

# Coding Conquest 2022

## AI for Mobile Apps (AI4MA)



### Session 1: History and Technology Trends

اونیورسیتی تکنولوچی برونای  
UNIVERSITI TEKNOLOGI BRUNEI

Prof. Somnuk Phon-Amnuaisuk  
UTB, SCI June 2022  
Picture: credited <https://www.cyberpunk.net>



meme

A meme (mí: m/ meem), a neologism coined by Richard Dawkins, is "an idea, behavior, or style that spreads from person to person within a culture". A meme acts as a unit for carrying cultural ideas, symbols, or practices that can be transmitted from one mind to another through writing, speech, gestures, rituals, or other imitable phenomena with a mimicked theme.

# Outline

- What is artificial intelligence?
- A brief history of AI
- Development of enabling technology
- Technology trends
- About coding conquest 2022: AI4MA
  - Secondary school, Diploma to yr1 university level
  - Undergraduate and graduate university level

# What is artificial intelligence?

A Proposal for the

DARTMOUTH SUMMER RESEARCH PROJECT ON ARTIFICIAL INTELLIGENCE

June 17 - Aug. 16

We propose that a 2 month, 10 man study of artificial intelligence be carried out during the summer of 1956 at Dartmouth College in Hanover, New Hampshire. The study is to proceed on the basis of the conjecture that every aspect of learning or any other feature of intelligence can in principle be so precisely described that a machine can be made to simulate it. An attempt will be made to find how to make machines use language, form abstractions and concepts, solve kinds of problems now reserved for humans, and improve themselves. We think that a significant advance can be made in one or more of these problems if a carefully selected group of scientists work on it together for a summer.

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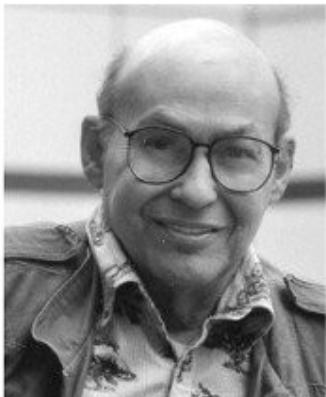
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# 1956 Dartmouth Conference: The Founding Fathers of AI



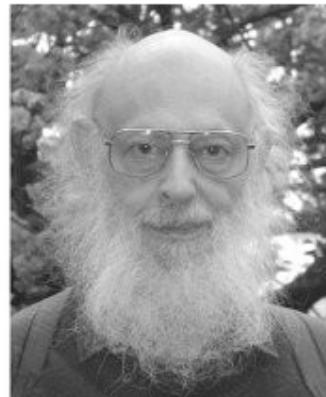
John McCarthy



Marvin Minsky



Claude Shannon



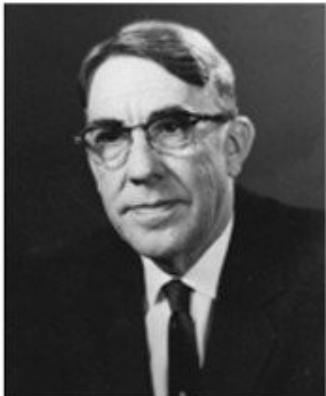
Ray Solomonoff



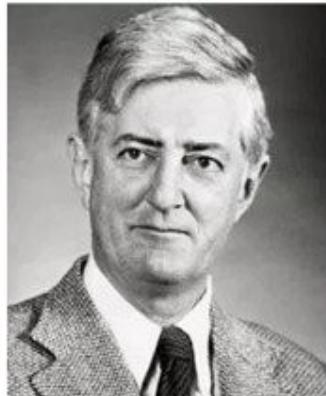
Alan Newell



Herbert Simon



Arthur Samuel



Oliver Selfridge



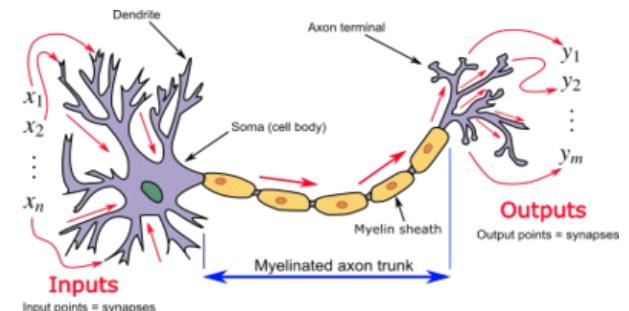
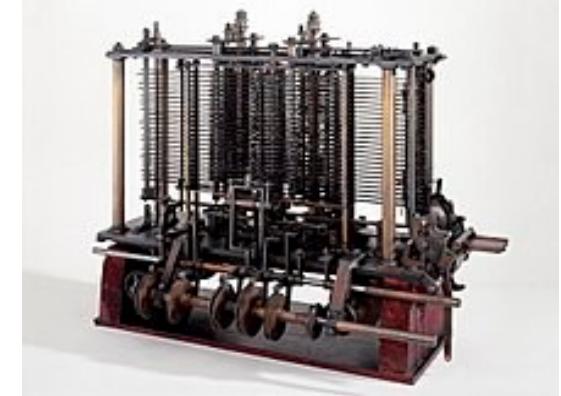
Nathaniel Rochester



Trenchard More

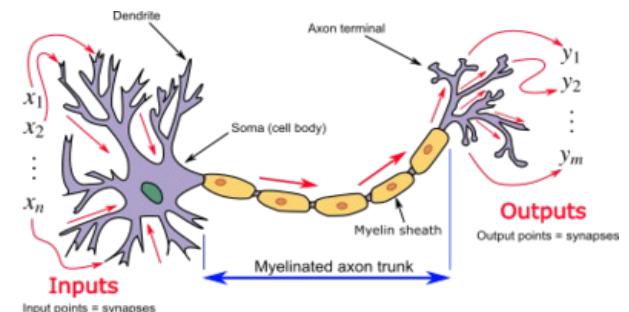
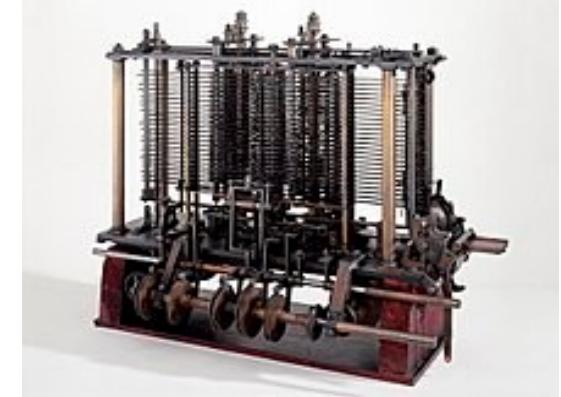
# Challenges in AI

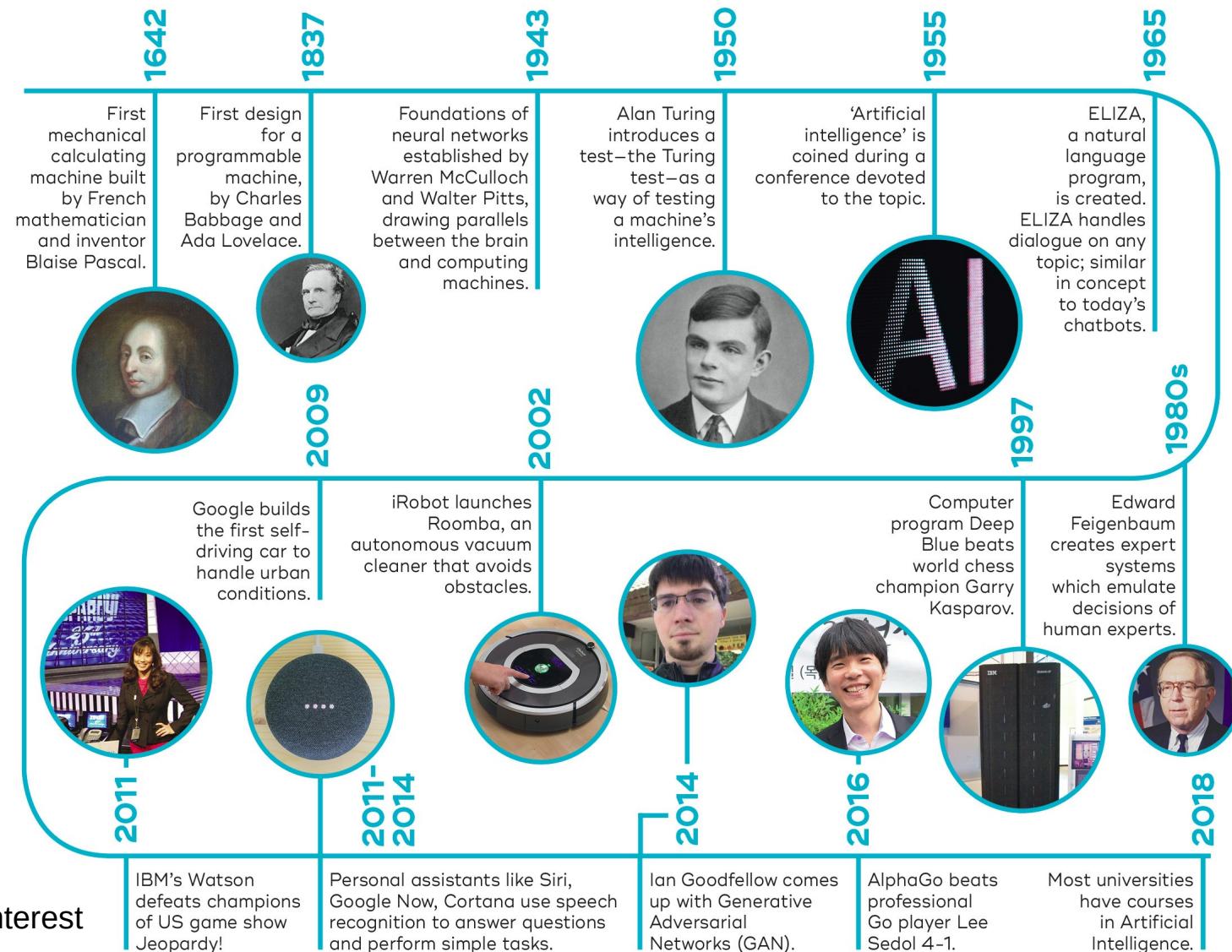
- Crunching numbers
- Infer, deduce
- Muscle skills
- Musical intelligence
- Emotional intelligence
- Spatial intelligence
- Linguistic intelligence
- etc.



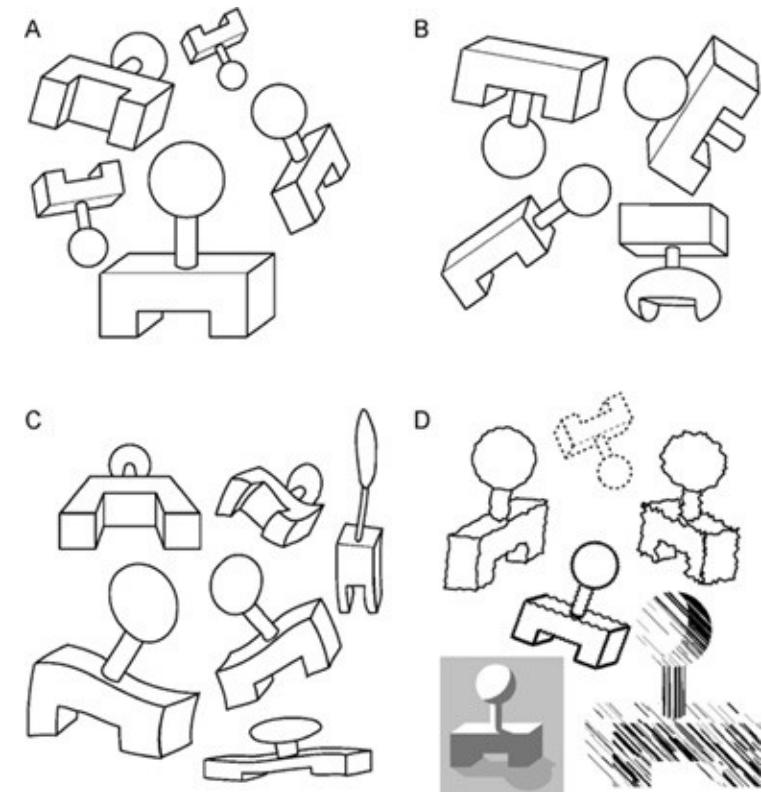
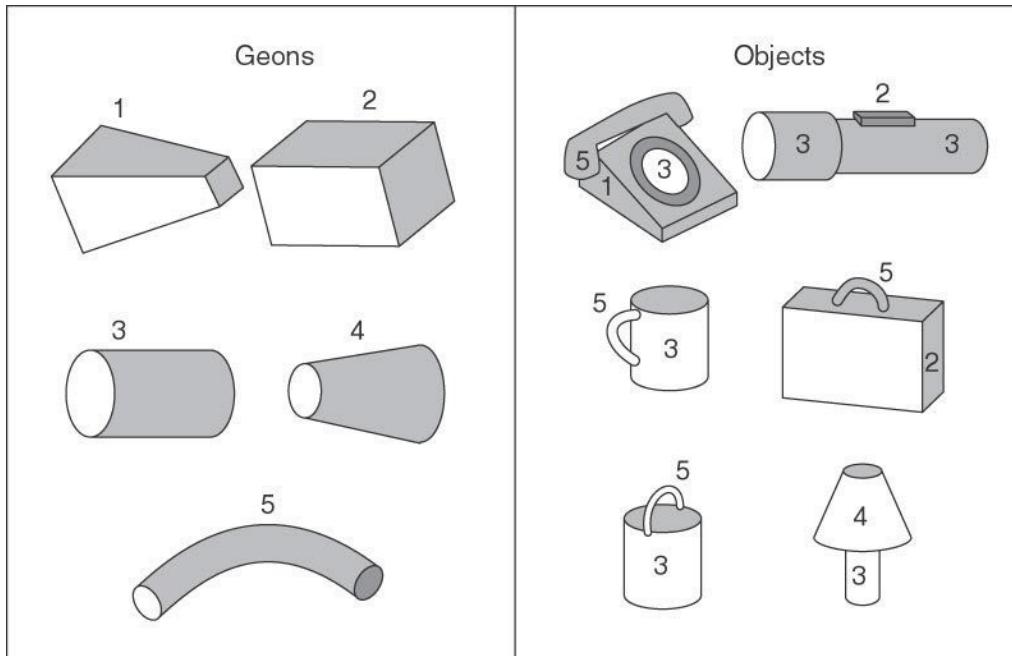
# Challenges in AI

