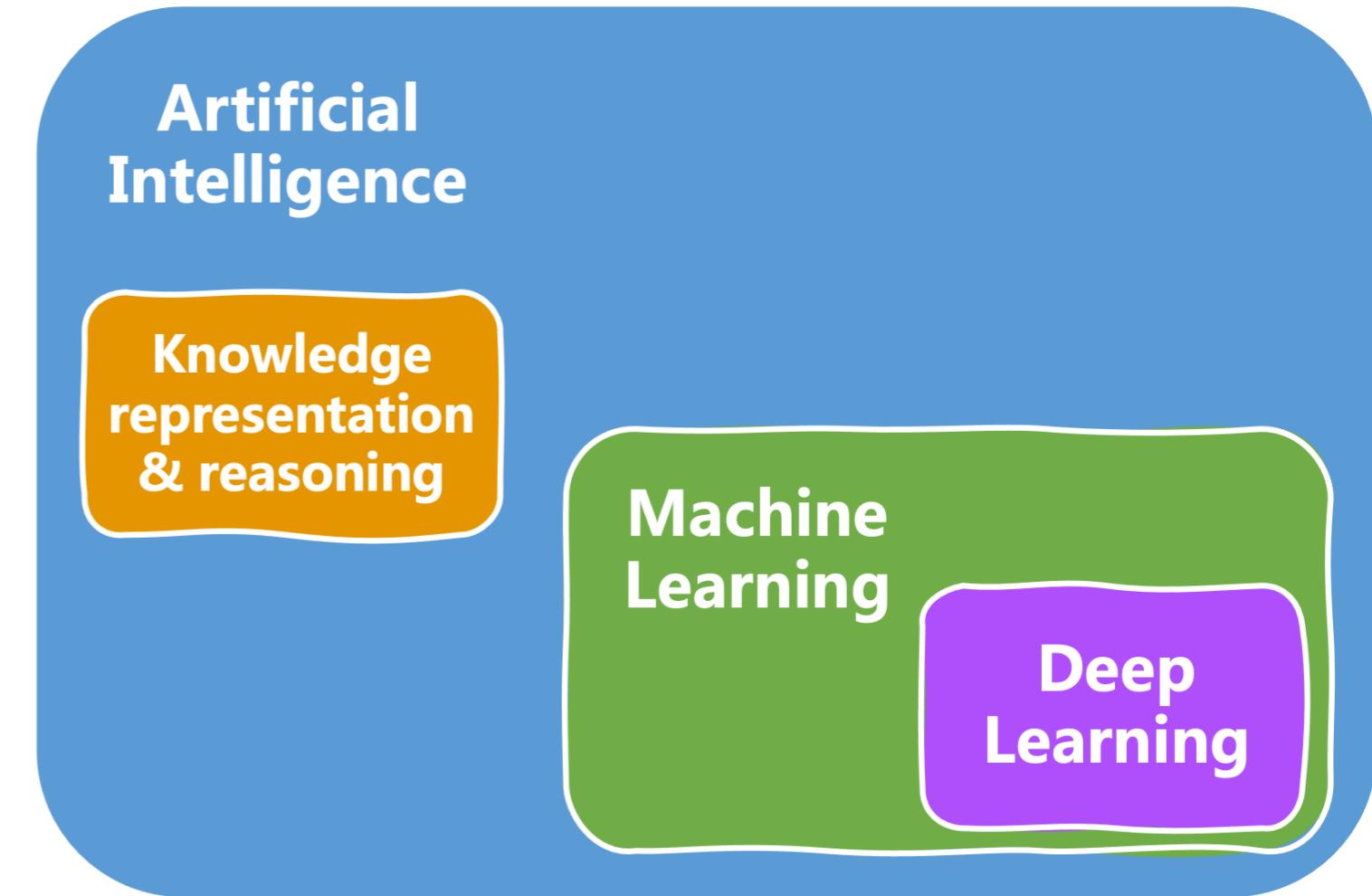
Subdomains of Artificial Intelligence

- **Machine Learning:** Learn from data; predictions, inference
 - **Deep Learning:** neural networks; solve most challenging AI problems



