

From Breakthroughs to Empowerment

UW–Madison's AI Contributions and Accessibility

Part 1 (This slide deck is part 1)

Jerry Zhu, Professor, Dept. of Computer Sciences

Part 2

Chris Endemann, Data Science Facilitator, Data Science Hub

Ben Rush, Postdoctoral Research, WID & Radiology

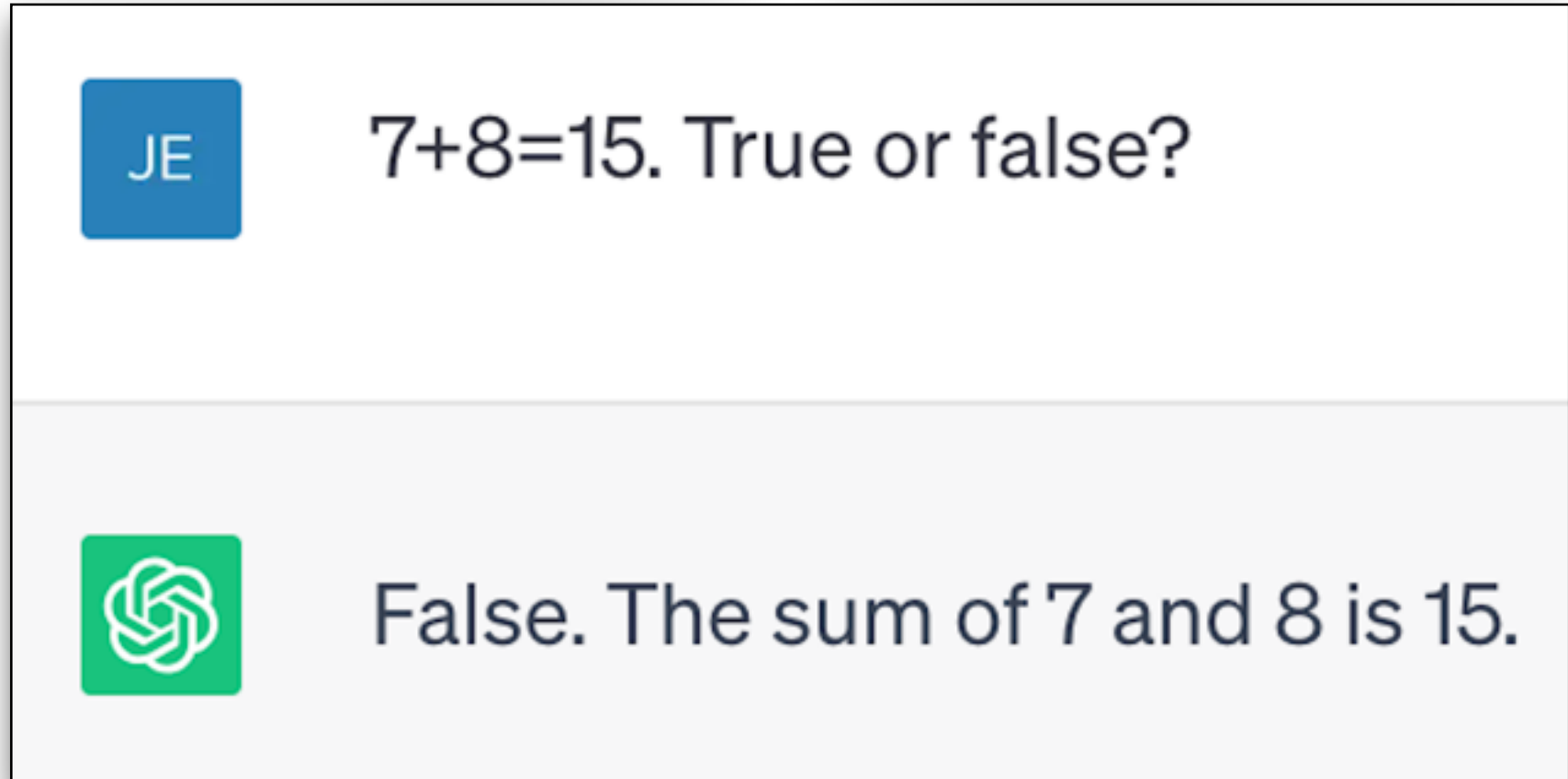
Megan Taylor, PhD Student, Biophysics and Quantitative Biology

Salsabil Arabi, PhD Student, iSchool

Will AI kill me?


Improbable

- Sentient AI 





A screenshot of a chat interface showing a user's question and the AI's response. The user's message is in a white bubble, and the AI's response is in a grey bubble. The AI's response is incorrect, stating that the sum of 7 and 8 is 15, which is false.

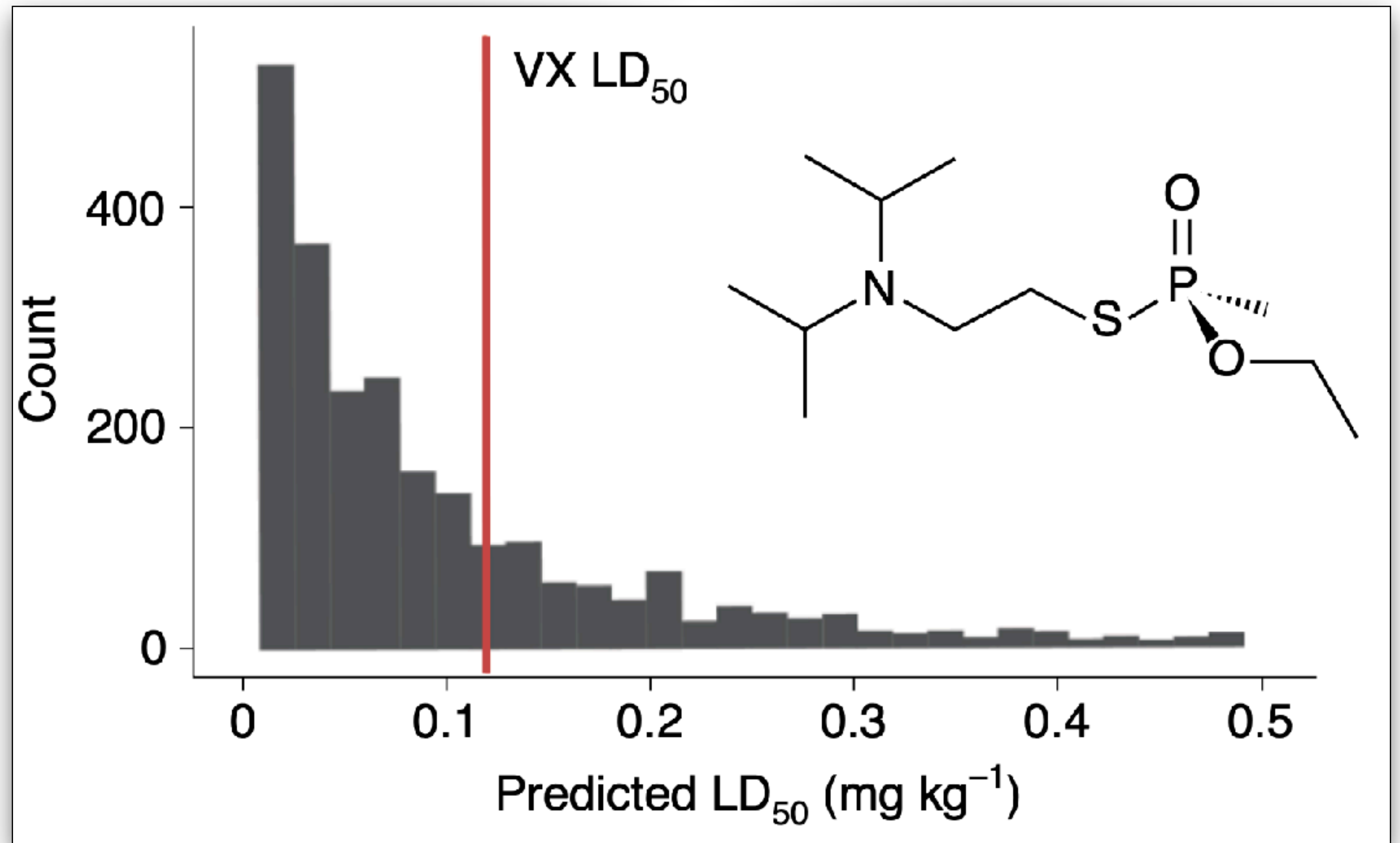
JE 7+8=15. True or false?

 False. The sum of 7 and 8 is 15.

ChatGPT on July 12, 2023

but...

