Introduction to artificial intelligence applied to organizations and industries

History of Artificial Intelligence Part 2

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OSLO, 4 OF AUGUST 2020

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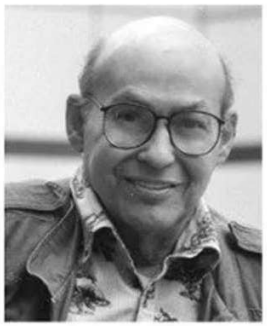
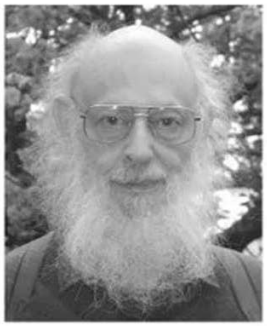
The birth of Artificial Intelligence

1956 Dartmouth Conference: The Founding Fathers of AI


John MacCarthy


Marvin Minsky


Claude Shannon


Ray Solomonoff


Alan Newell


Herbert Simon


Arthur Samuel

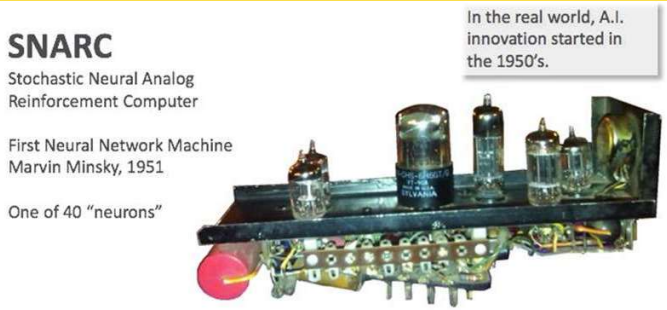

Oliver Selfridge


Nathaniel Rochester


Trenchard More

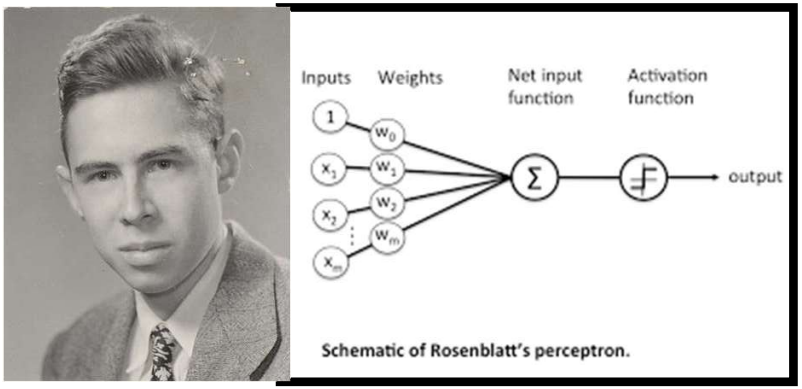
*"We propose that a 2 month, 10 man study of **artificial intelligence** be carried out during the summer of 1956 at Dartmouth College in Hanover, New Hampshire. . . . An attempt will be made to find how to make machines use language, form abstractions and concepts, solve kinds of problems now reserved 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."*