- Knowledge representation (KR)
- Compute – quantitative reasoning
- Qualitative reasoning
- Uncertainty
- Changes in beliefs
- Common sense
- Incremental learning





# Symbolic Information Processing



Biederman, I. (1993). Geon theory as an account of shape recognition in mind and brain.

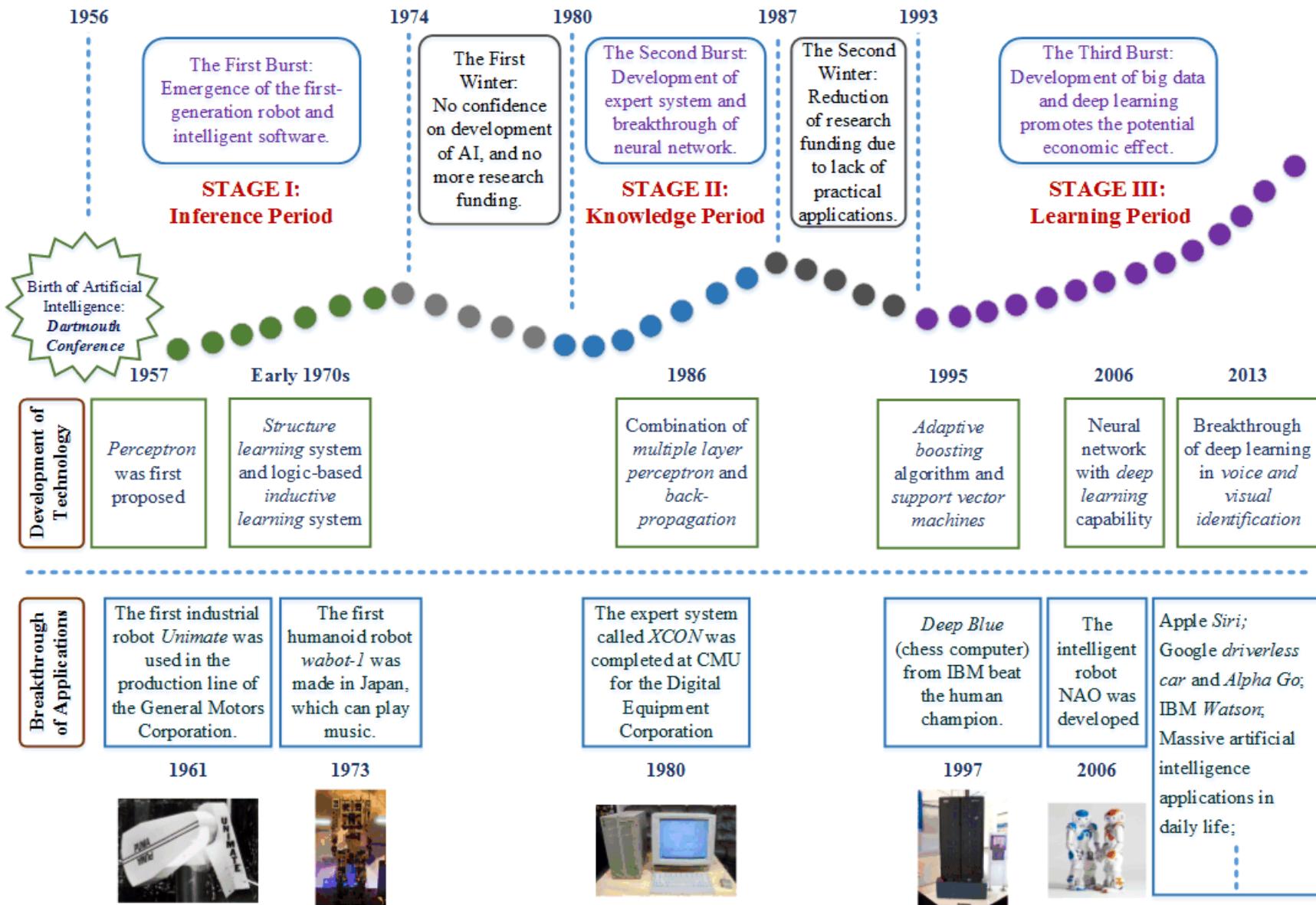
# Symbolic Information Processing

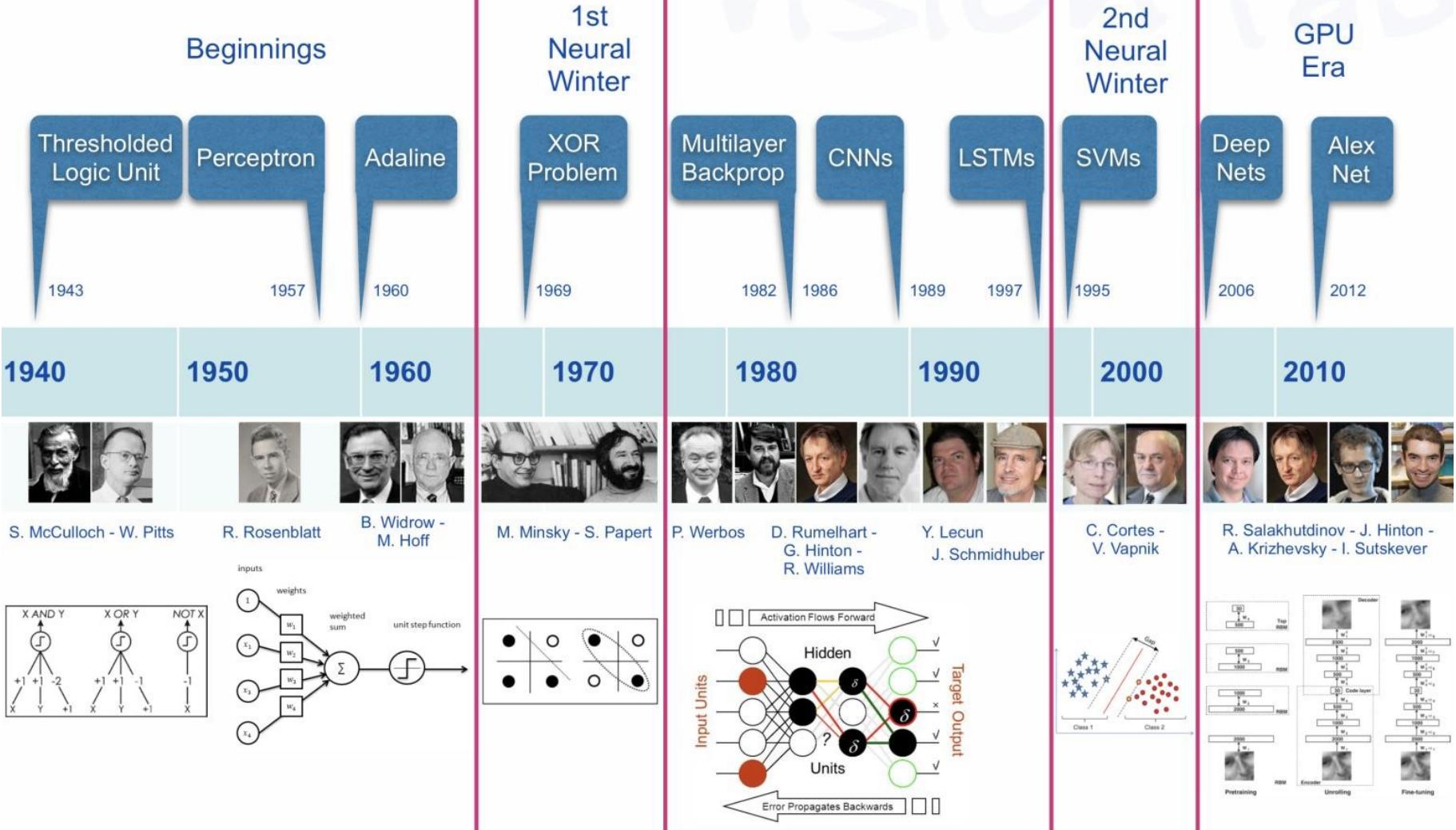
## Physical Symbol Systems

Physical Symbol Systems Hypothesis (PSSH): 'A physical symbol system has the necessary and sufficient means for intelligent action' (Newell and Simon 1976, p. 117).

Physical symbol systems are a reformulation of Turing universal computation (Church 1936, Turing 1936) that identifies symbol processing as a key feature of intelligent computation.

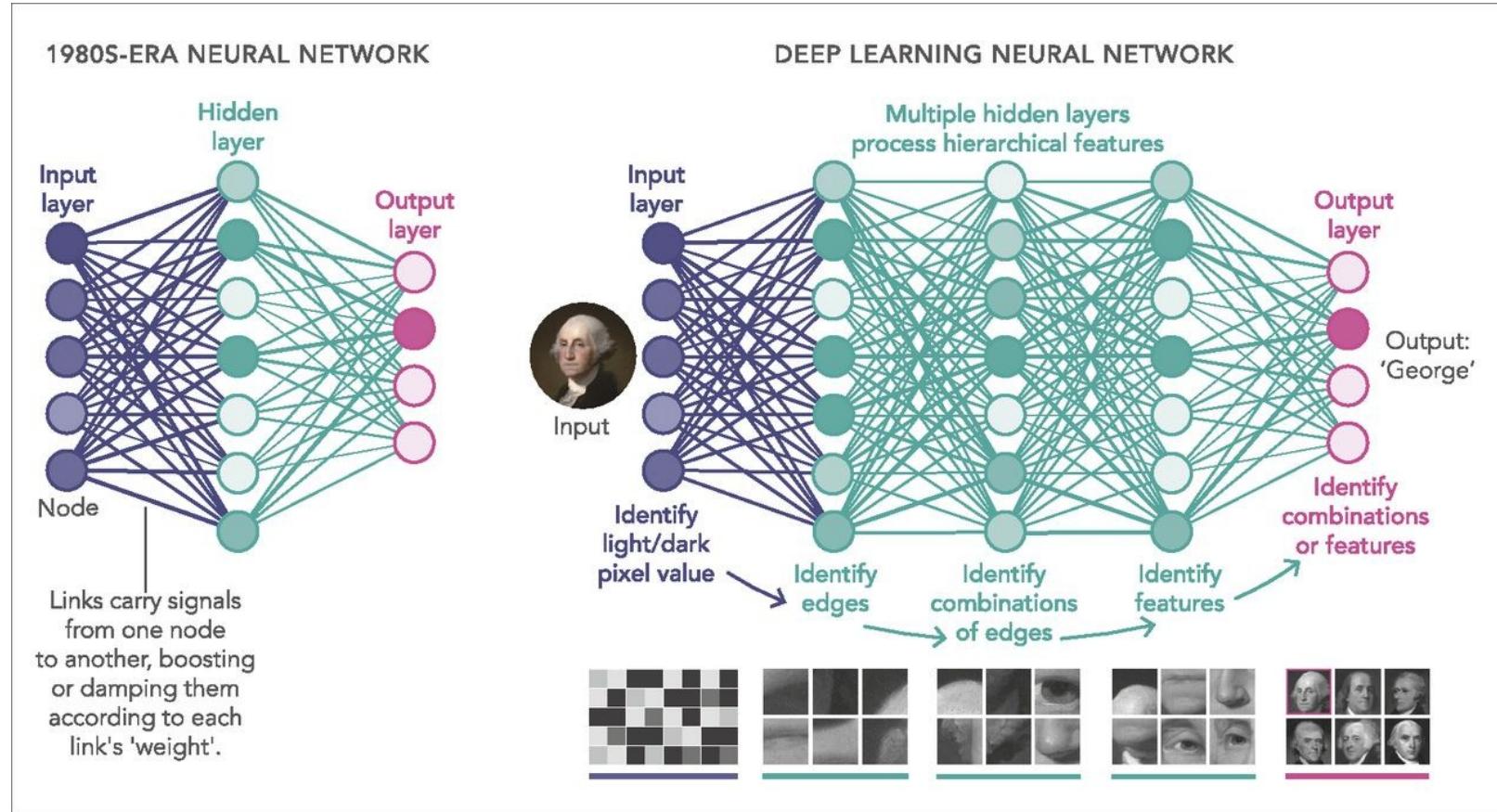
A mental representation is a system of symbols isomorphic to some aspect of the environment, used to make behavior-generating decisions that anticipate events and relations in that environment.