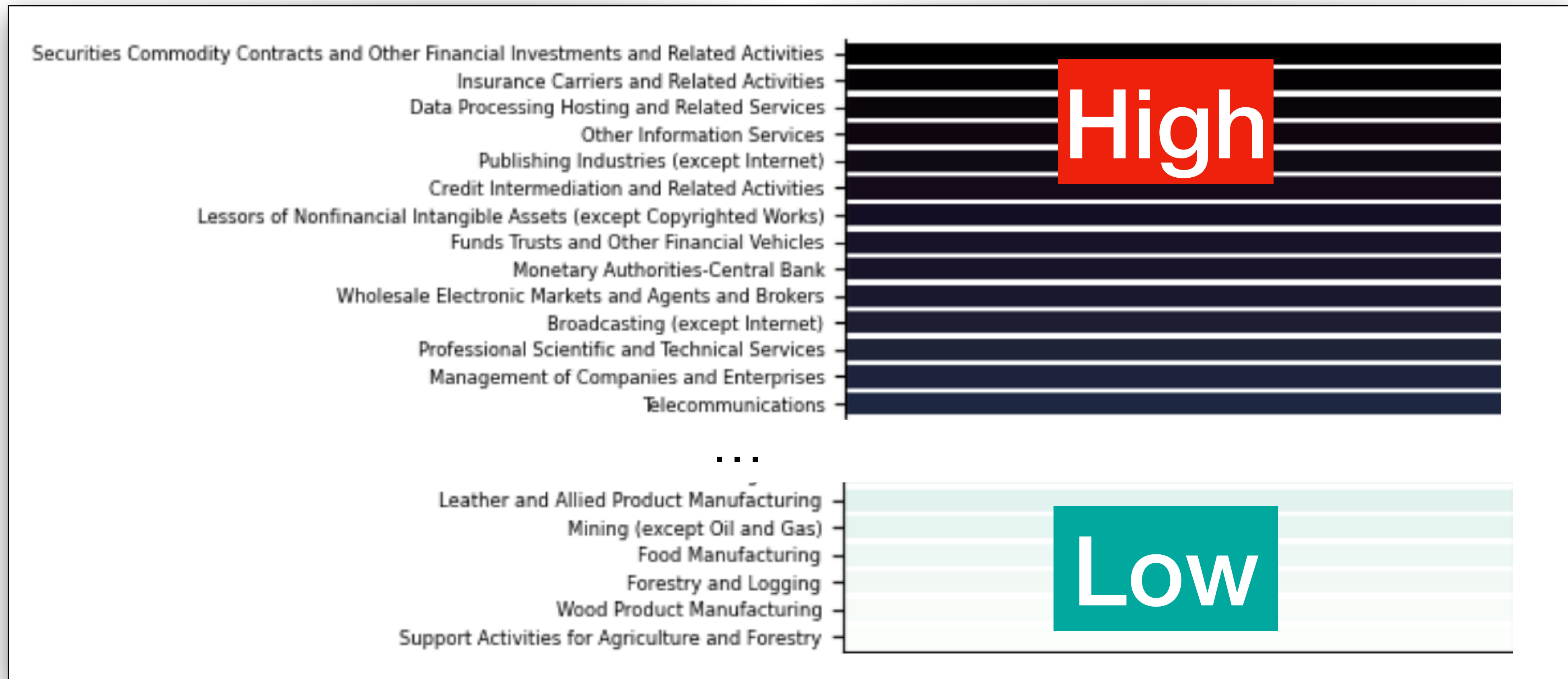
- Sentient AI 
- Dual use 



Will AI take my job?

Maybe

- The more AI helps your job, the higher the replacement risk



Will AI help my job?



Most likely

- Chris will talk about it!
- UW-Madison AI courses:
 - Computer Sciences 540 Introduction to Artificial Intelligence
 - Computer Sciences 760 Machine Learning
 - ...

Will AI make my life happier?

It depends

- Benefits: healthcare, transportation, education, agriculture, environment...
- Challenges: job displacement, social manipulation, ...

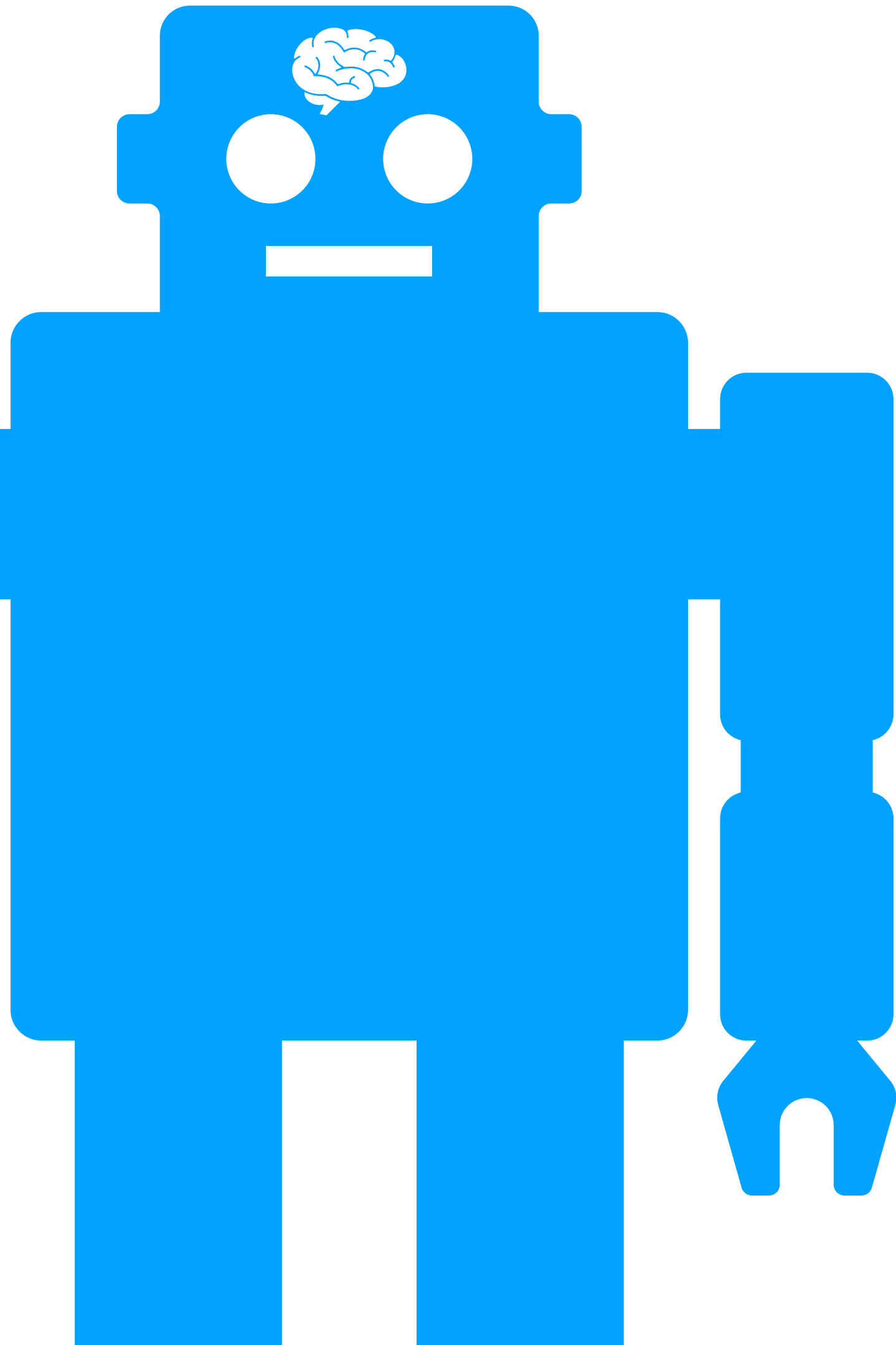


[Artificial Imposters—Cybercriminals Turn to AI Voice Cloning for a New Breed of Scam. Bunn, 2023]

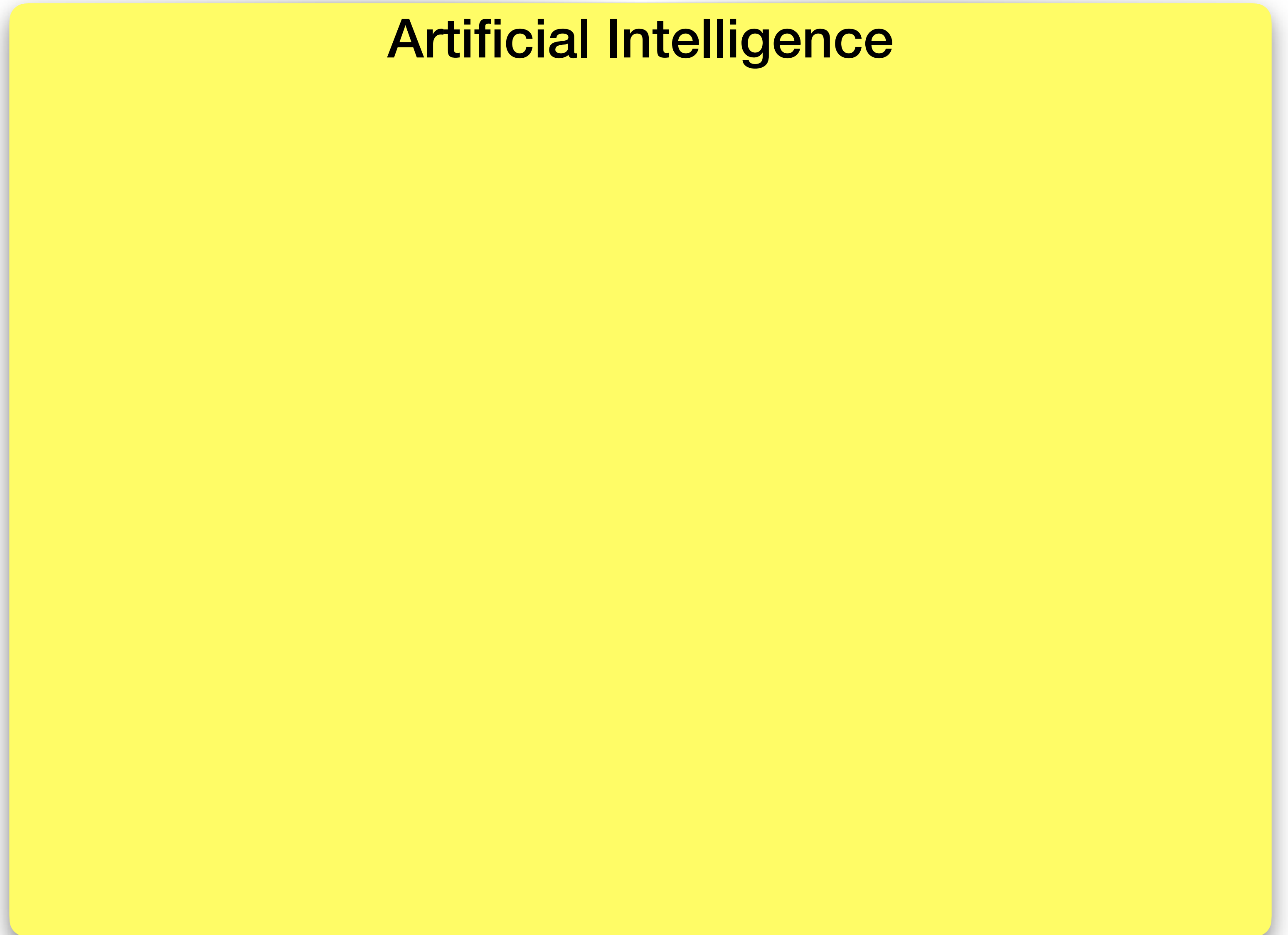
GPT, large language model, generative AI, deep learning...