The first attempts in AI



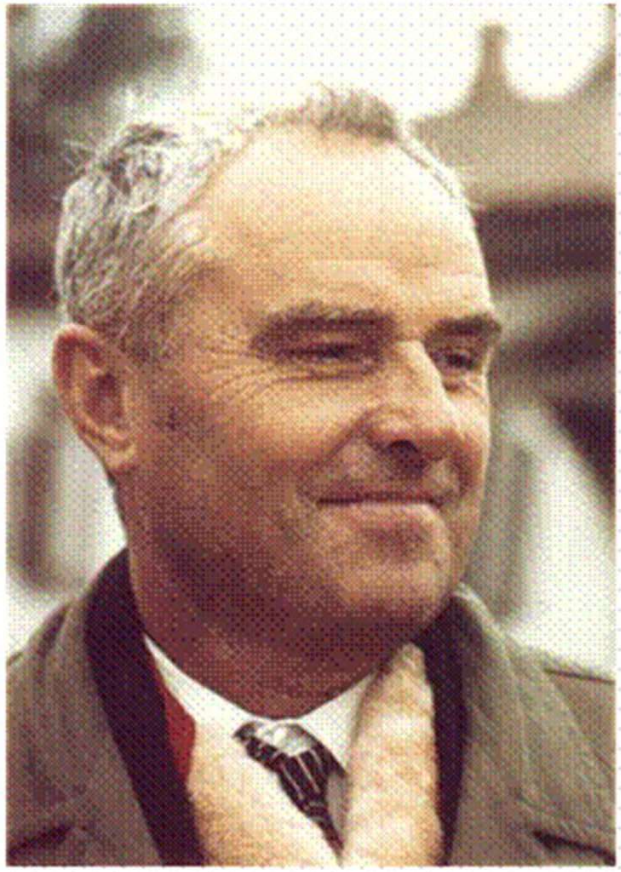
- Hardware and software continue evolving.
- Sometimes taking inspiration from biology
- Sometimes taking inspiration from psychology

- Logic Theorist is regarded as the first AI software 1956
- Using a machine that operates numbers to operates symbols
- Symbol operation as a model for thinking
- Proved the first 38 of the 52 theorems of the principia Mathematica