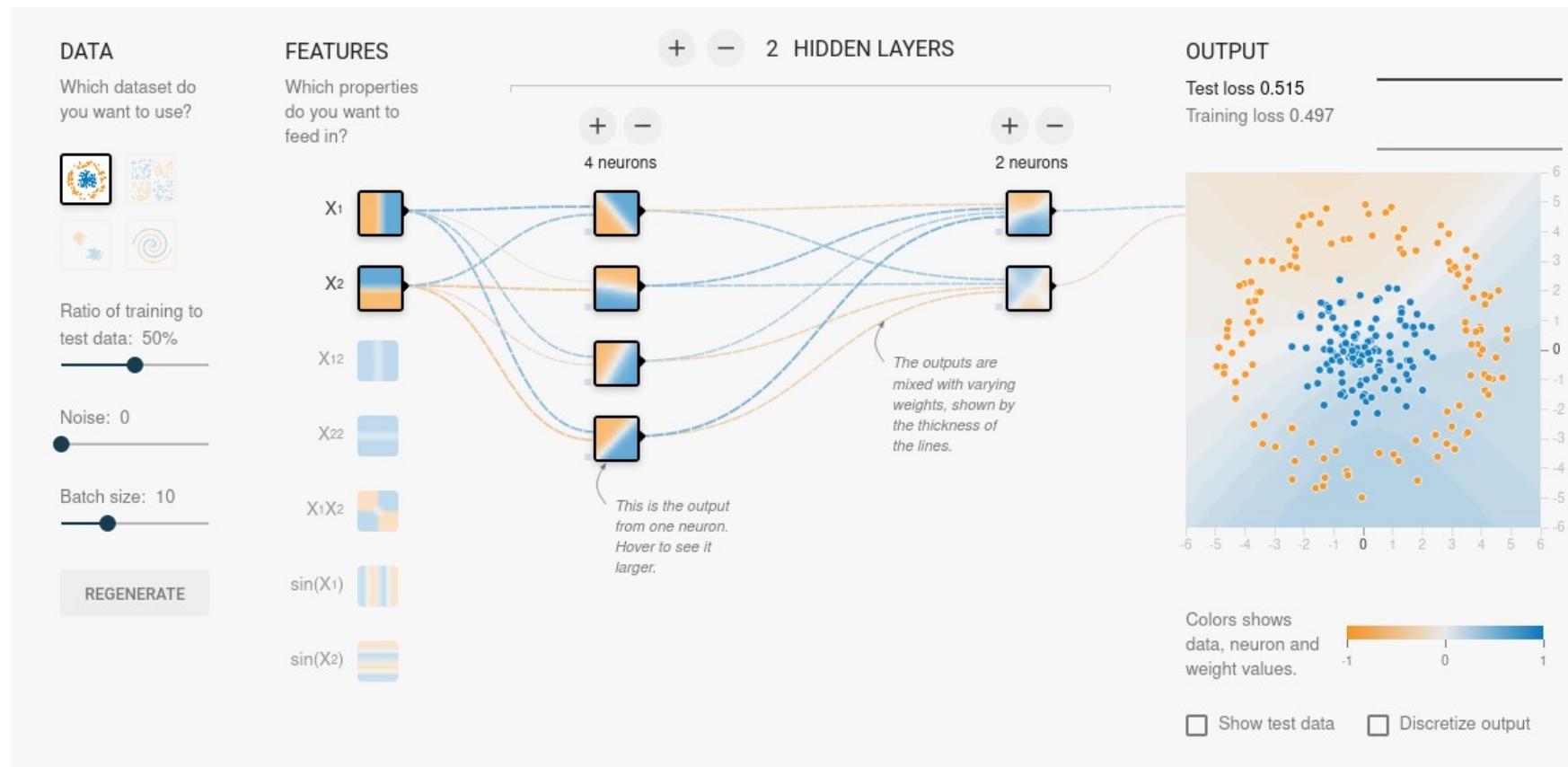
credit: pinterest

# Deep Learning

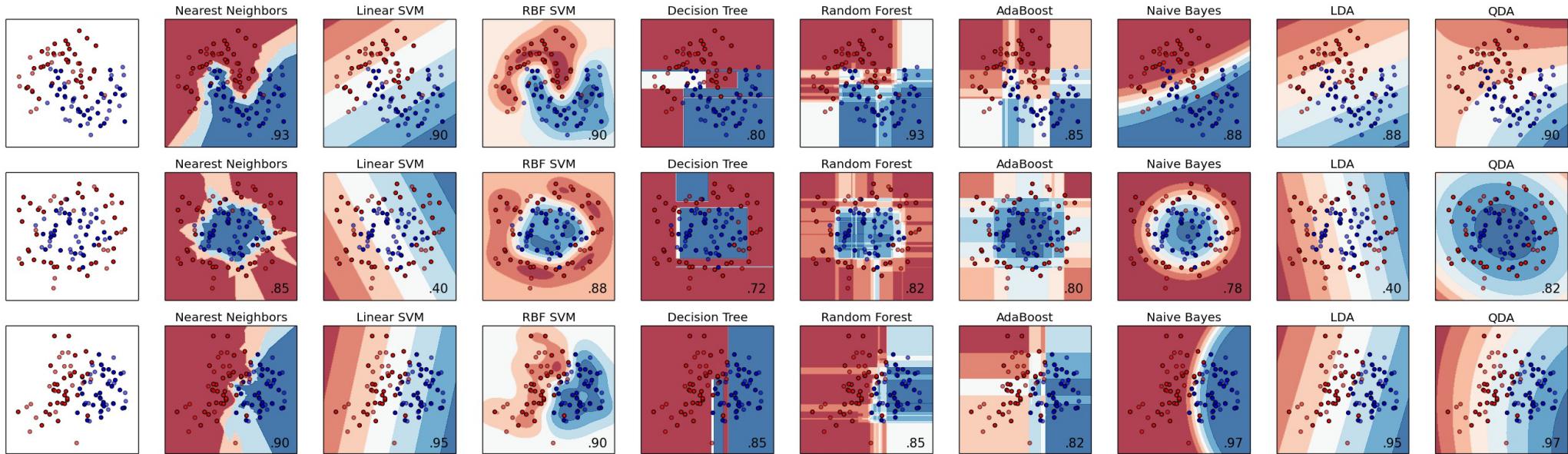


credit: Lucy Reading-Ikkanda (artist).

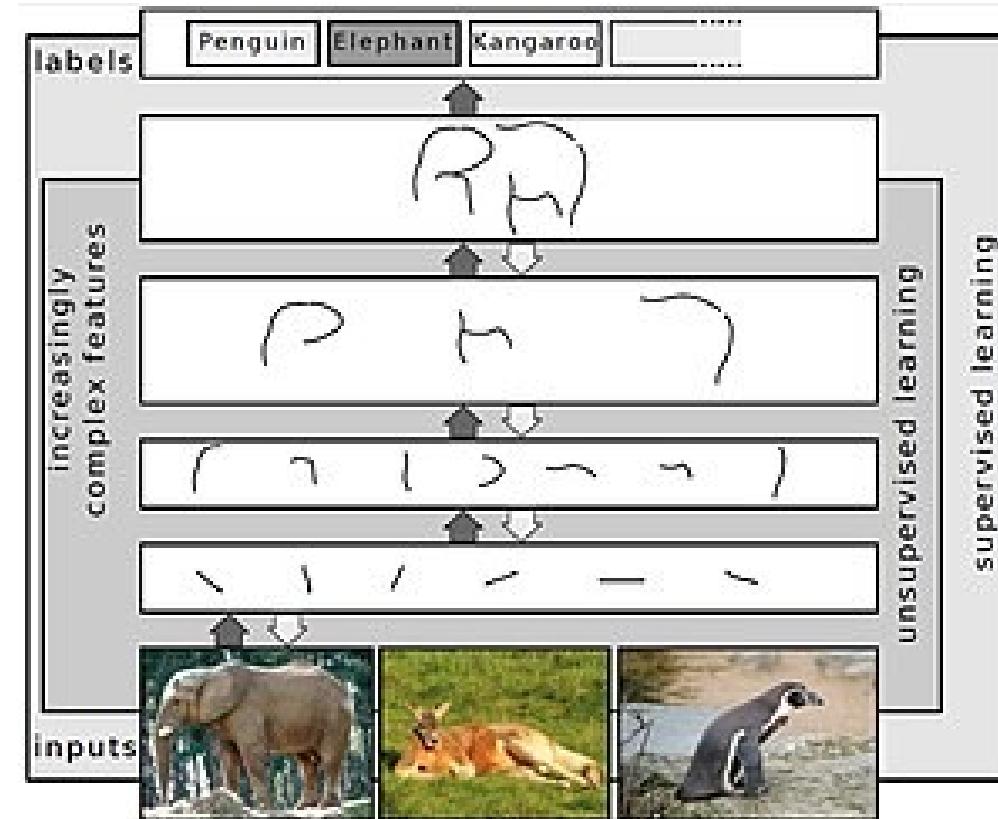
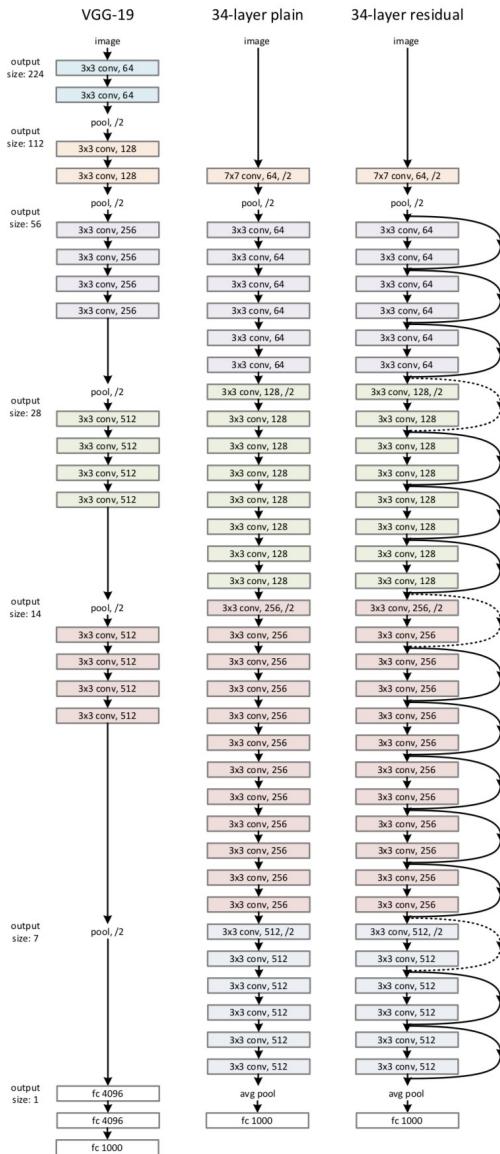
<https://www.pnas.org/doi/10.1073/pnas.1821594116>



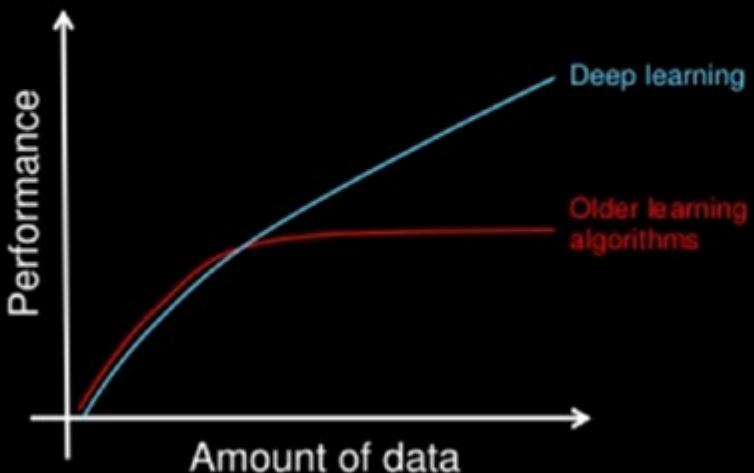
# Decision Boundary



# Deep Learning



## Why deep learning



How do data science techniques scale with amount of data?