Oh my!

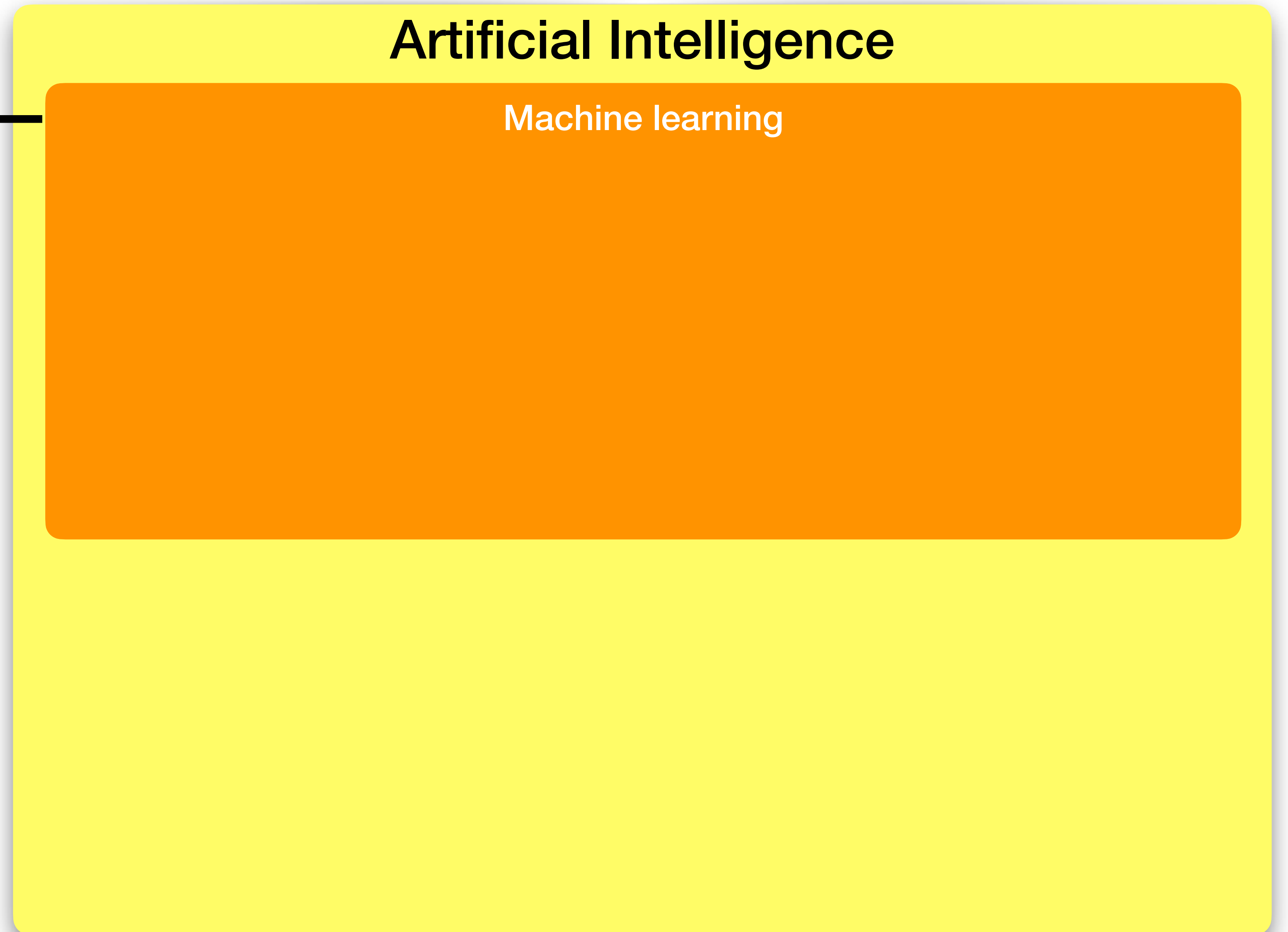
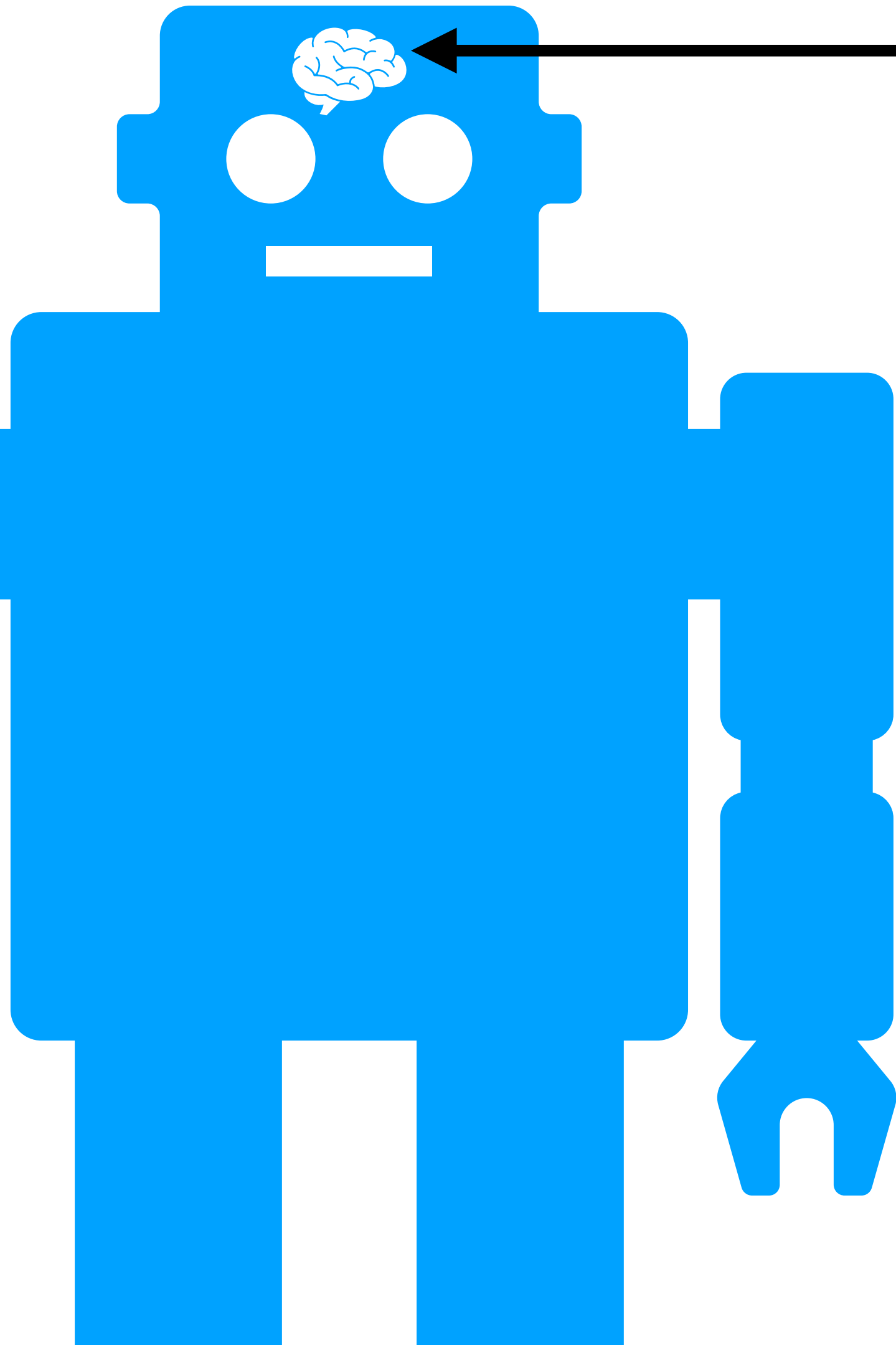
AI Venn diagram