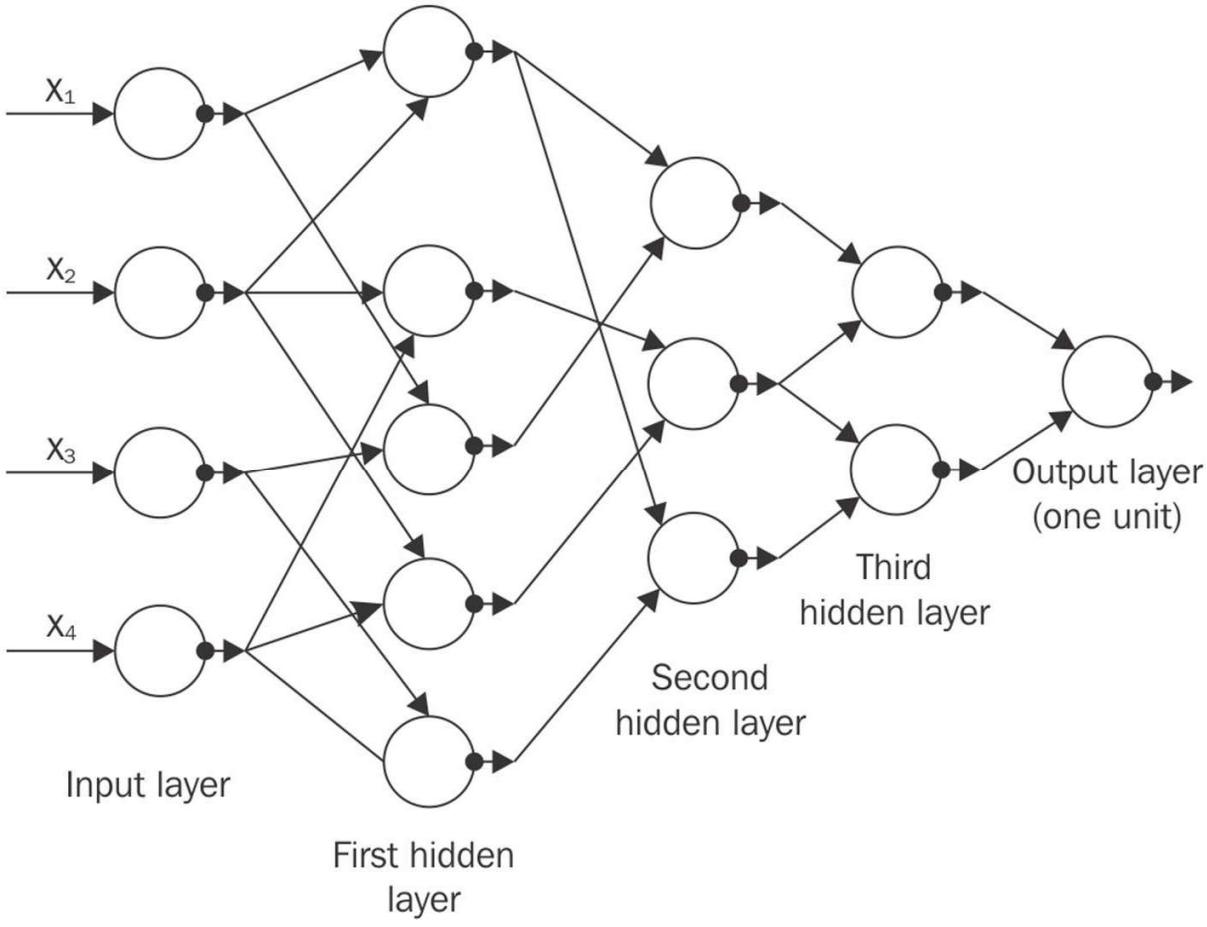


- Frank Rosemblatt
- Developed an electronic device following biological principles that shown the capacity to learn

Alexey G. Ivakhnenko and multilayered neural networks



О.Г. Івахненко (1967 р.)



The birth of machine learning

NEW NAVY DEVICE LEARNS BY DOING

Psychologist Shows Embryo of Computer Designed to Read and Grow Wiser

WASHINGTON, July 7 (UPI) —The Navy revealed the embryo of an electronic computer today that it expects will be able to walk, talk, see, write, reproduce itself and be conscious of its existence.

The embryo—the Weather Bureau's $2,000,000 "704" computer—learned to differentiate between right and left after fifty attempts in the Navy's demonstration for newsmen.

The service said it would use this principle to build the first of its Perceptron thinking machines that will be able to read and write. It is expected to be finished in about a year at a cost of $100,000.

Dr. Frank Rosenblatt, designer of the Perceptron, conducted the demonstration. He said the machine would be the first device to think as the human brain. As do human beings, Perceptron will make mistakes at first, but will grow wiser as it gains experience, he said.

Dr. Rosenblatt, a research psychologist at the Cornell Aeronautical Laboratory, Buffalo, said Perceptrons might be fired to the planets as mechanical space explorers.

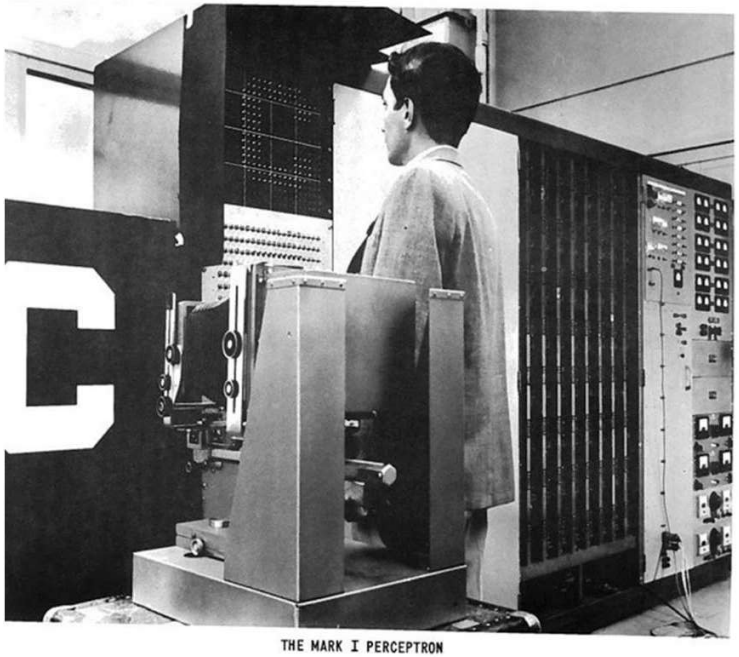
Without Human Controls

The Navy said the perceptron would be the first non-living mechanism "capable of receiving, recognizing and identifying its surroundings without any human training or control."