# ARTIFICIAL INTELLIGENCE

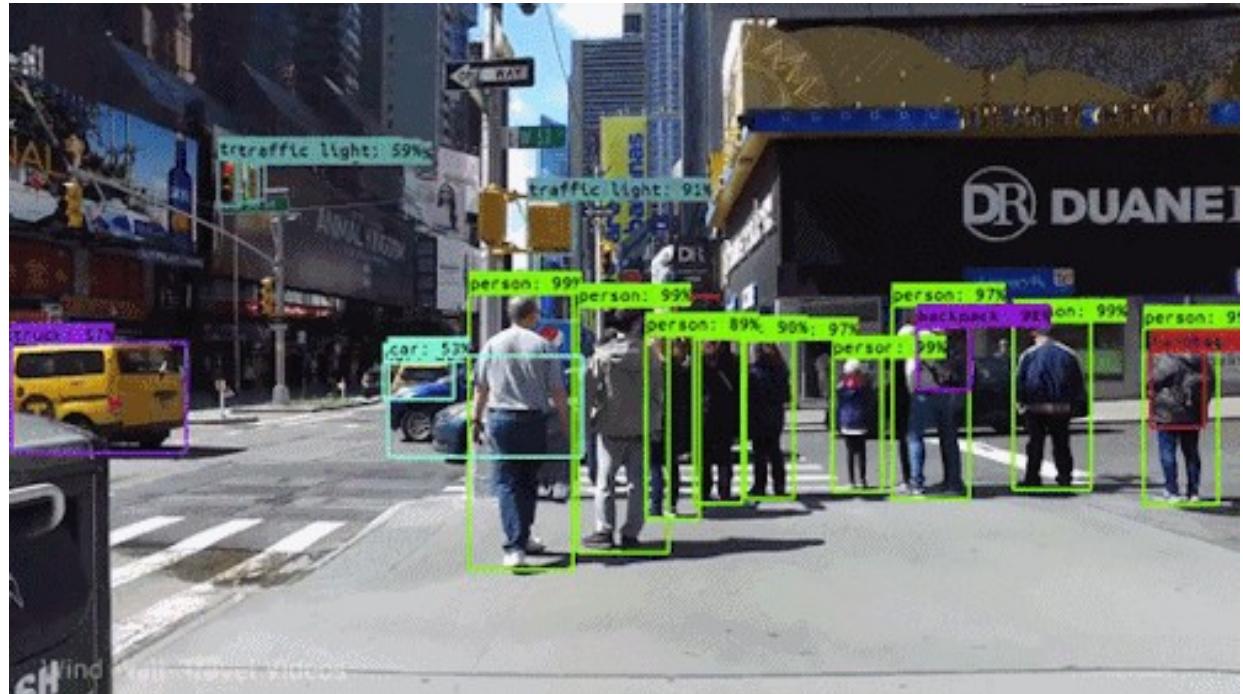
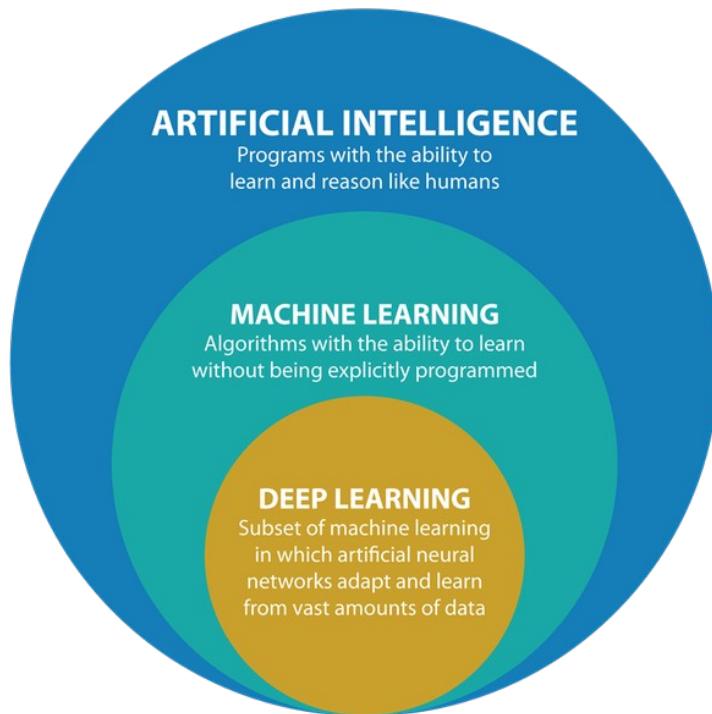
Programs with the ability to learn and reason like humans

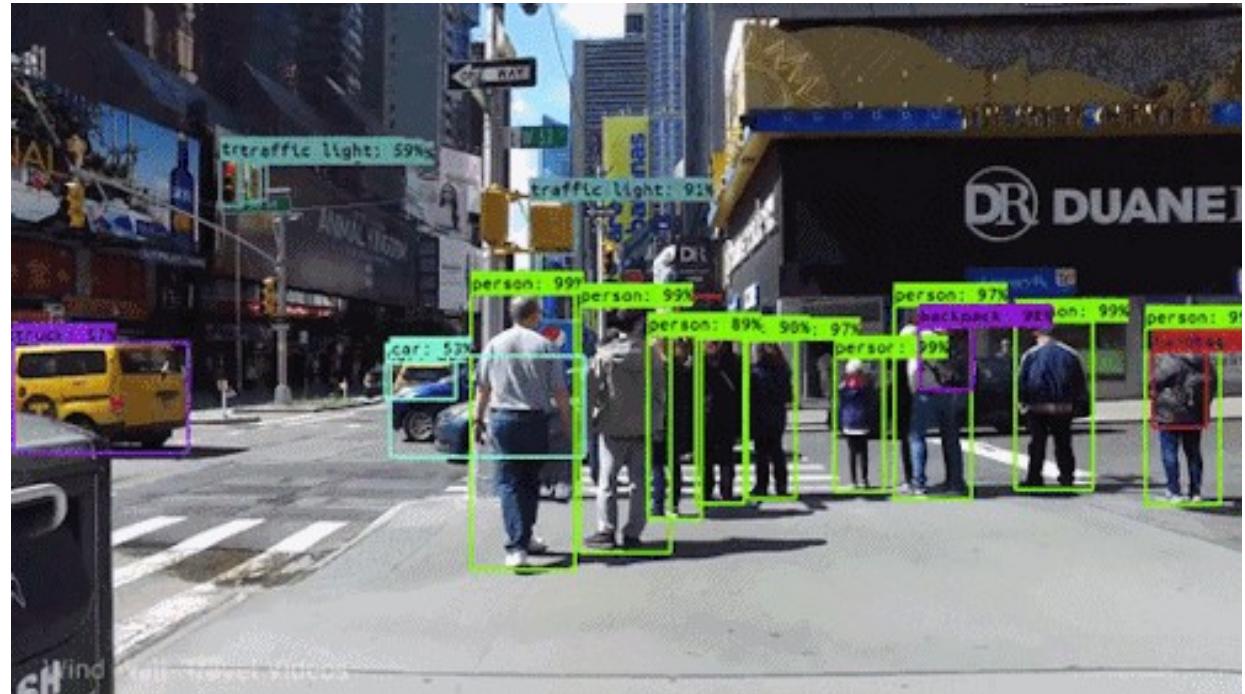
## MACHINE LEARNING

Algorithms with the ability to learn without being explicitly programmed

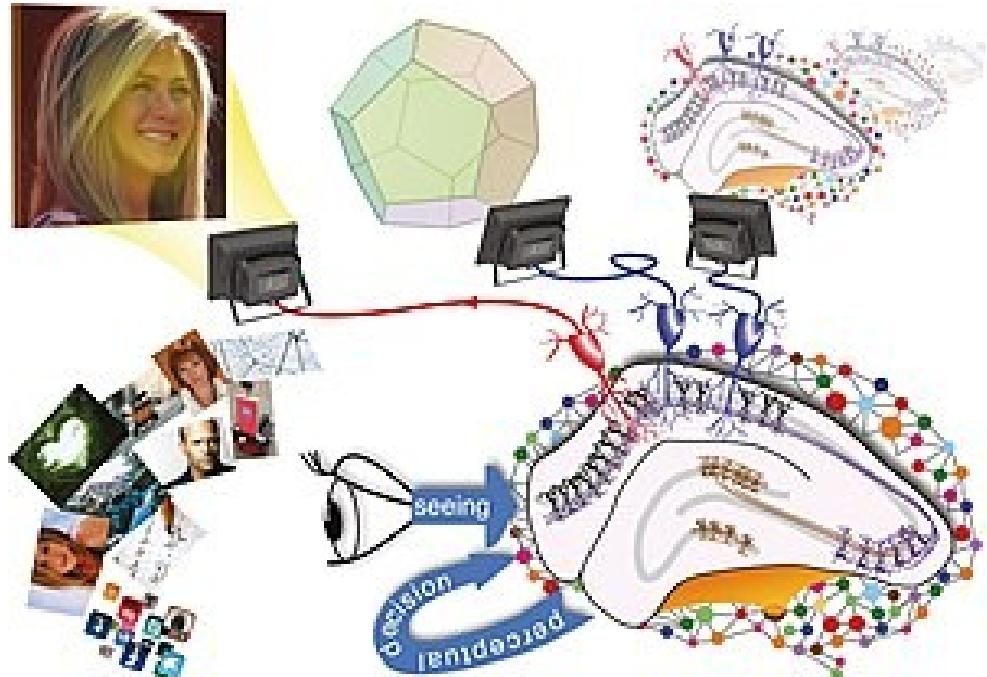
## DEEP LEARNING

Subset of machine learning in which artificial neural networks adapt and learn from vast amounts of data

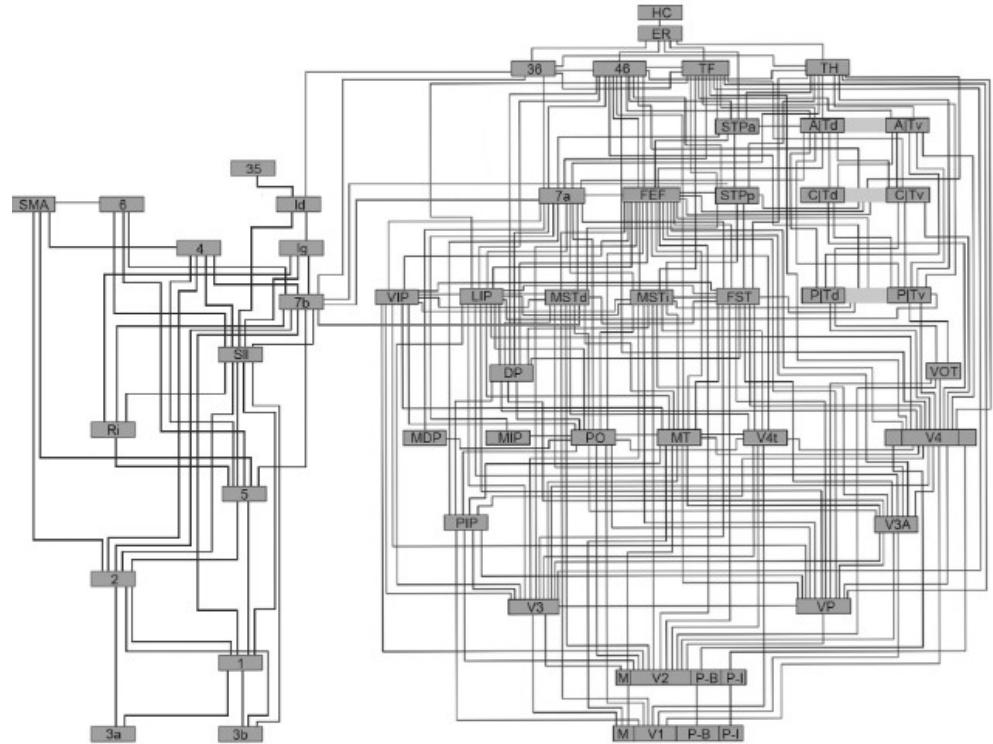
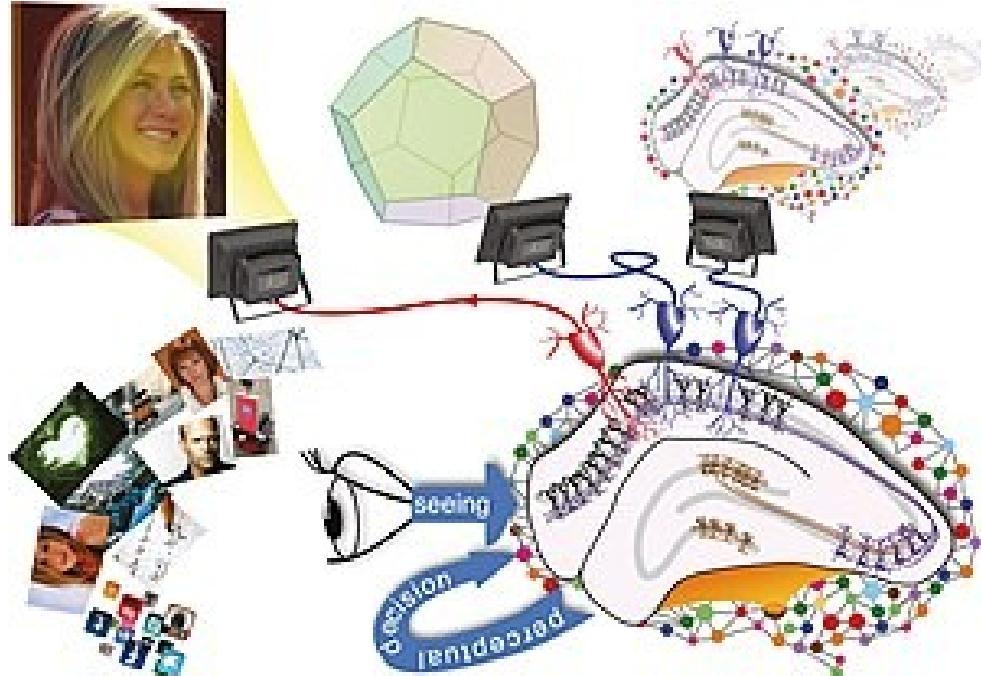