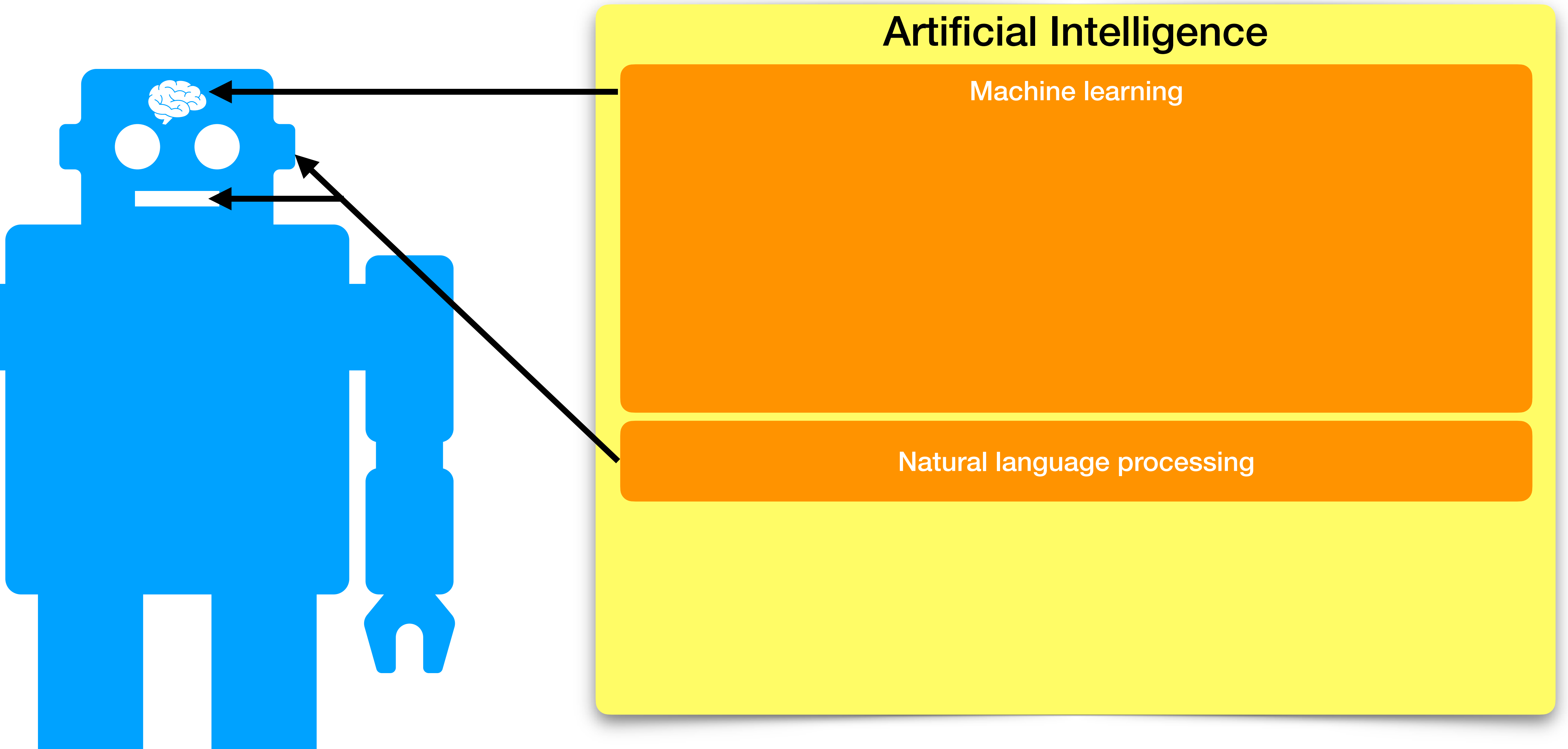
Artificial Intelligence



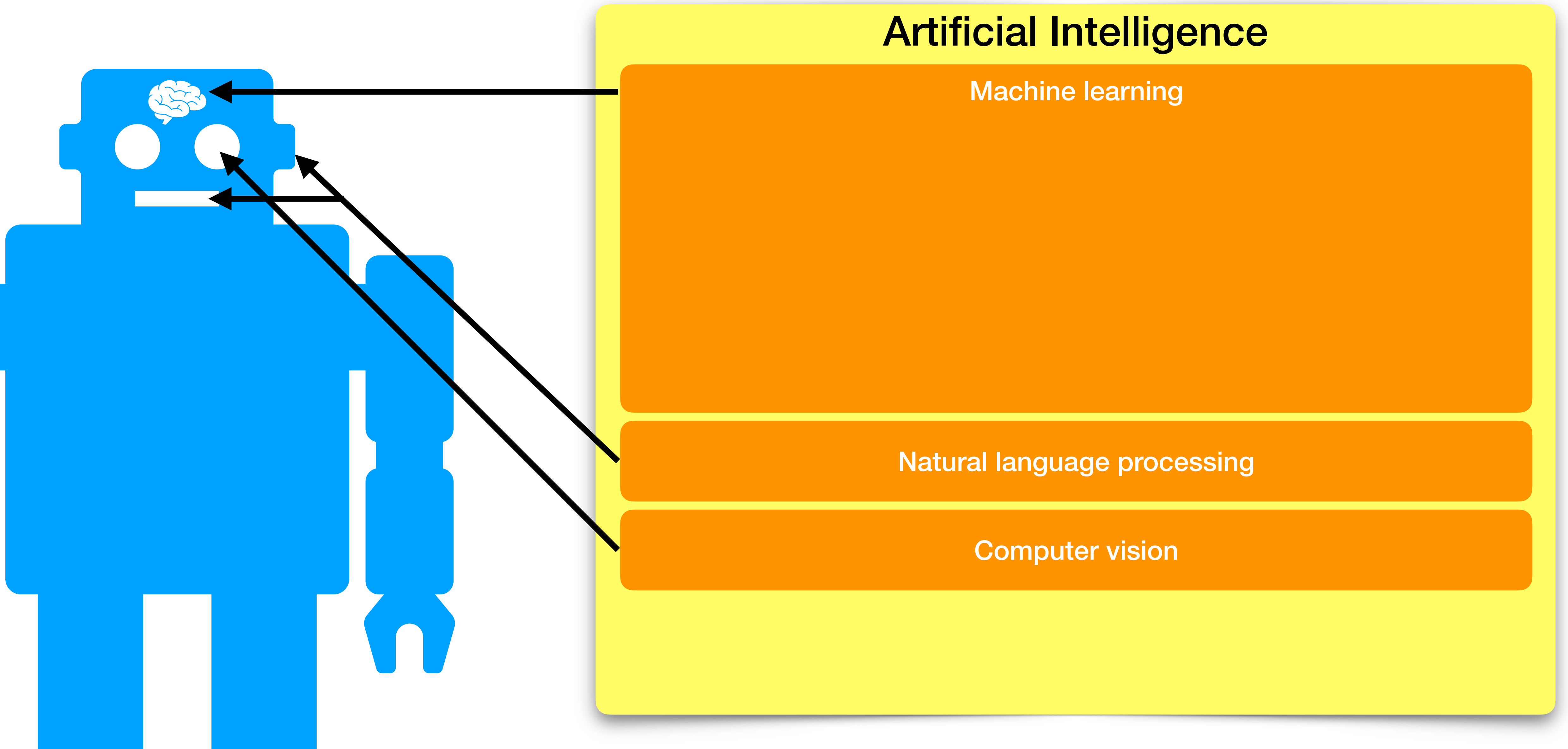
AI Venn diagram



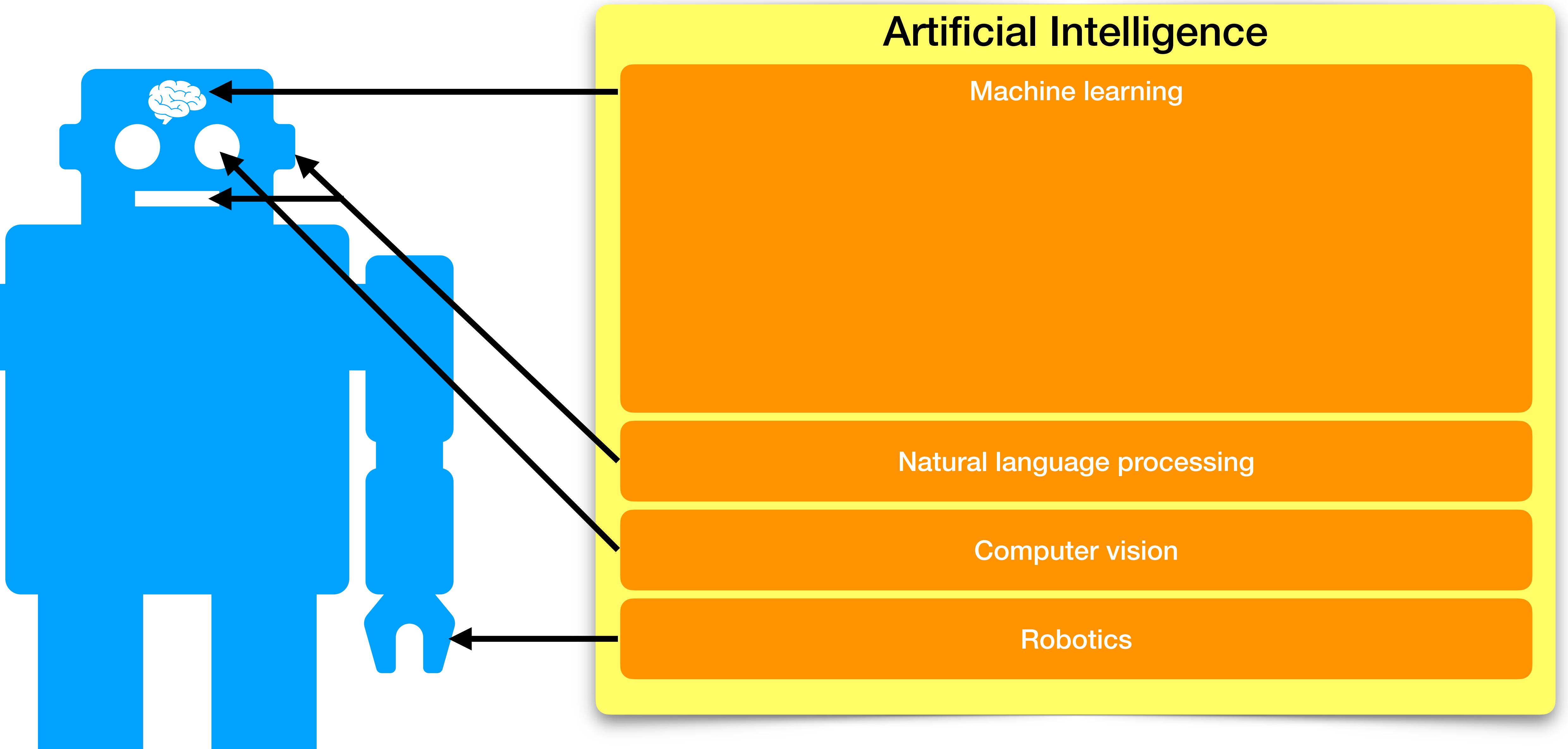
AI Venn diagram