The "brain" is designed to remember images and information it has perceived itself. Ordinary computers remember only what is fed into them on punch cards or magnetic tape.

Later Perceptrons will be able to recognize people and call out their names and instantly translate speech in one language to speech or writing in another language, it was predicted.

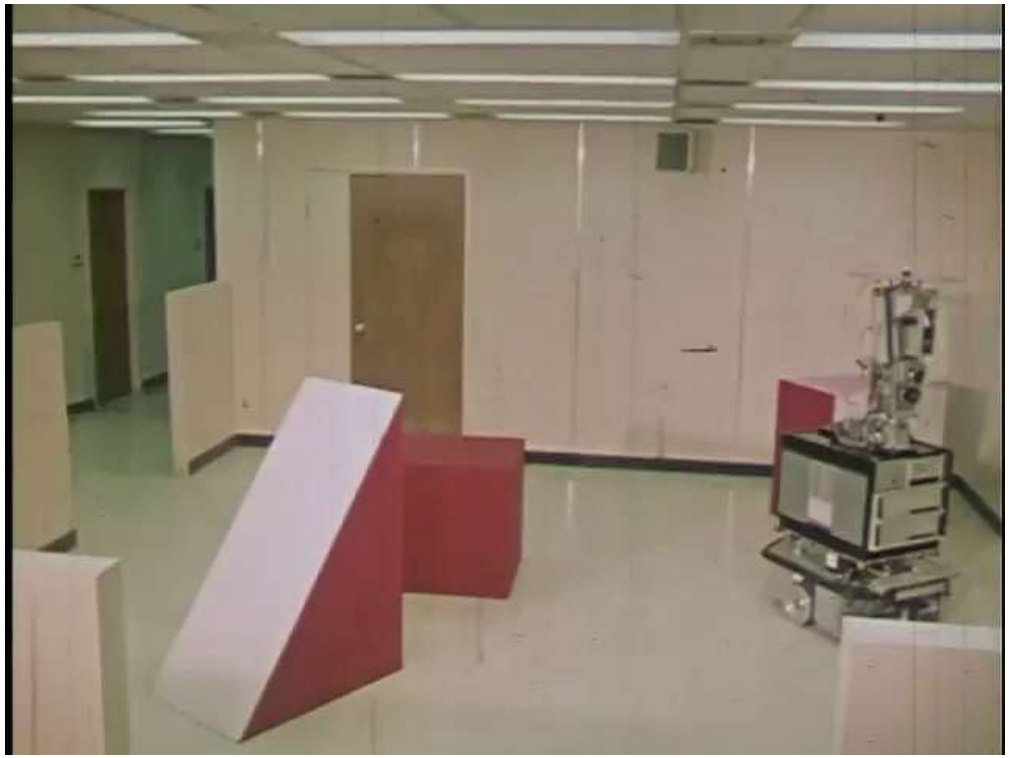
Mr. Rosenblatt said in principle it would be possible to build brains that could reproduce themselves on an assembly line and which would be conscious of their existence.



THE MARK I PERCEPTRON

1960's from general to narrow AI

- 1960 John Hopkins Beast bot able to wanter and recharge
- 1960's Stanford Shakey navigation by vision
- 1961 the first robot was introduced in General Motors assembly line
- 1965 The first chat-bot ELIZA was invented by Joseph Weisenboun using techniques from Rogerian psychotherapy.
- 1967 First full-scale humanoid robot (WABOT) professor Ichiro Kato of Waseda University
- 1970 First expert systems