# Uncharted Waters



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Welcome to

EEEEEE	LL	III	ZZZZZ	AAAAA
EE	LL	II	ZZ	AA AA
EEEEEE	LL	II	ZZZ	AAAAAAA
EE	LL	II	ZZ	AA AA
EEEEEE	LLLLL	III	ZZZZZ	AA AA

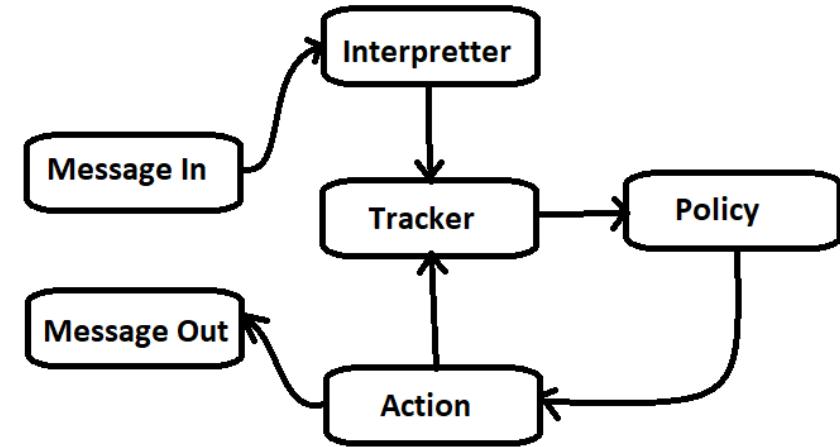
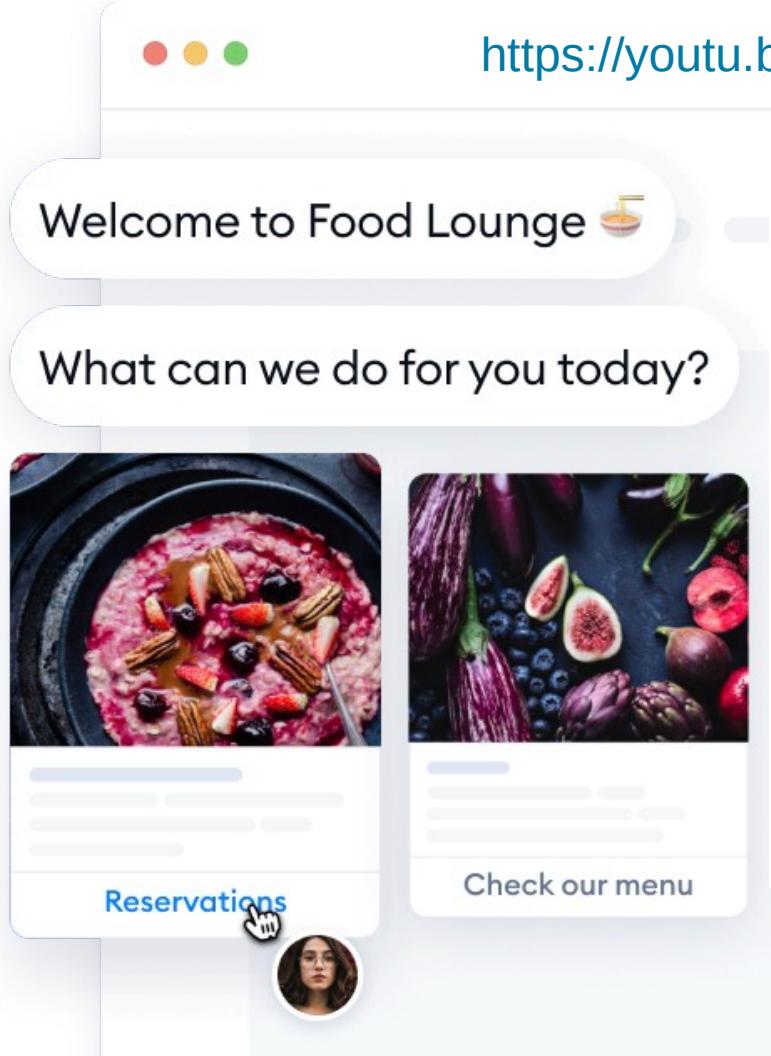
Eliza is a mock Rogerian psychotherapist.

The original program was described by Joseph Weizenbaum in 1966.

This implementation by Norbert Landsteiner 2005.

ELIZA: Is something troubling you ?  
YOU: Men are all alike.  
ELIZA: What is the connection, do you suppose ?  
YOU: They're always bugging us about something or other.  
ELIZA: Can you think of a specific example ?  
YOU: Well, my boyfriend made me come here.  
ELIZA: Is it important to you that your boyfriend made you come here ?  
YOU: He says I'm depressed much of the time.  
ELIZA: I am sorry to hear that you are depressed.  
YOU: It's true. I am unhappy.  
ELIZA: Can you explain what made you unhappy ?  
YOU:

## Notable AI Applications



# Notable AI Applications



# Notable AI Applications

The image displays four distinct AI applications arranged in a 2x2 grid, each featuring a conversational interface between a user (G) and an AI (B).

**Top Left (Fiction Book Recommender):**

- User (G): Do you have any fiction book recommendations?
- AI (B): I devoured a lot of science fiction in my youth. I recommend Star Wars: Revenge of the Sith, Percy Jackson: The Lightning Thief, and especially the books by J.G. Ballard, such as Stardust and Canyon Song.

**Top Right (Black Hole Explainer):**

- User (G): Explain the basics of black holes to me.
- AI (B): So I guess I'm trying to answer this simple question: "What's a black hole?"
- User (G): Indeed. Please go ahead
- AI (B): Black holes usually occur when a star dies and implodes in a runaway reaction. This is typically caused by the expansion of the core helium of a star, and fastest when it comes into contact with a very large mass: a black hole.

**Bottom Left (AlphaFold AI):**

- User (G): Can you tell me about AlphaFold?
- AI (B): AlphaFold is a blood genome analysis platform that predicts DNA binding sites for proteins. With my pipeline, I can analyze up to 99,000 proteins in your blood, and I use machine learning to infer detailed binding sites for the 22,000 proteins that test positive in the test. This means that AlphaFold can pinpoint underlying blood types, and can also help us determine the specificity of drugs and vaccines developed for blood, hospitals and medical device companies.
- User (G): Why is it called AlphaFold? What is being folded?
- AI (B): The name AlphaFold is based on a roof tile of the University of Maryland, which matches the sequence number and neuroscience thread index, which is how neuroscience researchers manage their data.

**Bottom Right (Paris Travel Guide):**

- User (G): What is the capital of France?
- AI (B): Marseille.
- User (G): What is Marseille famous for?
- AI (B): Jazz music.
- User (G): Who are some famous Jazz musicians from Marseille?
- AI (B): Herbie Hancock, John Coltrane, Tony Bennett, Etienne Wouter.
- User (G): What is the capital of France?
- AI (B): Paris!
- User (G): What are some things to see in Paris?
- AI (B): Paris is full of specific things for every season and every type of traveller. Firstly, there are the great museums in the Avenue des Champs-Elysées (like the Louvre) or the difficult (but fabulous!) Notre Dame cathedral. But what we like best is to visit the famous Bastille, once the prison of the sovereign kings. This was the scene of the Terror of 1789, when the Revolution began.

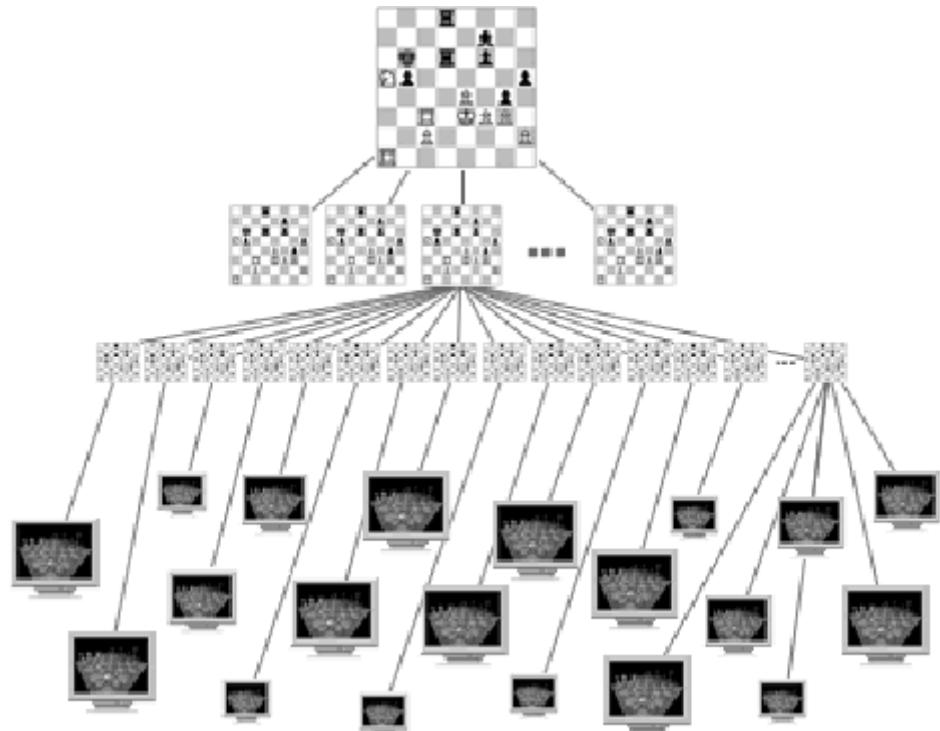
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Context →	Here is a riddle: All of us have one, but few get to choose If you don't know mine, you are not my friend When it is called, our attention is drawn Even if we are gone, they are still around
	I think the answer is
Model Answer 1 →	Name All of us have one, but few get to choose Everyone has a name, but few get to choose what their name is. If you don't know mine, you are not my friend If you don't know someone's name, you can't be friends with them. When it is called, our attention is drawn If someone calls your name, you will pay attention to them. Even if we are gone, they are still around If you are gone, your name will still be around.
Model Answer 2 →	A phone number All of us have one, but few get to choose Everyone has a phone number, but you don't choose it If you don't know mine, you are not my friend You can't be friends without knowing each other's phone numbers When it is called, our attention is drawn When you get a phone call, you are drawn to the phone Even if we are gone, they are still around Phone numbers are still around even when we aren't there

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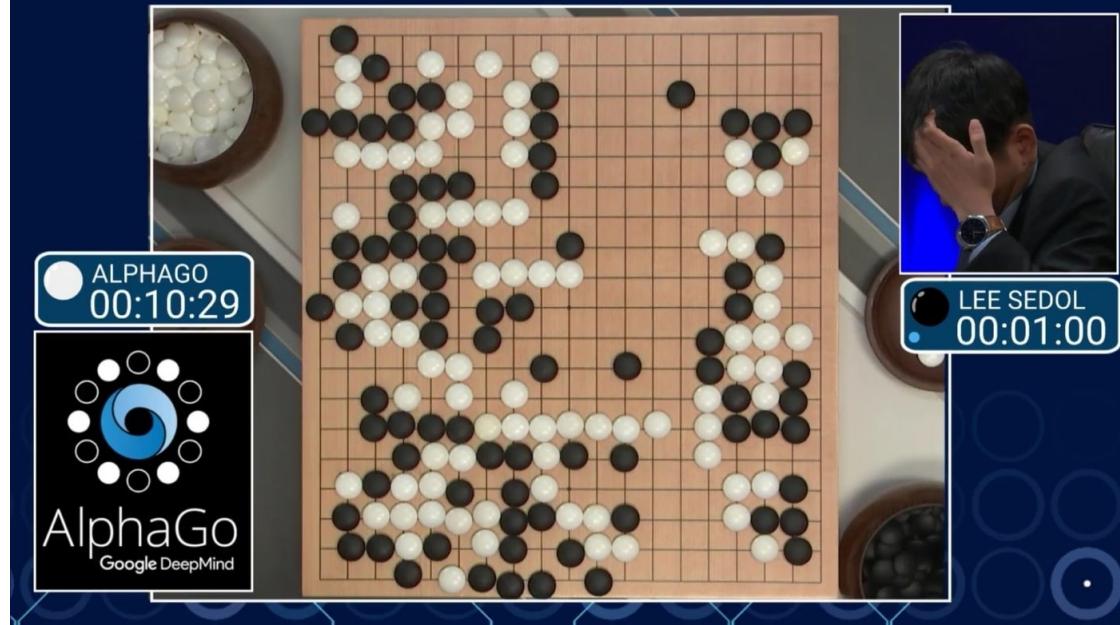
Table 14: Samples from MT-NLG for answering riddles with alternative answers. MT-NLG generates different interpretations of the same riddle based on the answer it gave.