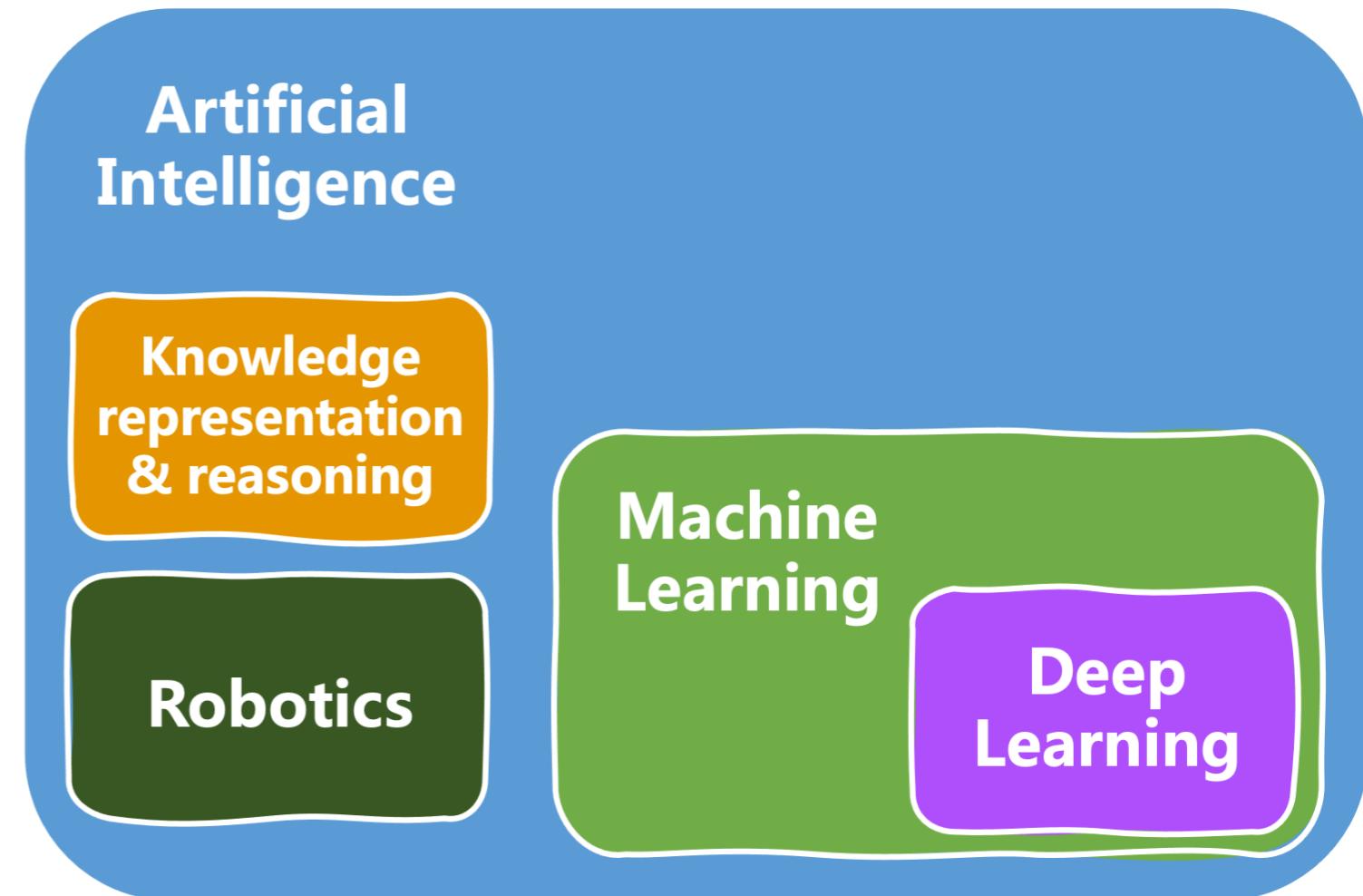
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- **Knowledge representation and reasoning:** reason, communicate with other AI systems