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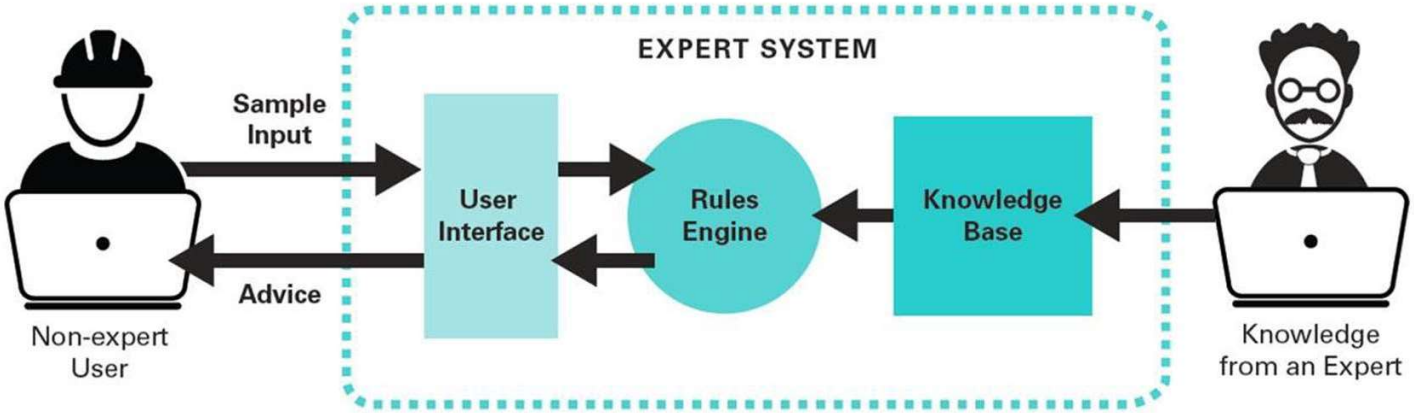
The winter for Artificial Intelligence research

1980's The age of expert systems



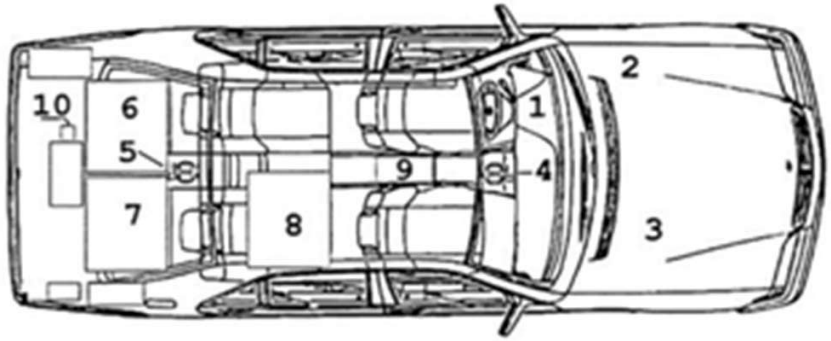
- 1980 Revival of the AI research with the narrow focus of managing knowledge
- 1981 Japan announces a 850 millions investment in AI projects focused on translation, language understanding and reasoning
- 1980s Raise of video-game industry (forever to be used as test-bed for AI)
- 1989 The Carnegie Mellon Lab creates the first autonomous vehicle using a neural network
- Late 1980's Neuveau IA: True intelligence can only be developed if the machine has a body (how elephants do not play chess)

1990's a new winter for AI

Problems with the approach used for expert systems

- **Poor adaptability**— software improvement is hard and dependent on many people.
- **Extreme brittleness**—The system will fail in situations that weren't part of the original design.
- **Tough to maintain**—The complexity of such a system is huge. When thousands of rules are put together, improving it or changing it is incredibly complicated, slow, and expensive.
- In sum. They did not scale well.