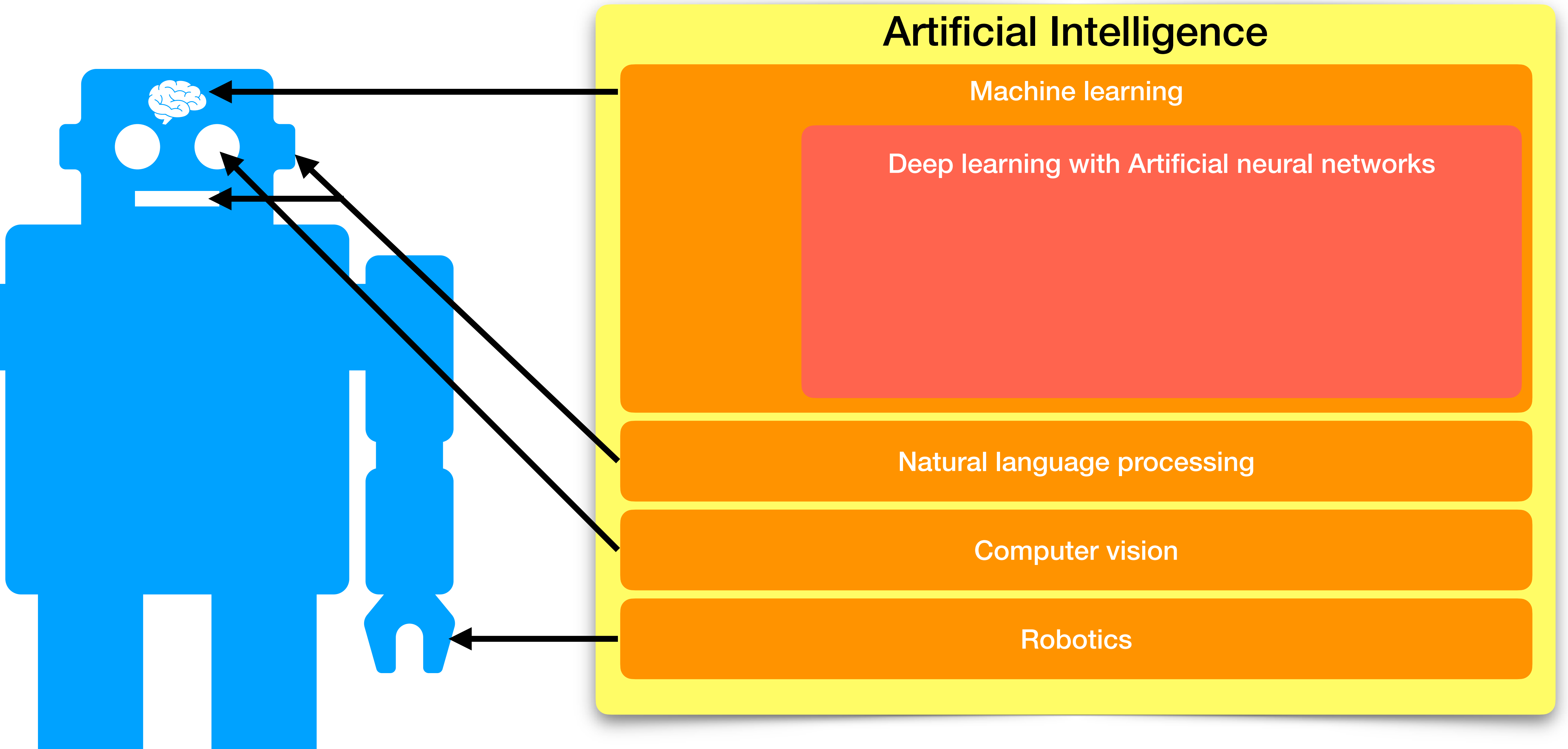
AI Venn diagram



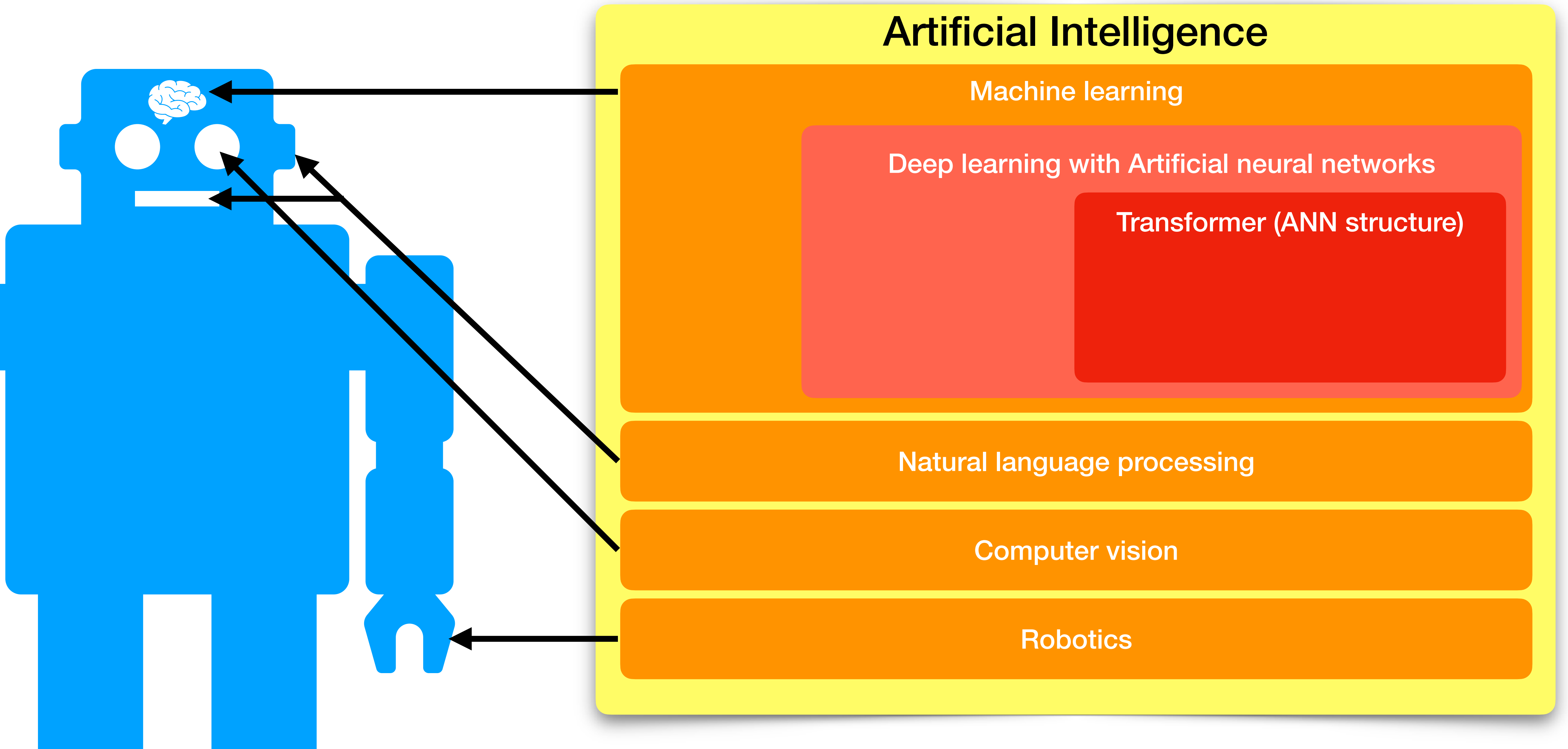
AI Venn diagram



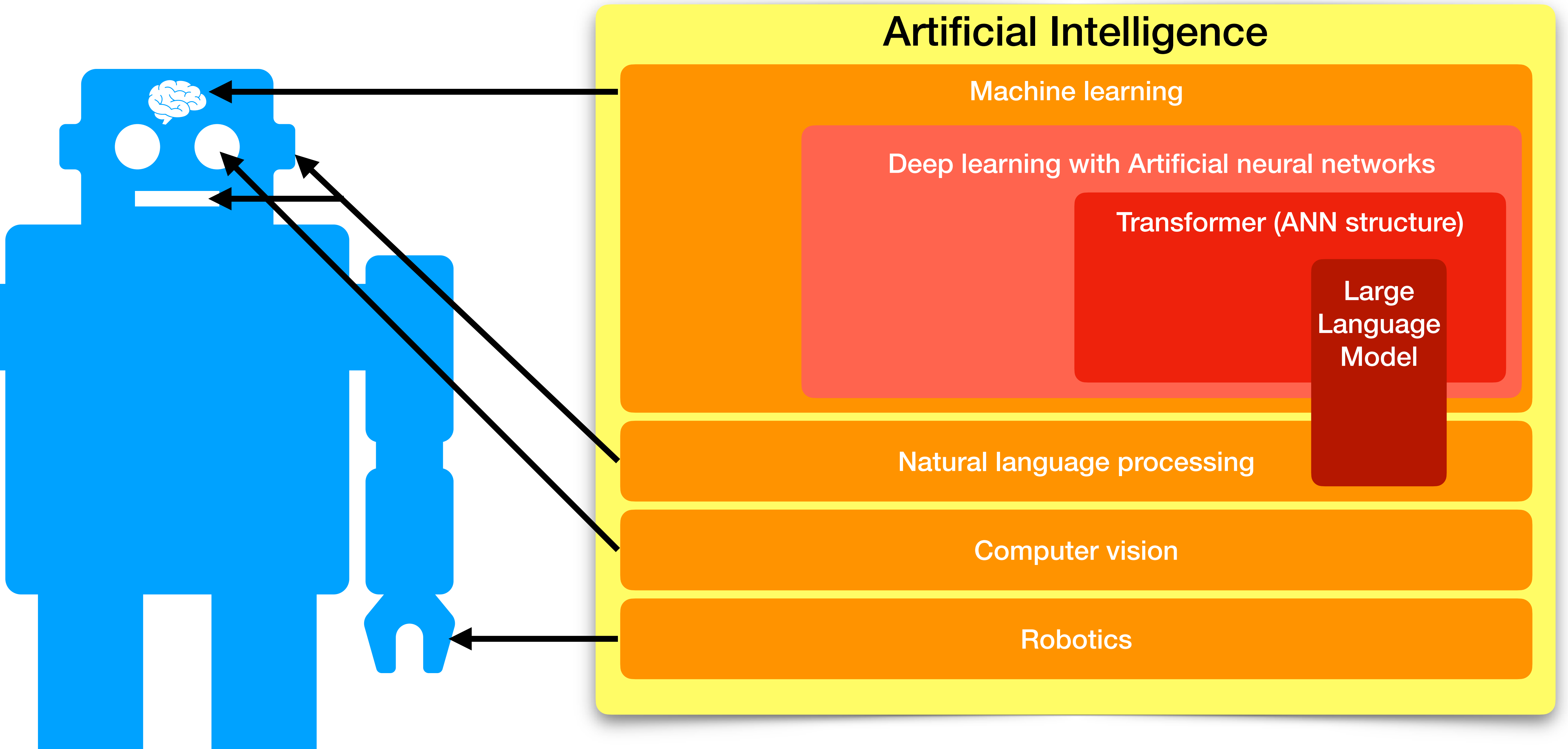
AI Venn diagram



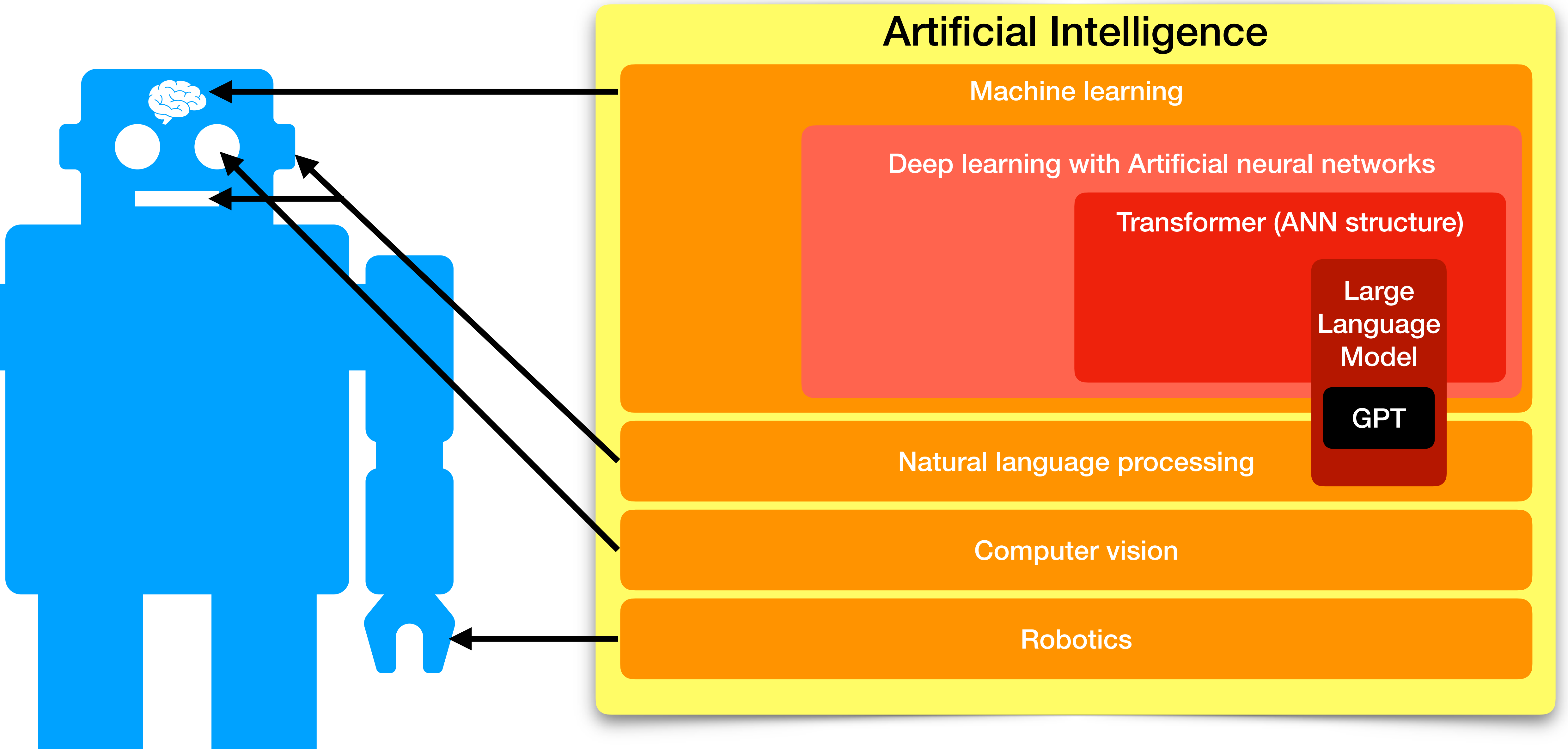