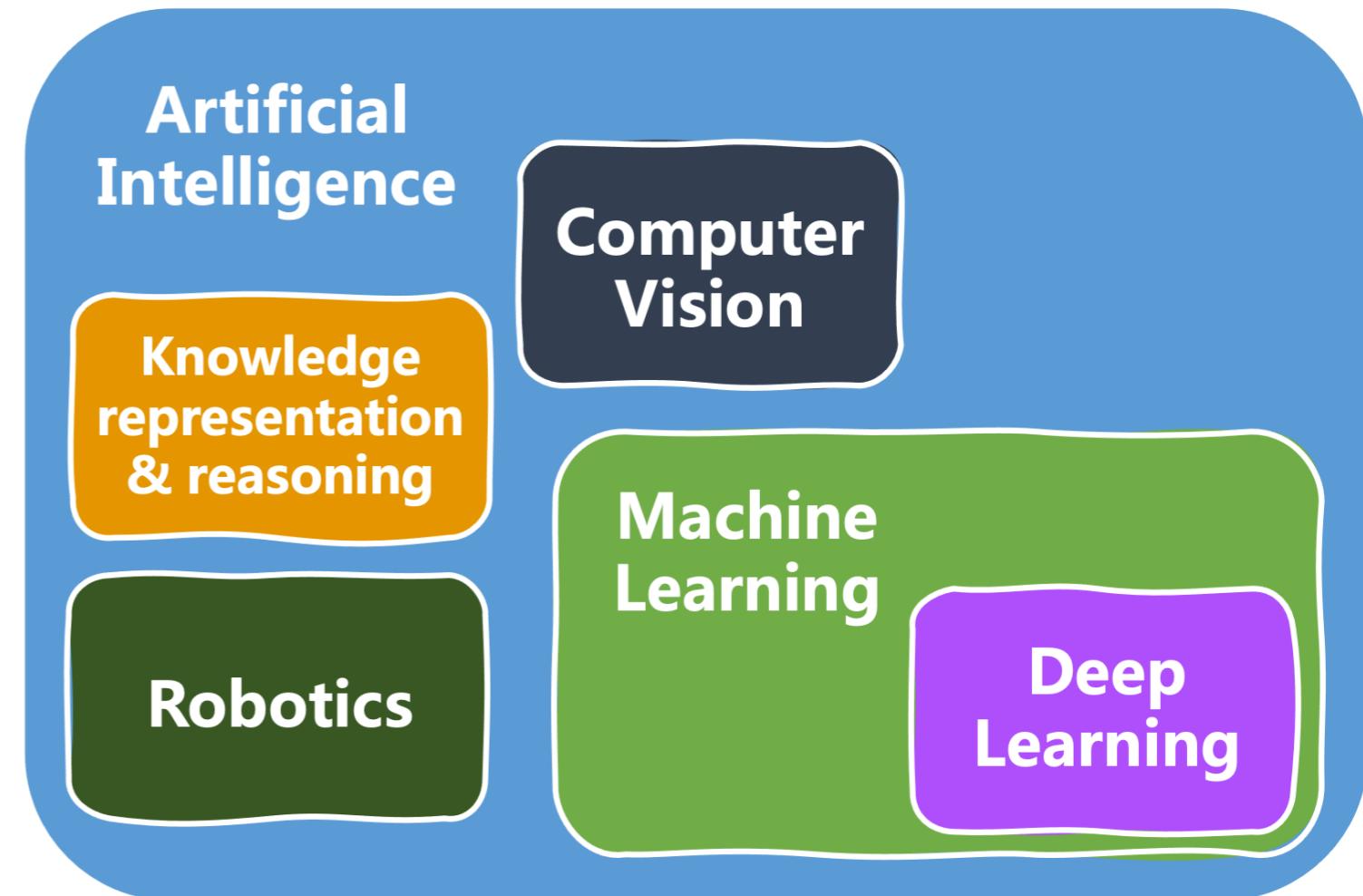
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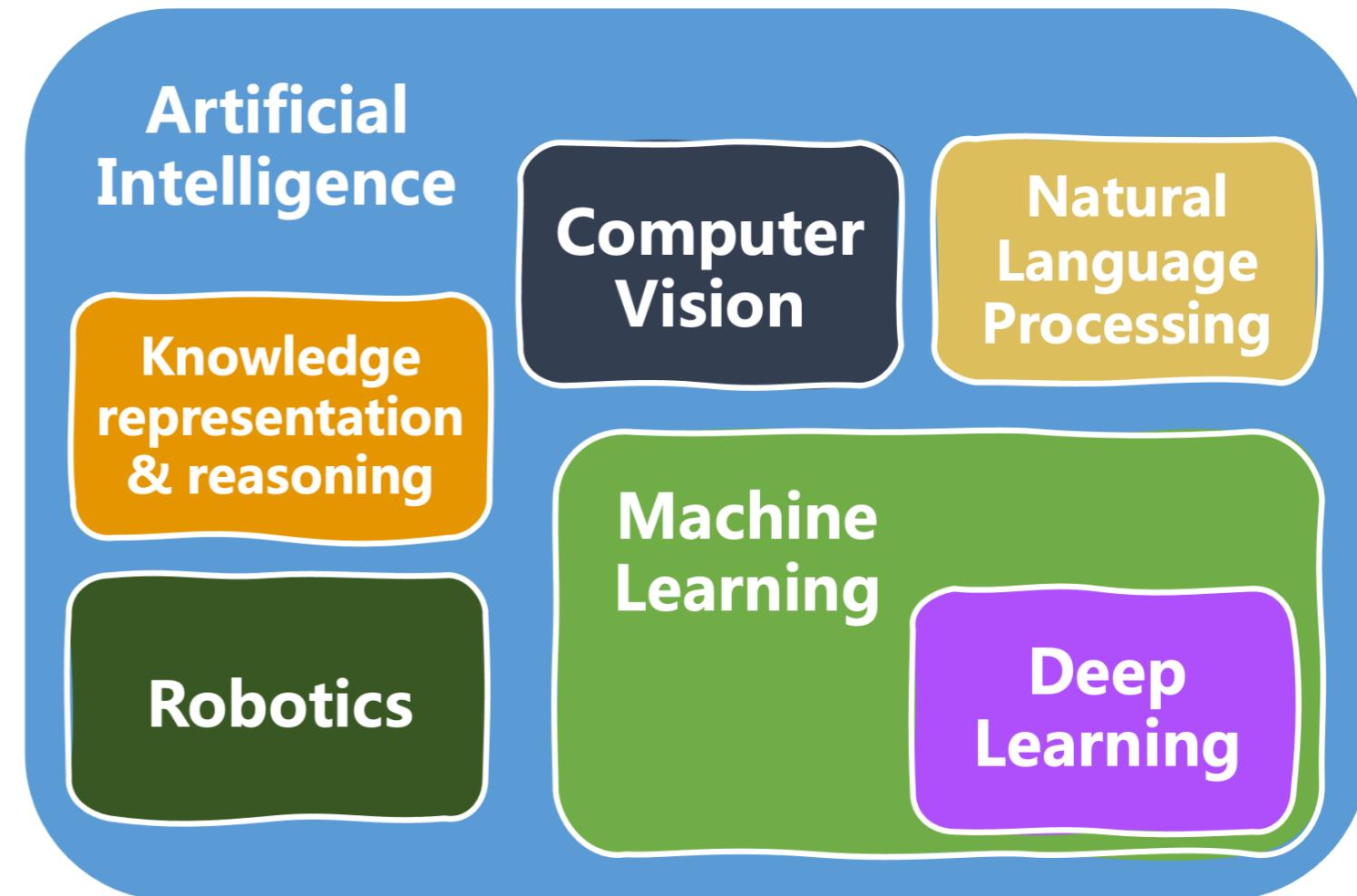