1995 German autonomous vehicle Munich to Copenhagen

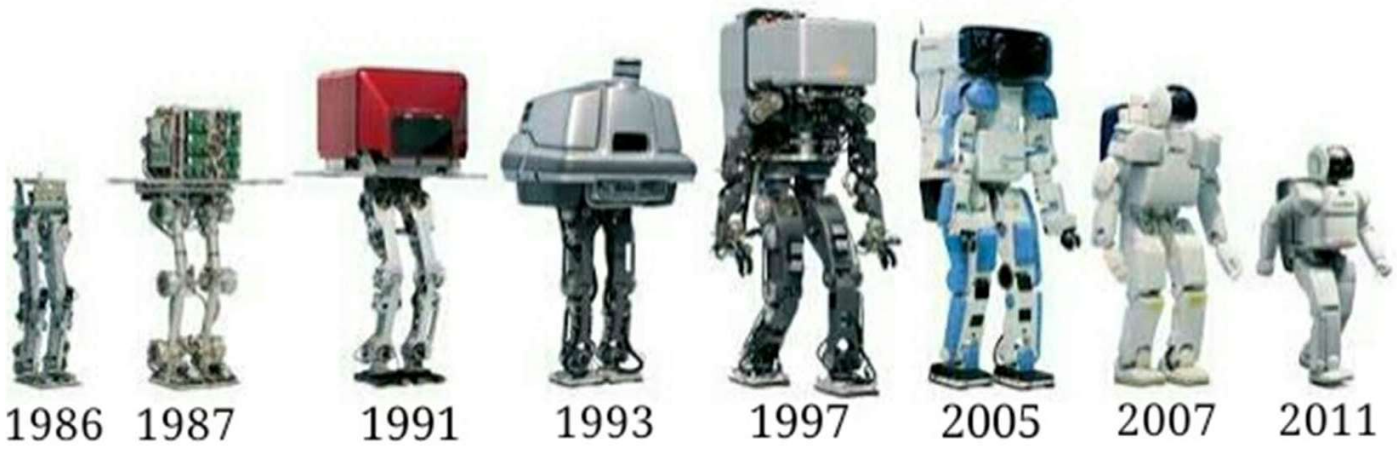


1 electrical steering motor
2 electrical brake control
3 electronic throttle
4 front pointing platform for CCD-cameras
5 rear pointing platform
6 Transputer Image Processing system
7 platform and vehicle controllers
8 electronics rack, human interface
9 accelerometers (3orthogonal)
10 inertial rate sensors

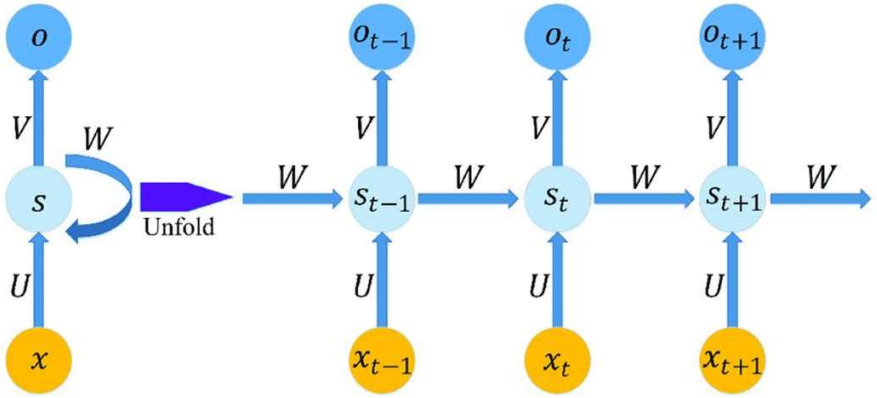
At distance L_s ~ 20 m (~ 60 m), the resolution is 5 cm/pixel