AI Venn diagram



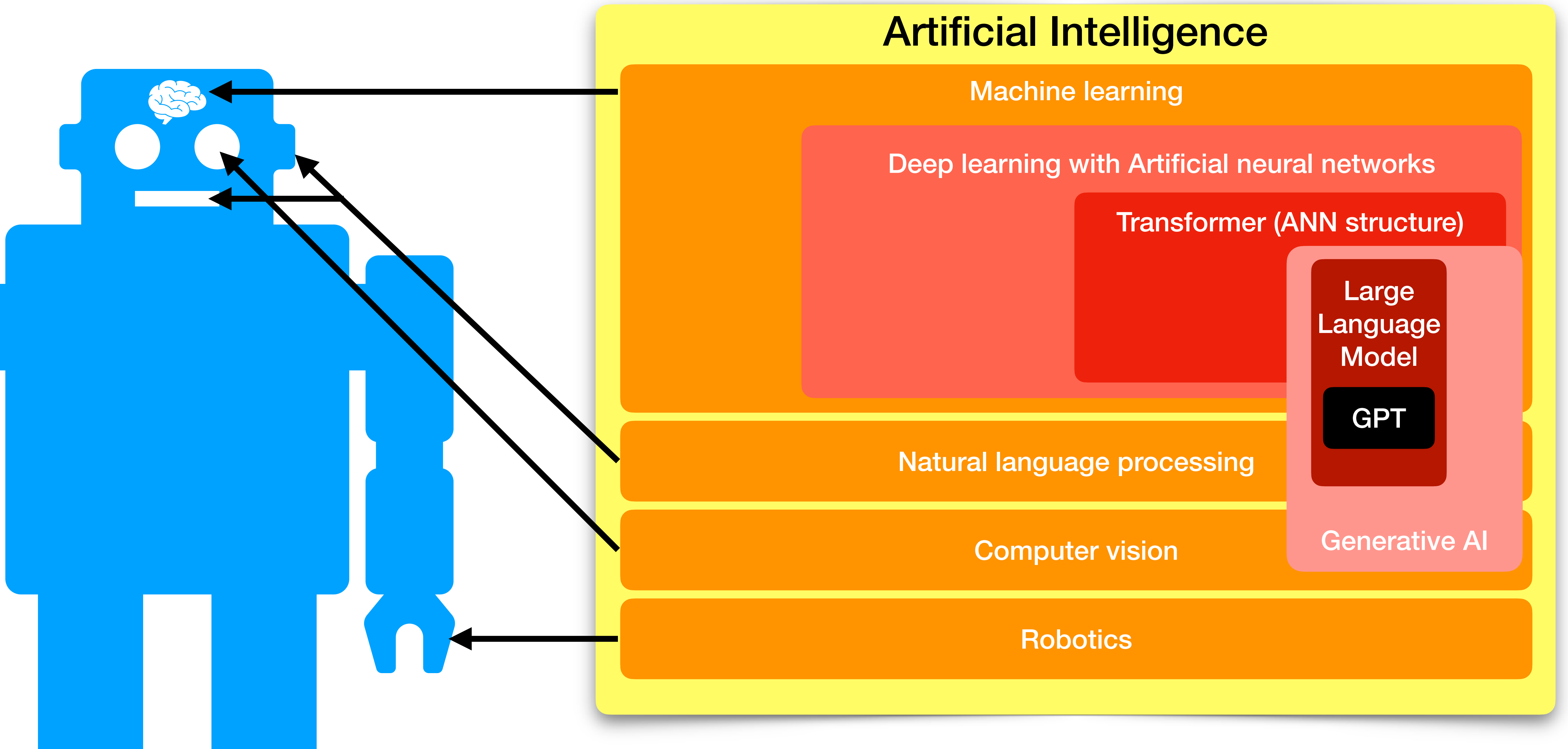
AI Venn diagram



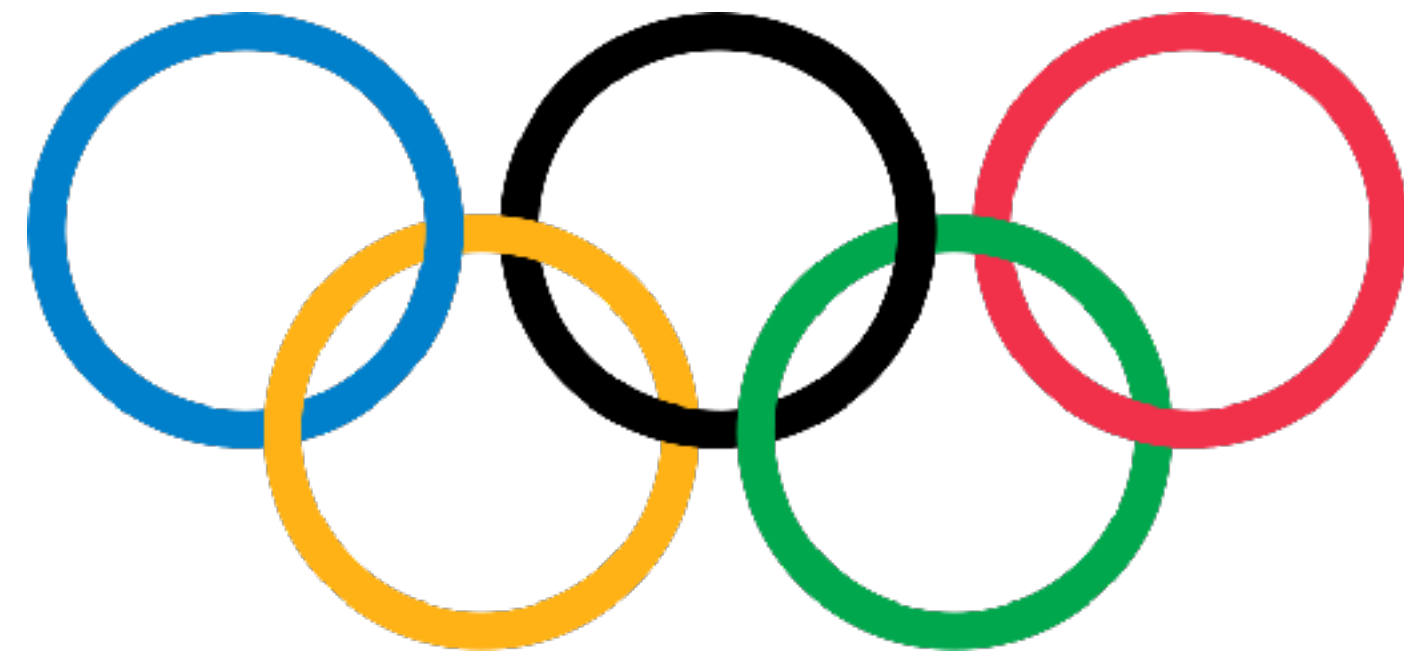
AI Venn diagram



AI Venn diagram



UW-Madison AI contributions