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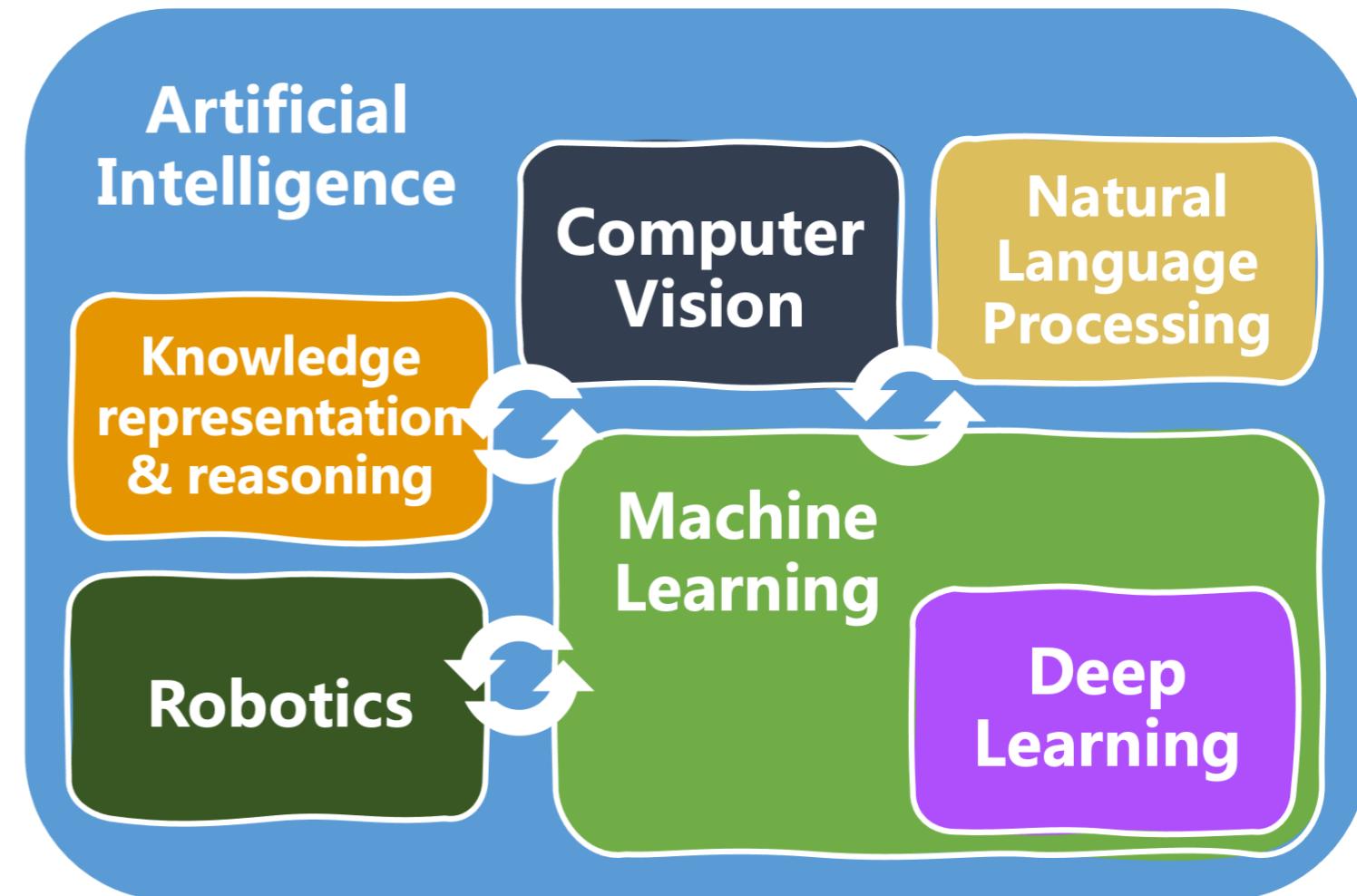
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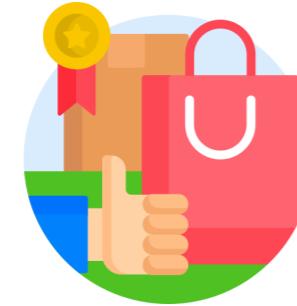
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Examples of AI applications