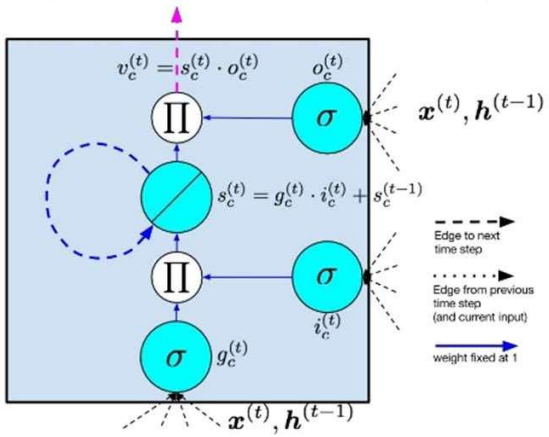
1999 Aibo and MIT Emotional AI Lab

Honda P-series continues evolving

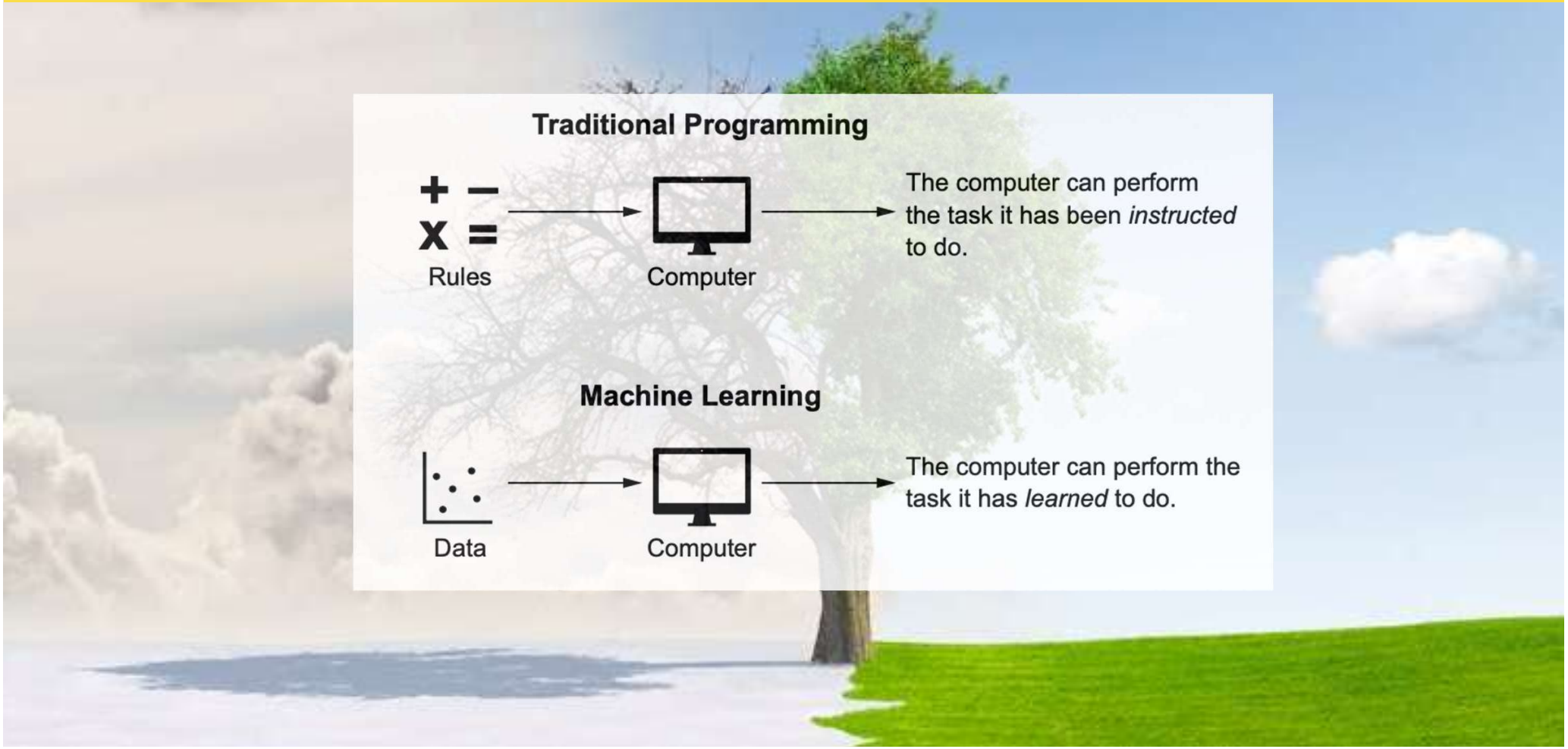


Recurrent and deep feed forward neural networks