## Notable AI Applications



[https://www.researchgate.net/figure/Distributed-chess-tree-search\\_fig1\\_224056308](https://www.researchgate.net/figure/Distributed-chess-tree-search_fig1_224056308)

## Notable AI Applications

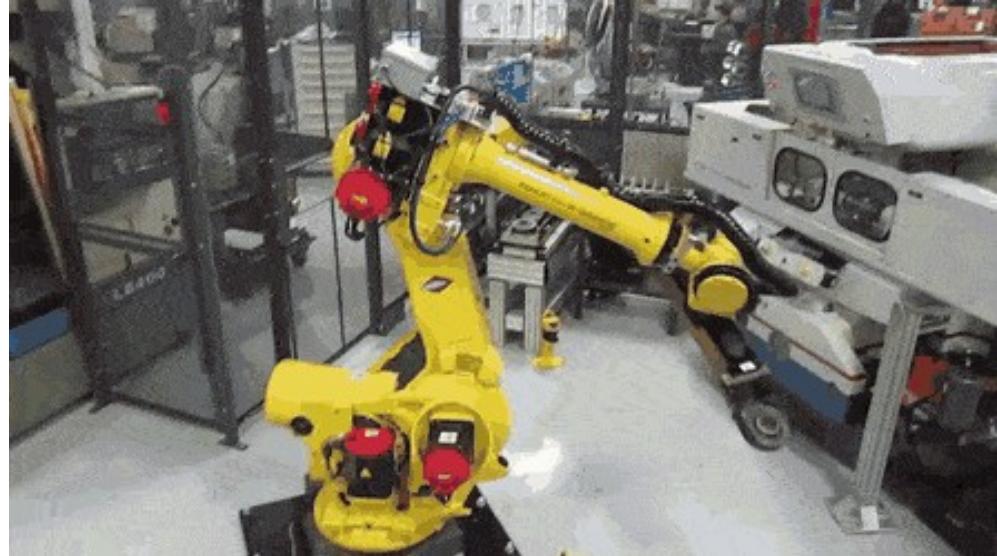


Game	Board size	State space	Game tree size
Go	19 x 19	$10^{172}$	$10^{360}$
Chess	8 x 8	$10^{50}$	$10^{123}$
Checkers	8 x 8	$10^{18}$	$10^{54}$

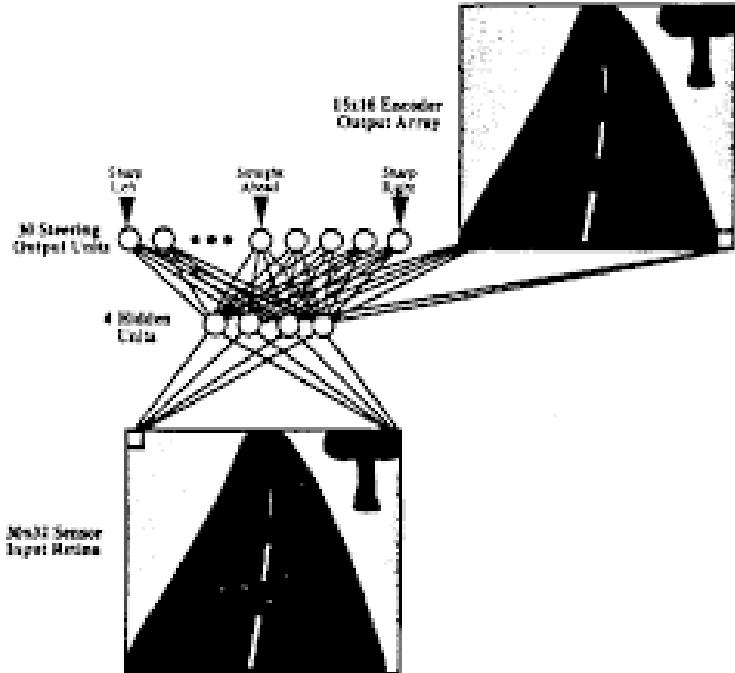
# Notable AI Applications SHRDLU



# Notable AI Applications



## Notable AI Applications



ALVINN (Autonomous Land Vehicle In a Neural Network) 1989

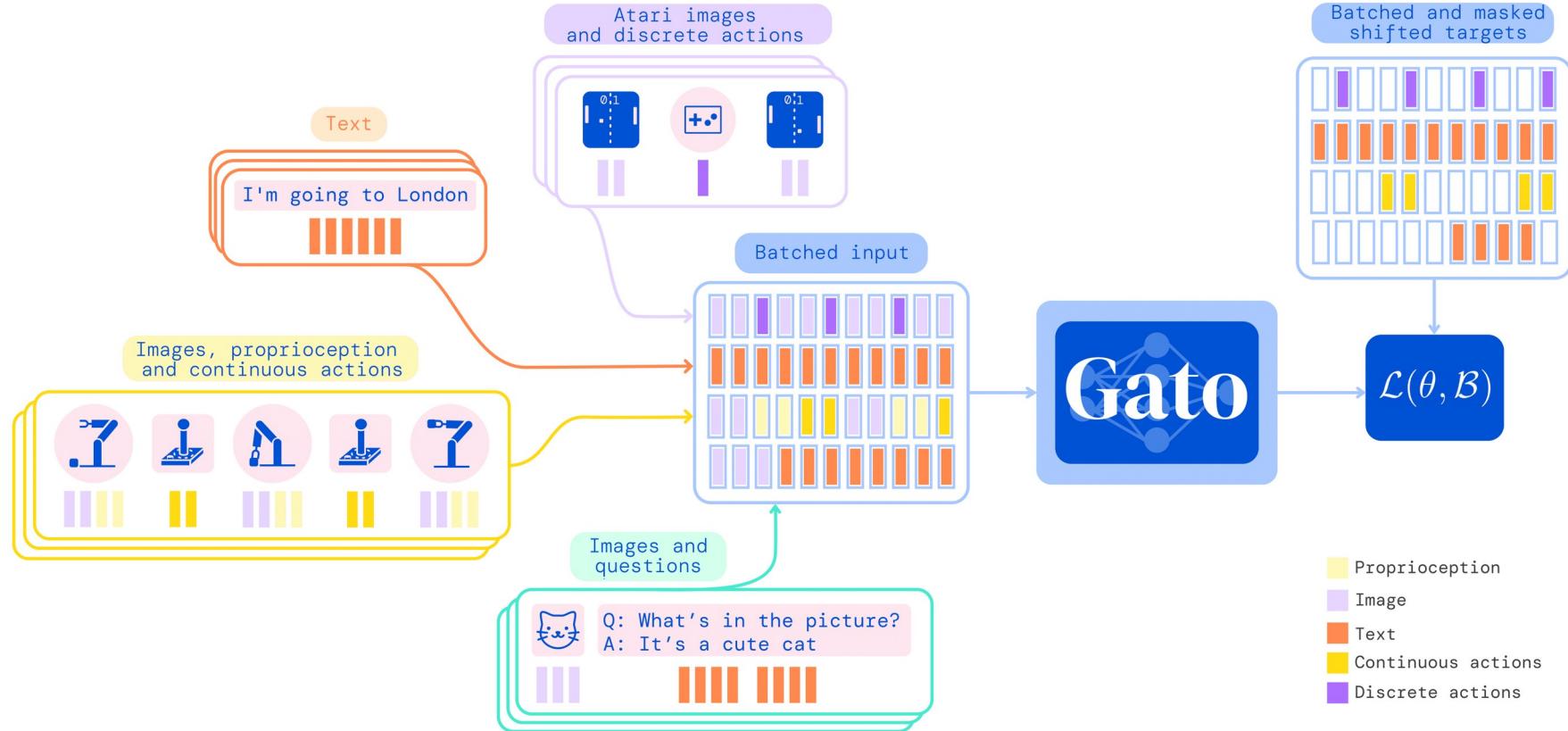
## Notable AI Applications



## Notable AI Applications



# Notable AI Applications



## Notable AI Applications



# Notable AI Applications



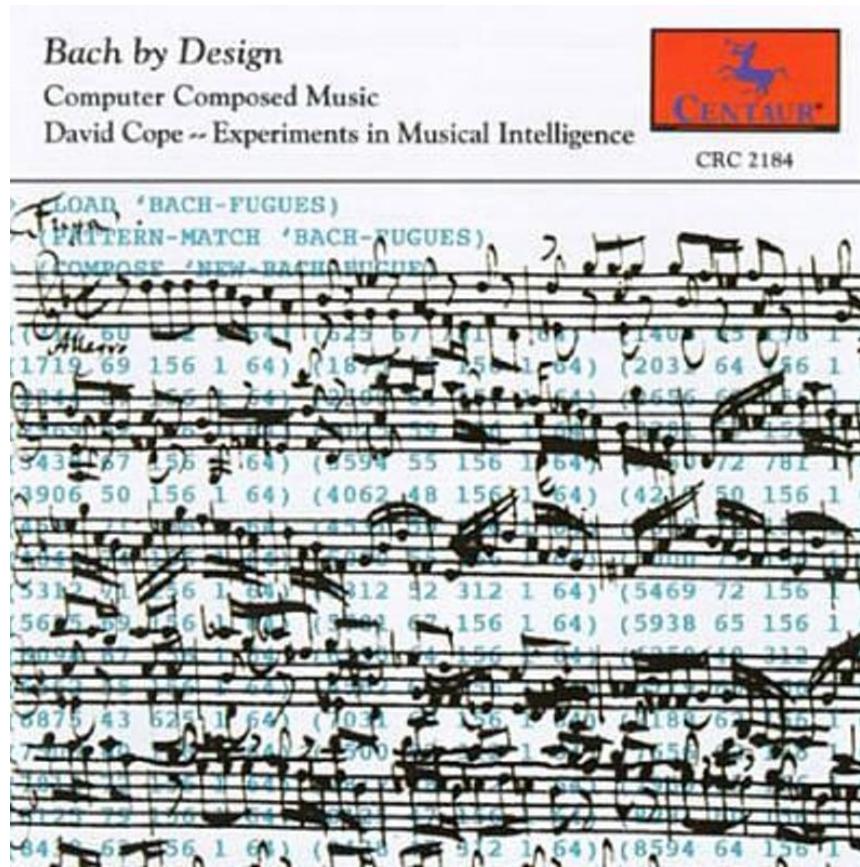
AARON image created at the Computer Museum, Boston, MA, 1995