Personalized product recommendations

Machine Learning



Medical diagnosis

Computer Vision, Deep Learning



Warehouse management

Robotics, Computer Vision, Reasoning

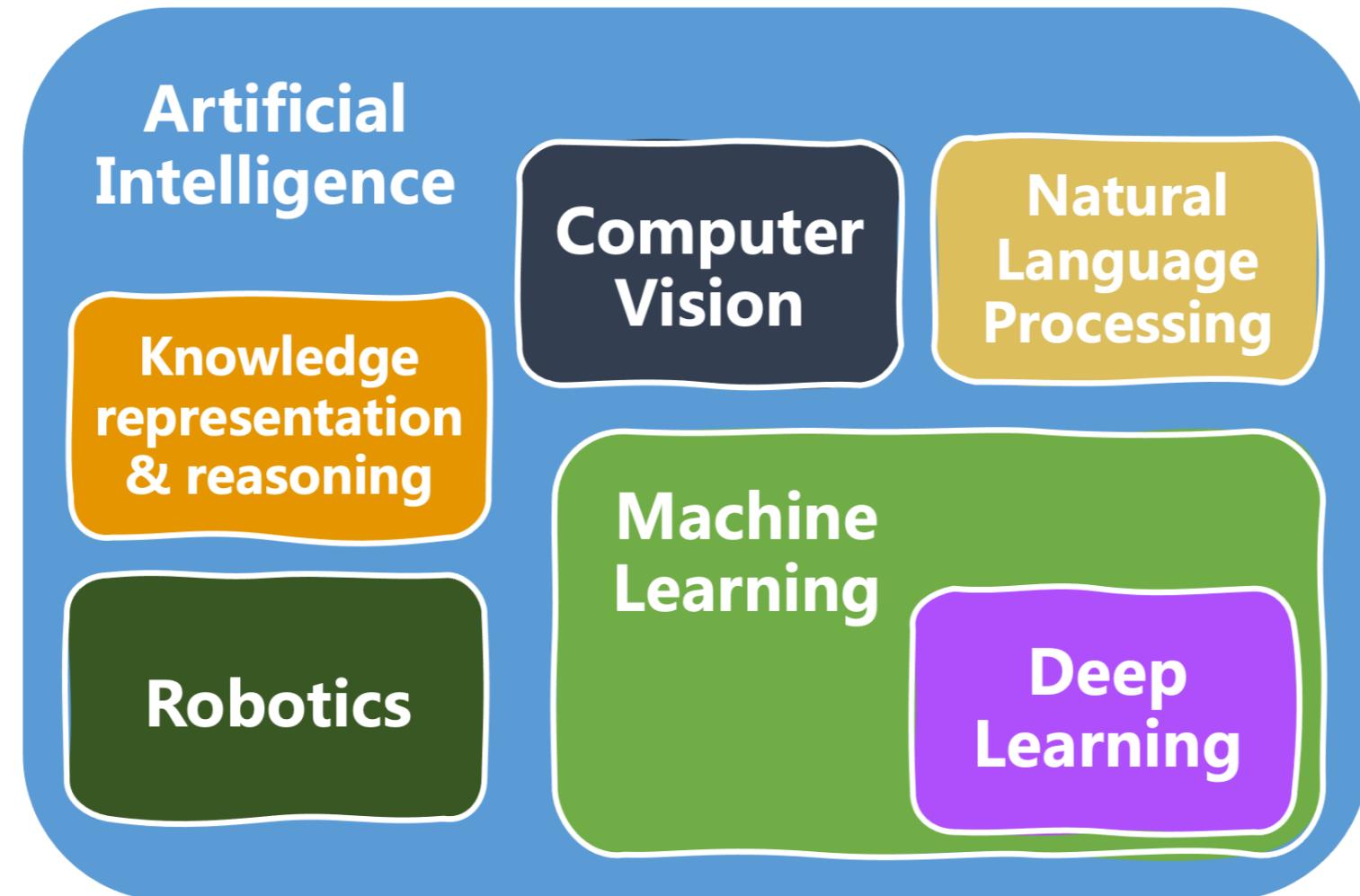


Smart voice assistants