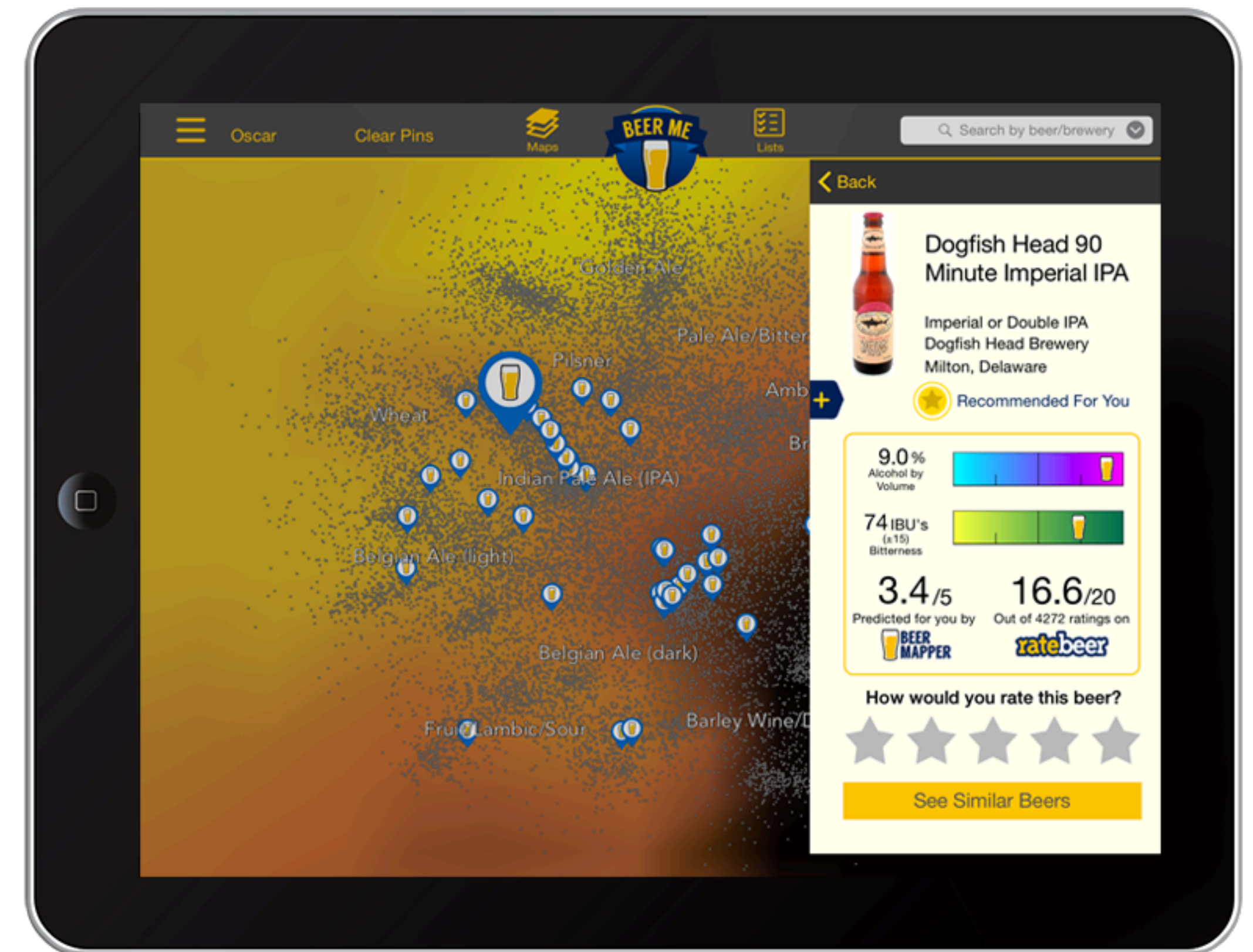


Faster, Higher, Stronger

UW contributions: faster training

- New optimization algorithms
- Learning from weak supervision
- Active learning
- Preference-based learning
- ...