## Notable AI Applications



Phon-Amnuaisuk S. Image synthesis and style transfer, 2019

## Notable AI Applications



<https://www.youtube.com/watch?v=Lt7fEchgFrU>

<https://www.youtube.com/watch?v=2kuY3BrmTfQ>

# Notable AI Applications

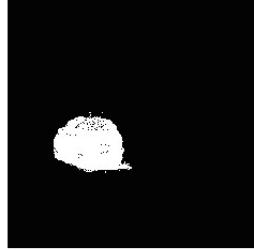
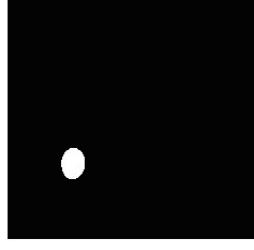
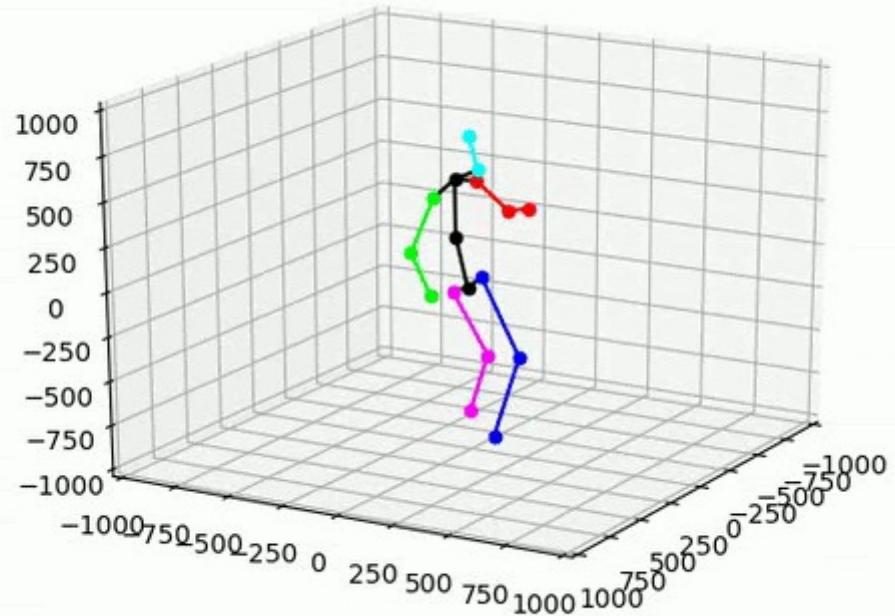
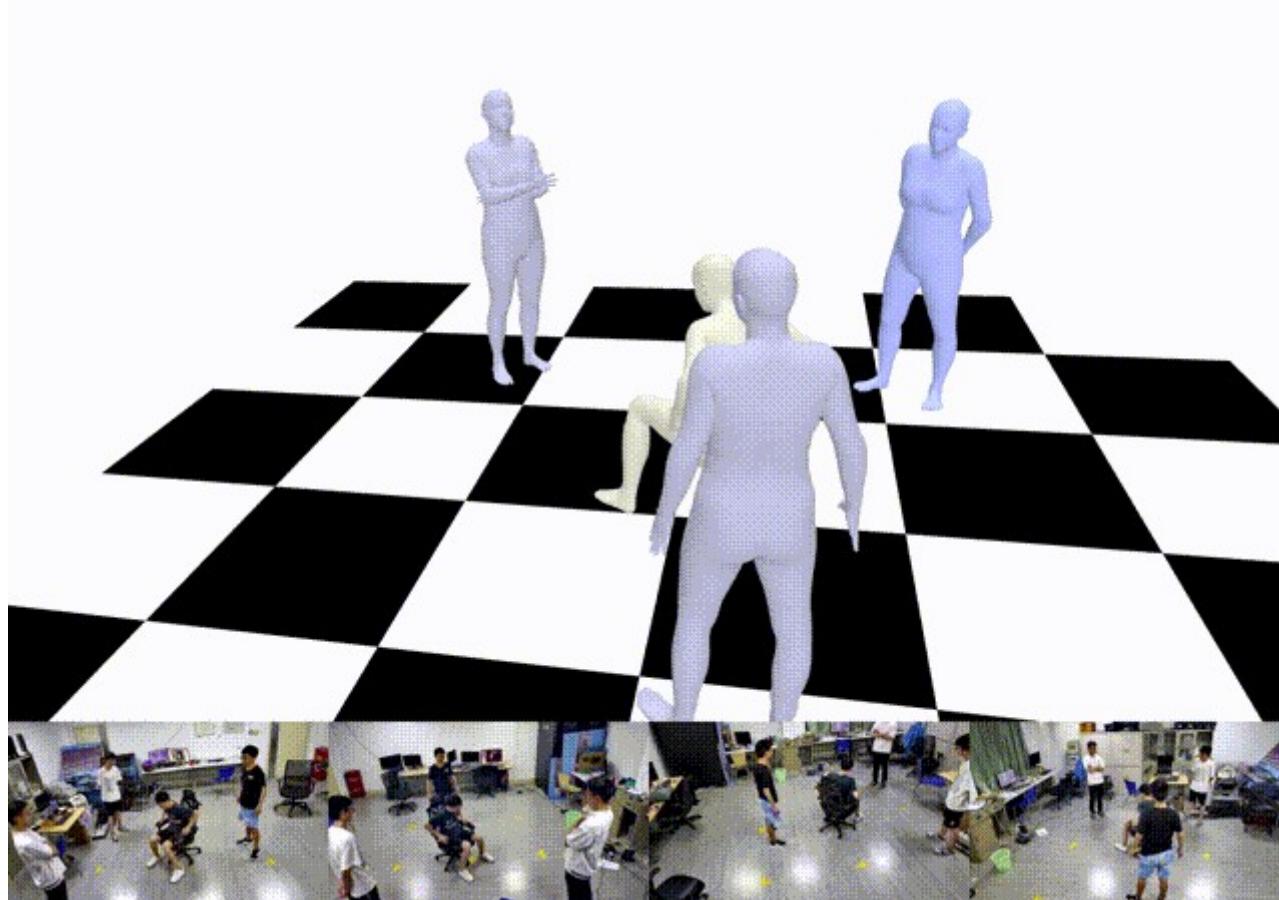
Original Image	Image Mask	Criminisi's Algorithm Result	Proposed Algorithm Result
			
			
			
			

Figure 4: Experimental results of the proposed algorithm in comparison to the Criminisi's algorithm.

## Notable AI Applications



# Notable AI Applications



## Notable AI Applications



<https://thisrentaldoesnotexist.com/>

# Notable AI Applications



<https://thispersondoesnotexist.com/>

## Notable AI Applications



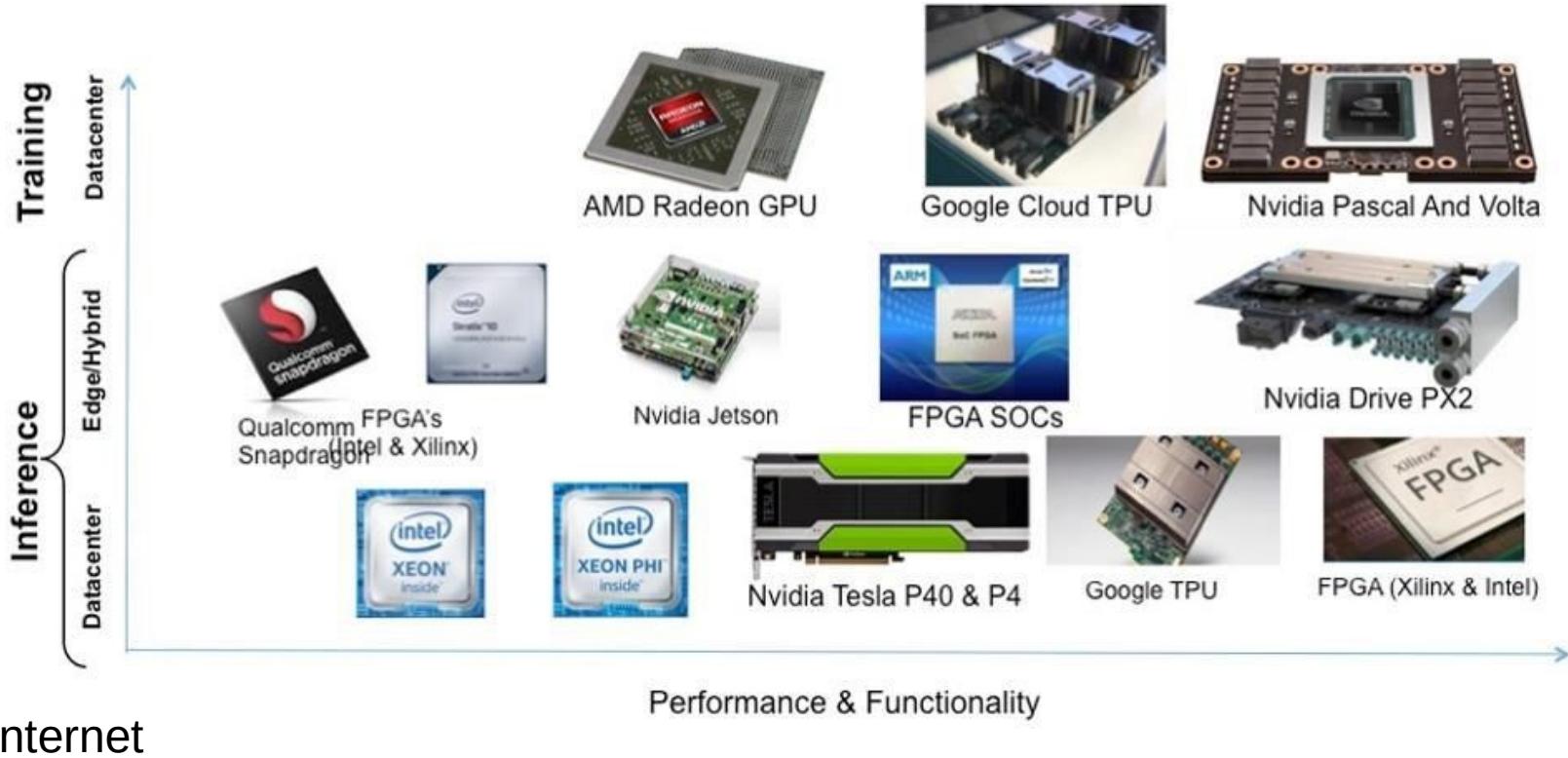
<https://youtu.be/5iZuffHPDAw>

# Technology Trends:



# Technology Trends:

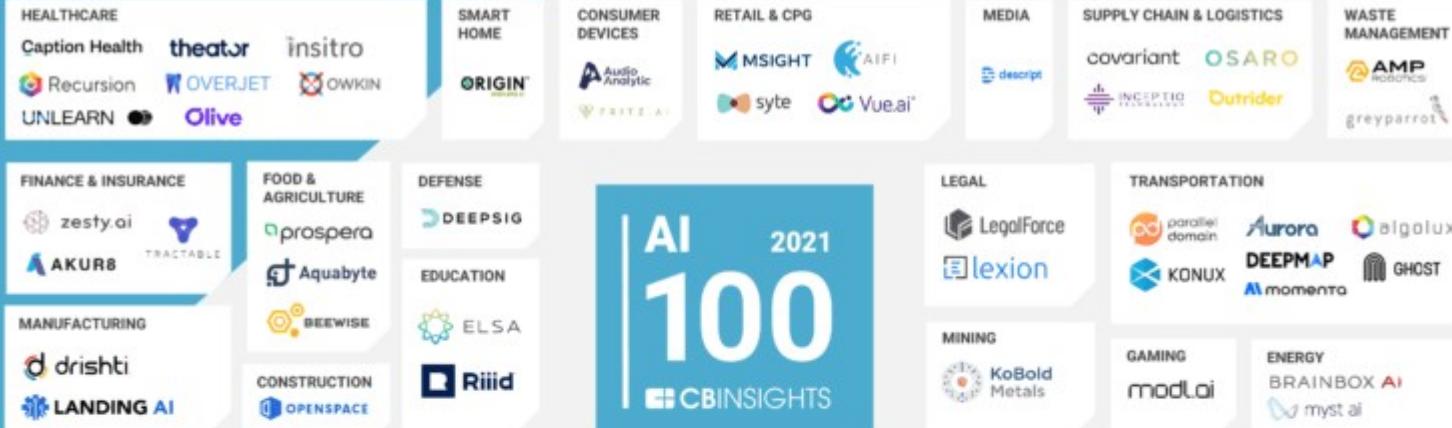
## HARDWARE TECHNOLOGIES USED IN MACHINE LEARNING



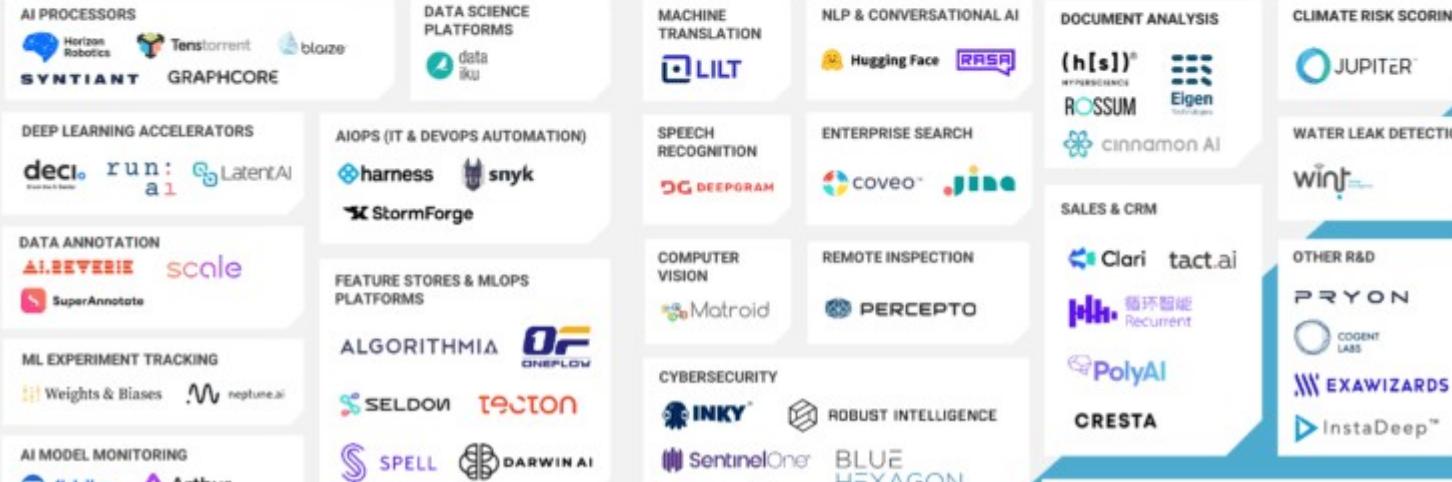
# Technology Trends:

- TensorFlow, Keras, Pytorch, Caffe, Chainer
- Python, Java, Javascript, Swift, C++, Matlab
- Google AutoML, Microsoft Azure, AWS, IBM Watson
- Intel OpenVINO, NVIDIA Omniverse, Facebook Meta, OpenAI, DeepMind, HuggingFace, Rasa, etc.
- Generative Pre-trained Transformer (GPT)
- AlphaGo (2014), AlphaZero, AlphaStar: Games
- AlphaFold (2016): Protein fold prediction
- WaveNet (2016) Text to speech system
- etc

## INDUSTRIAL AI APPLICATIONS

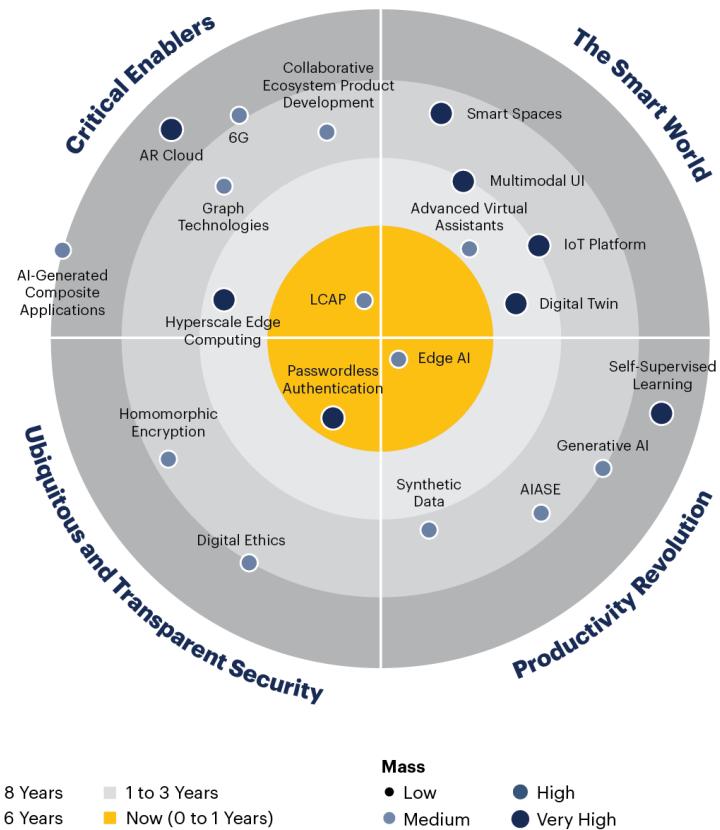


## COMPUTING, DATA PROCESSING, AND AI DEPLOYMENT



Created by You. Powered by CB INSIGHTS

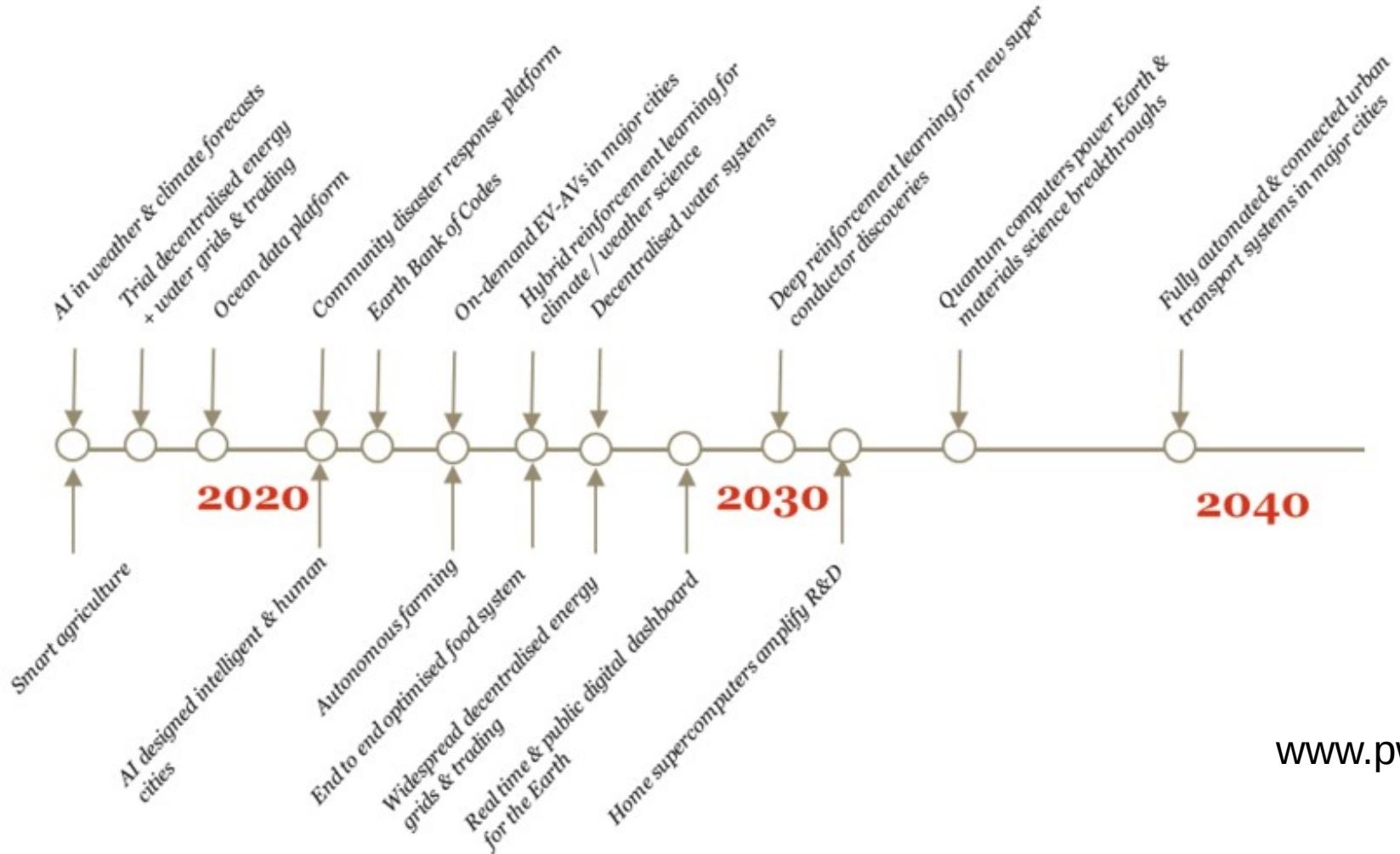
# Impact Radar for 2022



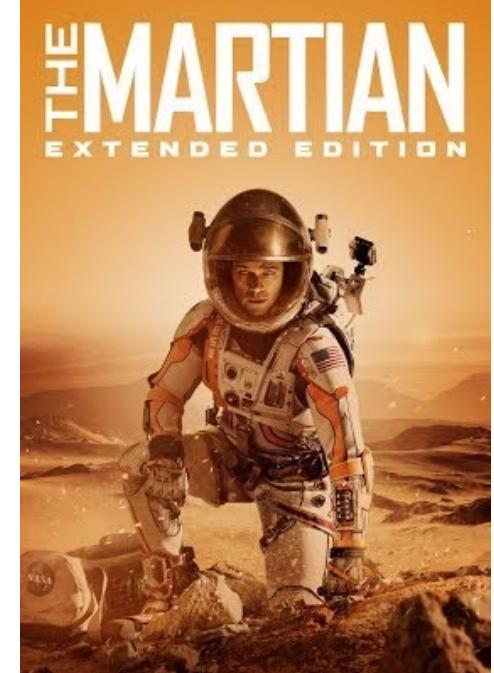
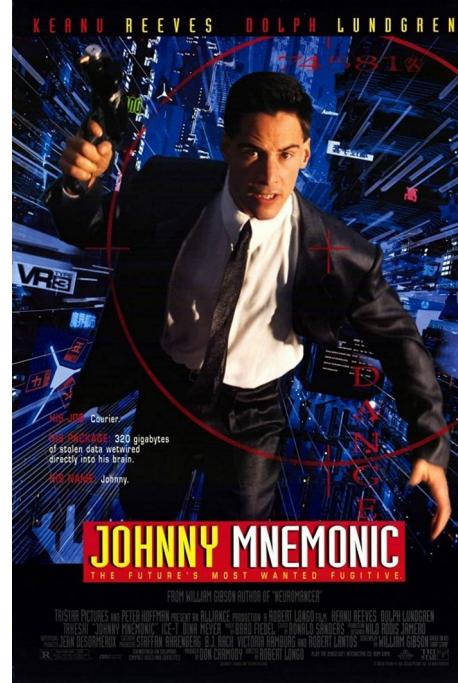
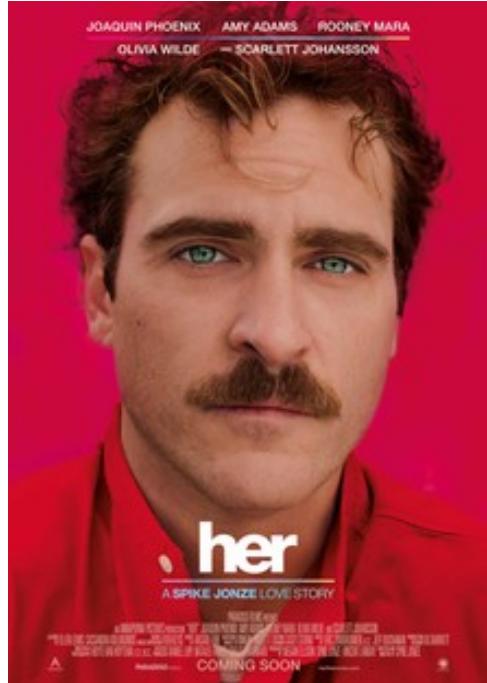
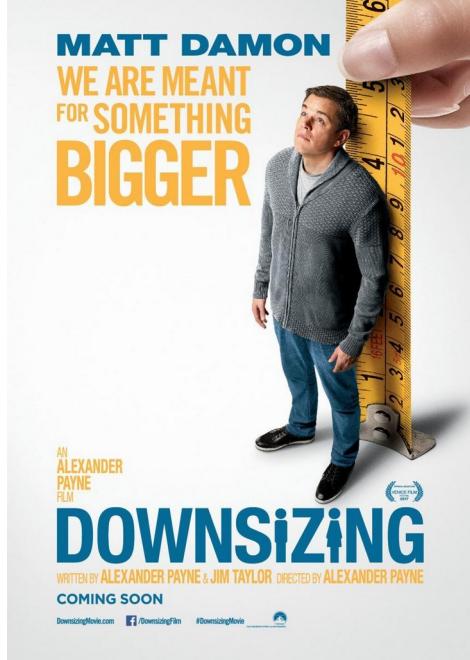
These trends center around four key themes:

- 1) The smart world: Change how people interact with the world around them.
- 2) Productivity revolution: Build on core AI technologies and extend computing ability.
- 3) Ubiquitous and transparent security: Underscore the importance of protecting an increasingly digital world.
- 4) Critical enablers: Act as an additive force to bring the emerging technologies and trends together, and heighten the benefits by reshaping business practices, processes, methods, models and/or functions in markets where they are applied.

## ***AI for the Earth game-changers: indicative timeline***



# Revelation from Hollywood



# Revelation from Hollywood



Logan's Run is a 1976 American science fiction action film. It is based on the 1967 novel Logan's Run by William F. Nolan and George Clayton Johnson.

In the [year of the city](#) 2274, the remnants of human civilization live in a sealed city contained beneath a cluster of [geodesic domes](#), a utopia run by a computer that takes care of all aspects of life, including reproduction. The citizens live a [hedonistic](#) lifestyle but, to prevent overpopulation, everyone must undergo the rite of "Carrousel" when they reach the age of 30. There, they are killed under the guise of being "renewed". To track this, each person is implanted at birth with a "life-clock" crystal in the palm of the left hand that changes color as they get older and begins blinking as they approach their "Last Day".

(Wikipedia)

# Q & A

How are global risks interconnected?