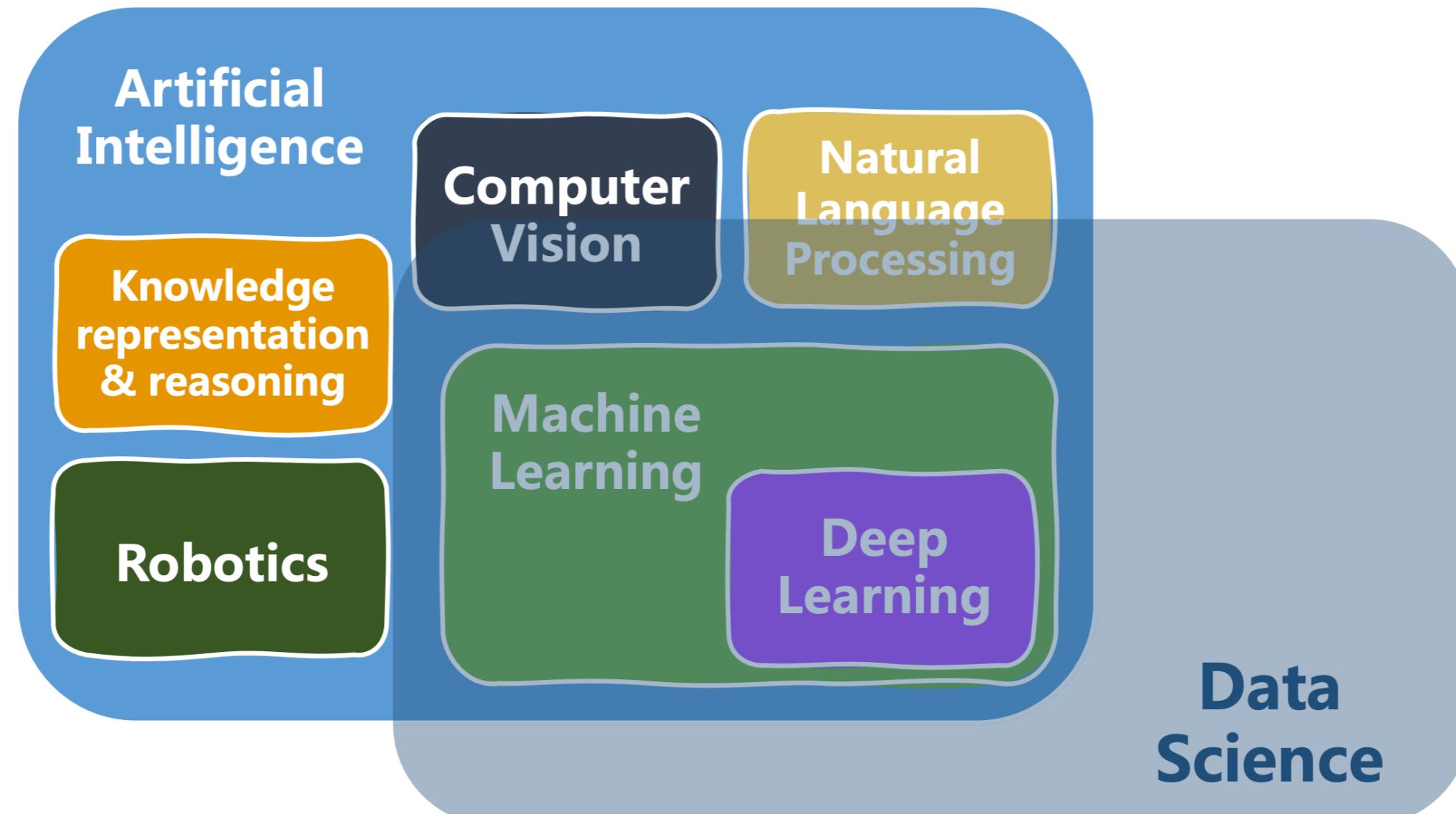
NLP, Deep Learning



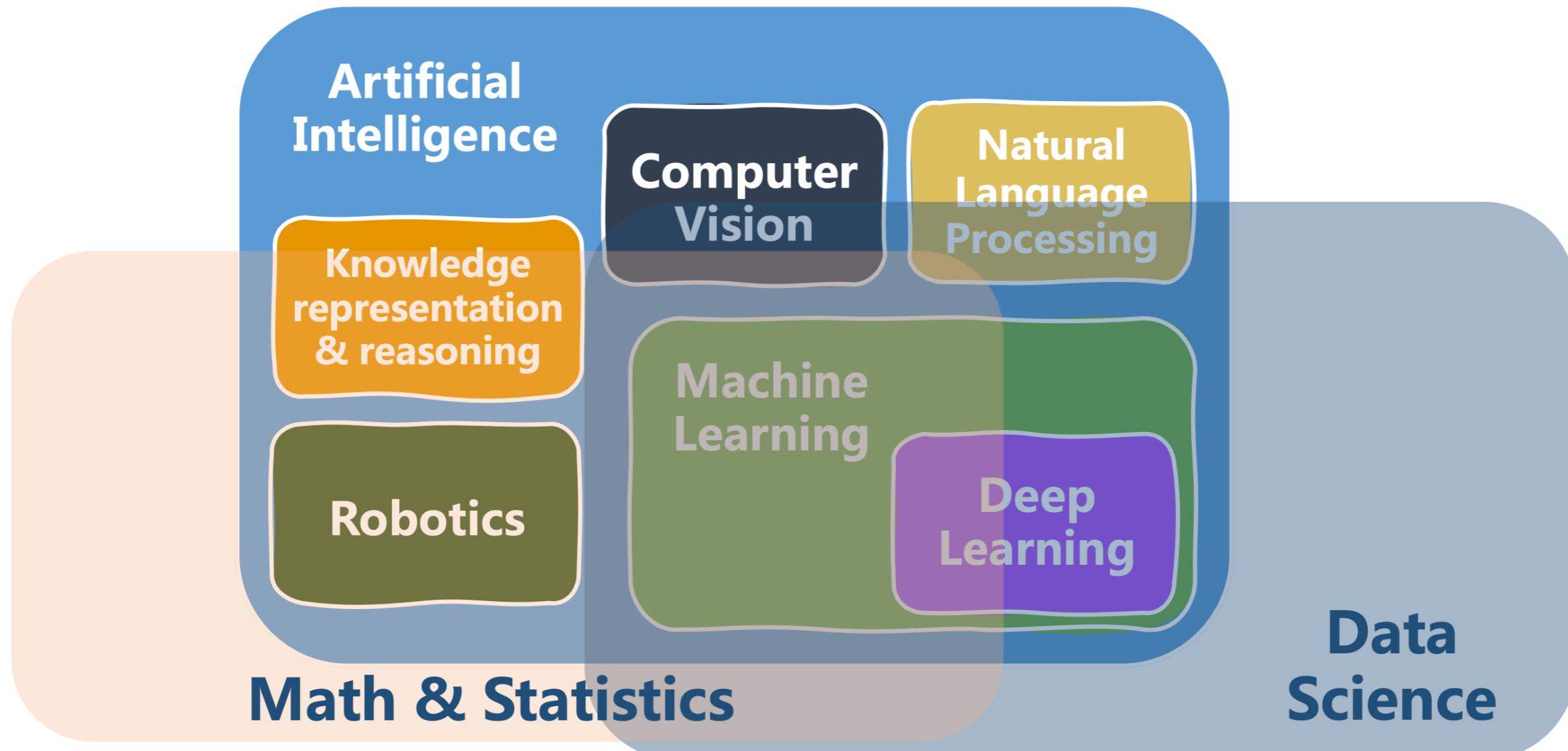
Related disciplines



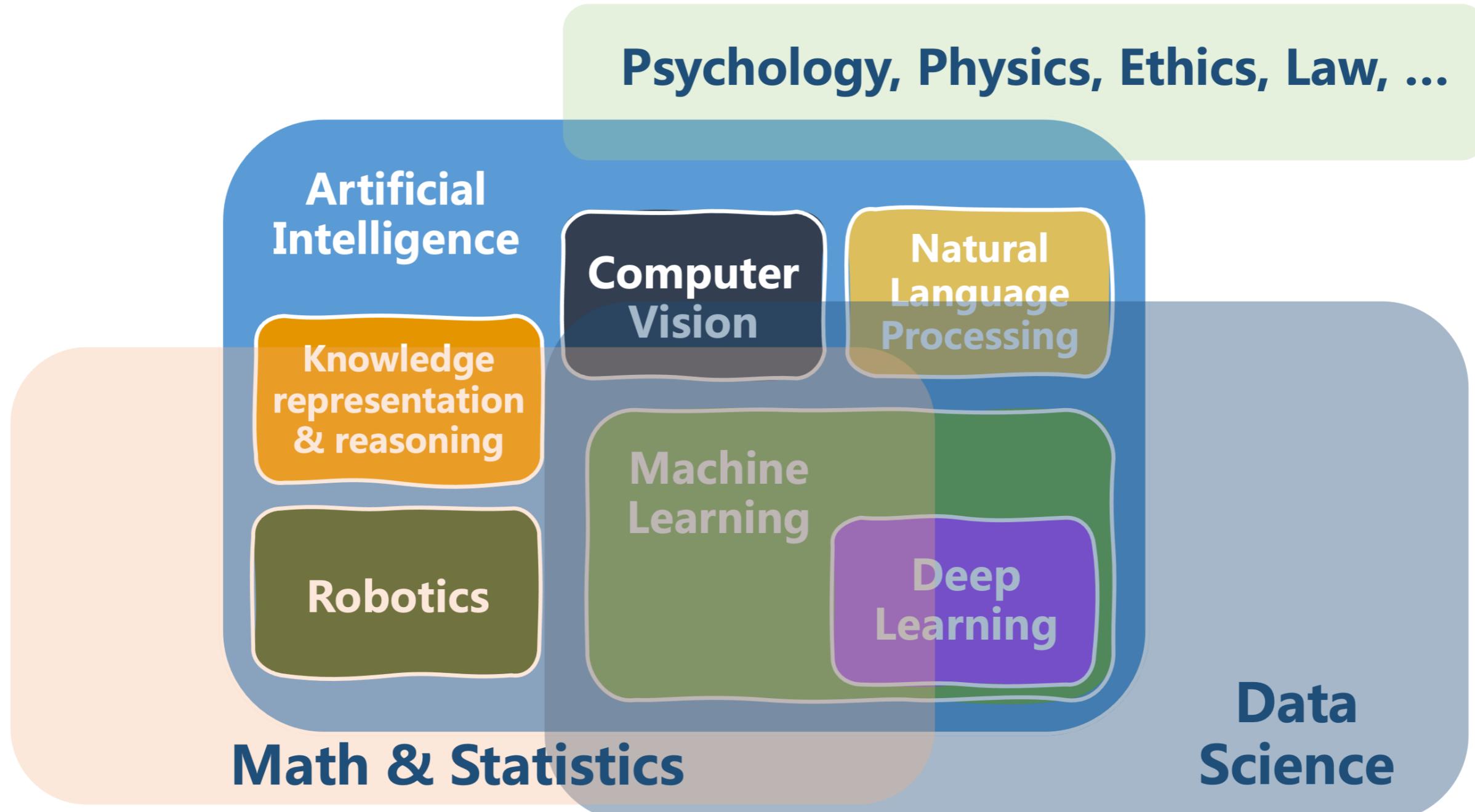
Related disciplines



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Video takeaways

- AI is an umbrella discipline with several popular areas.
- Present AI systems and applications combine principles from multiple areas.
- Math, Data Science, and Statistics are closely related disciplines to AI.

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