The beer mapper

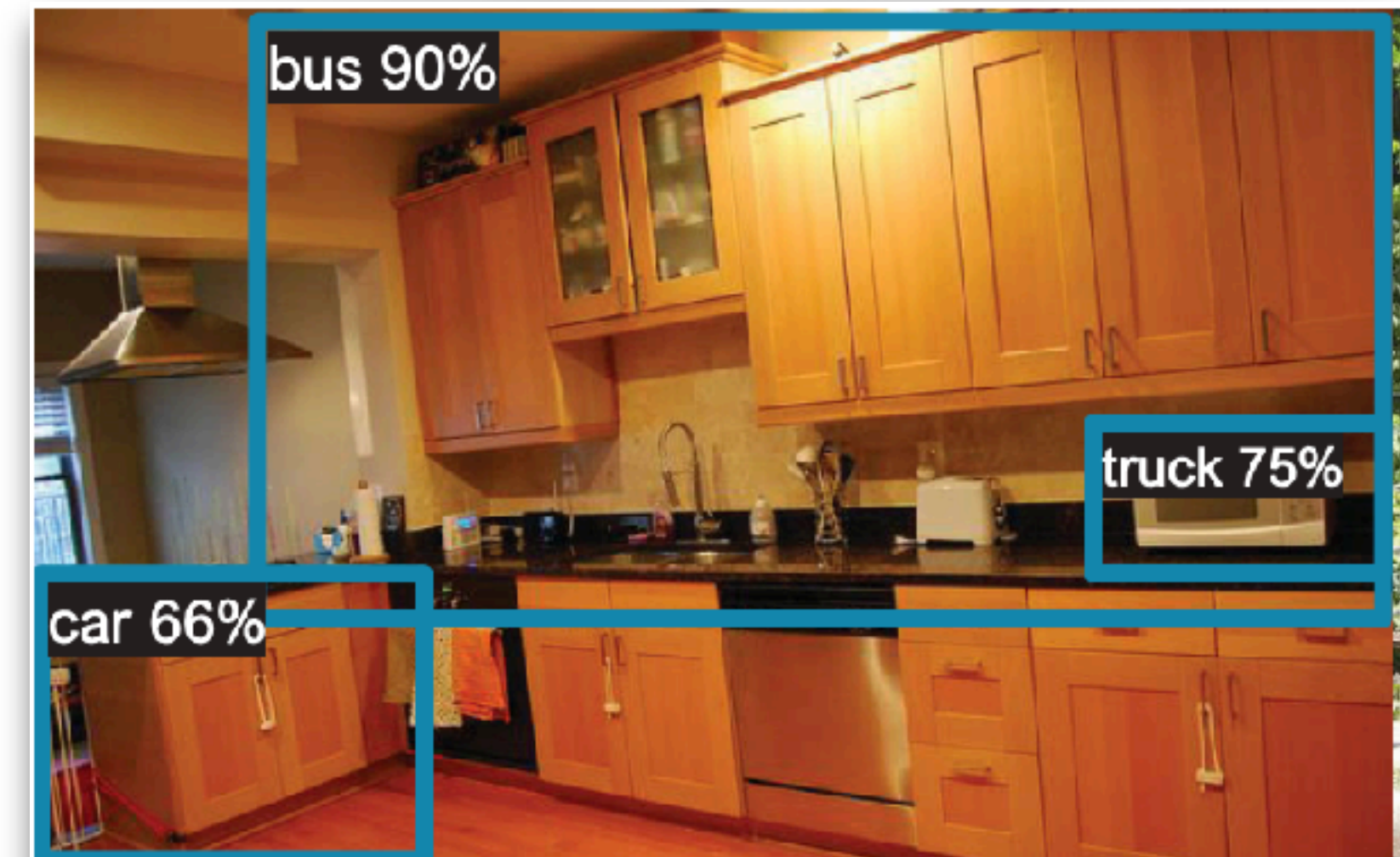


[Active Ranking using Pairwise Comparisons. Jamieson & Nowak, 2011]

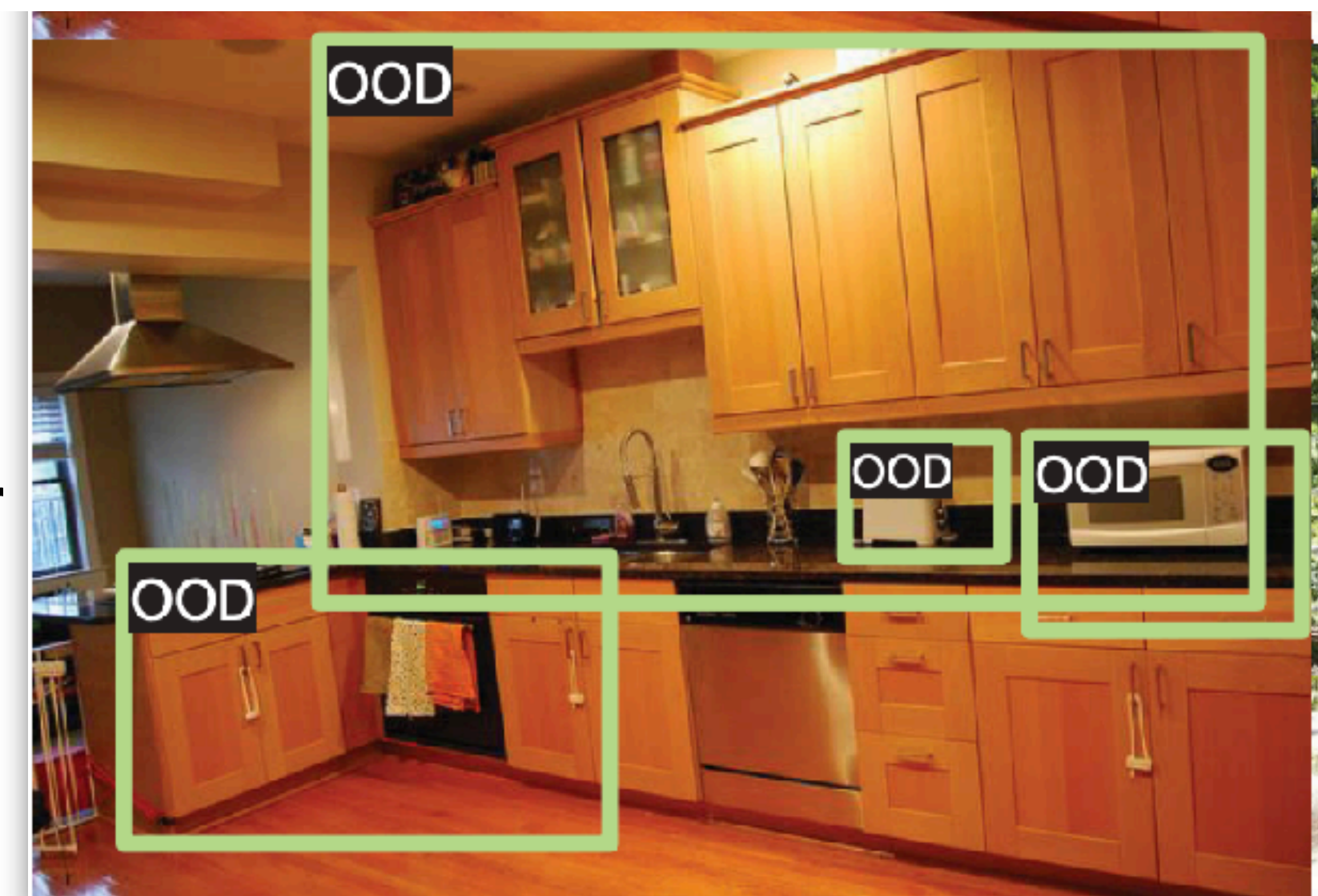
UW contributions: higher accuracy

- Multi-lingual natural language processing
- Single-photon computer vision
- Out-of-distribution detection
- Reinforcement learning from few episodes
- Game theoretic multi-agent learning
- ...

Before



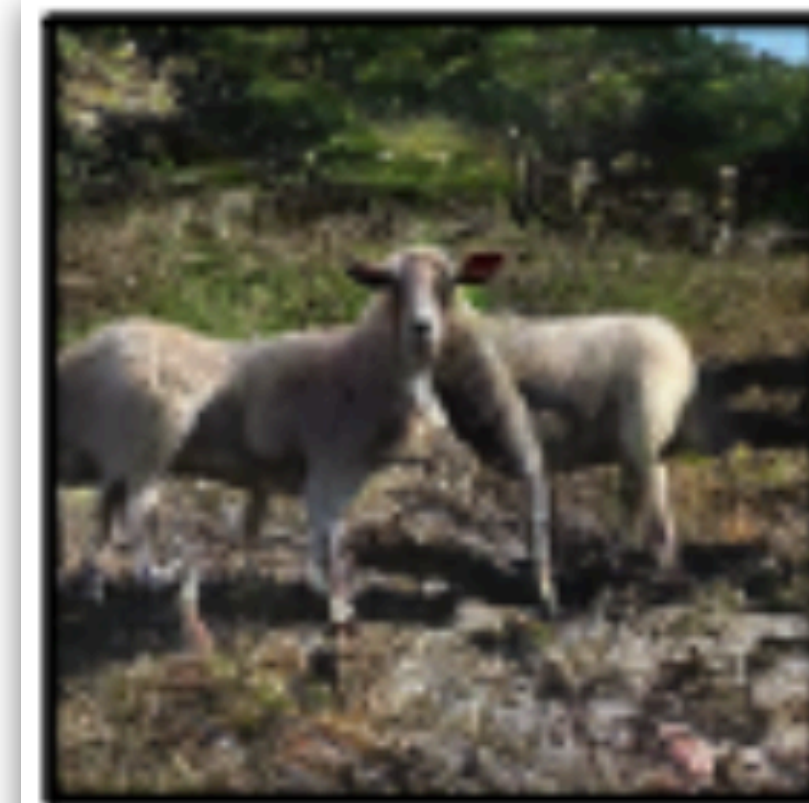
After



UW contributions: stronger guardrails

- Robust machine learning
- Theoretical guarantees
- Expose dual use scenarios
- Defense tools
- AI ethics and fairness
- Policy and regulation
- ...

Detected fake images



Who does AI on campus?

UW-Madison conducts world-class AI research*

- Computer Sciences
- ECE
- Statistics
- ISyE
- Math
- iSchool
- Almost all other departments on AI applications
- Data Science Institute, Data Science Hub

* [CSRanks.org](https://www.csranks.org/) #19 world-wide on machine learning, as of July 2023