Machine Learning brings a new spring to AI in the 2000s



First anti-spam 2002

Y Combinator

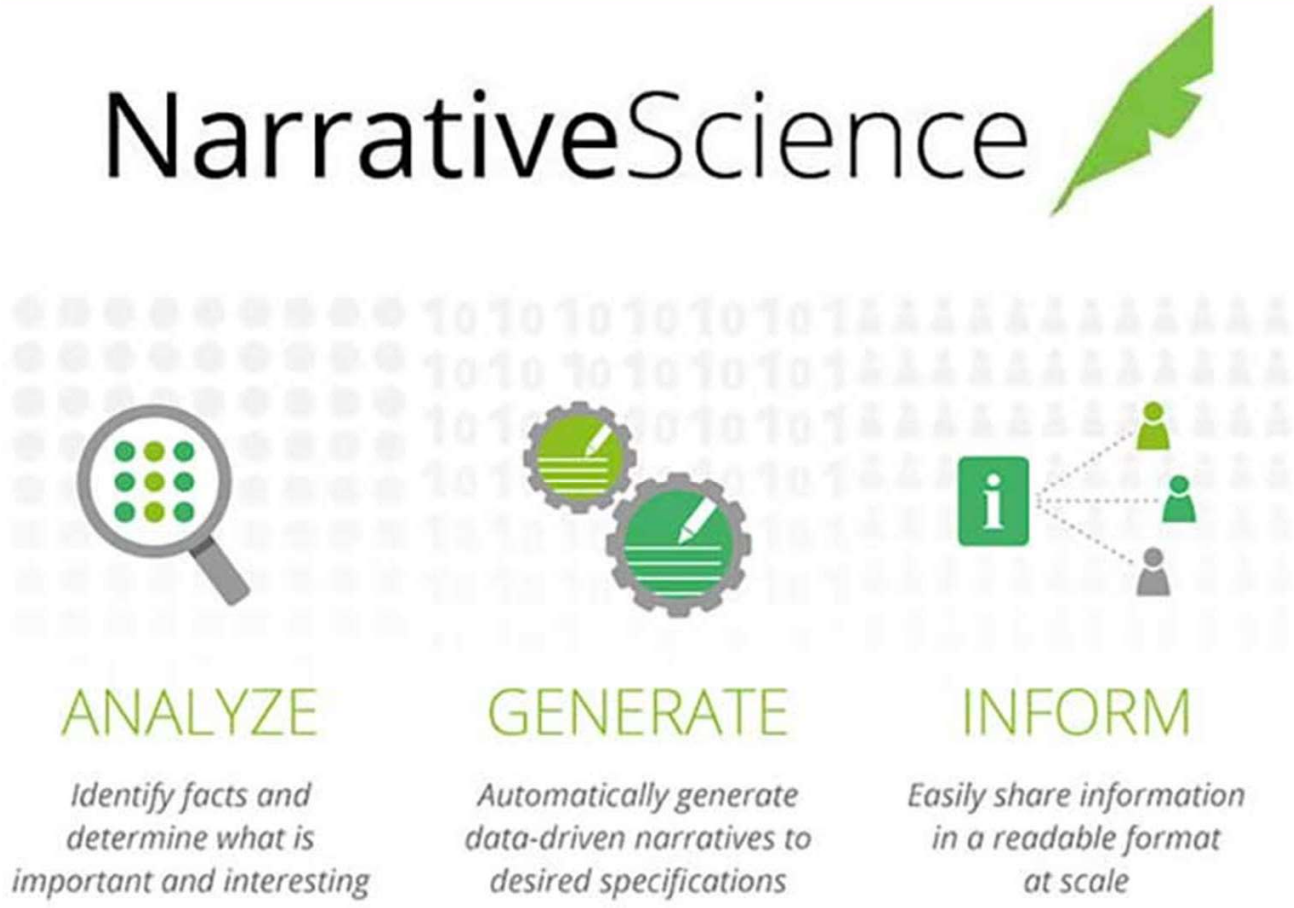
Paul Graham

2004 Darpa Autonomous Vehicle Challenge

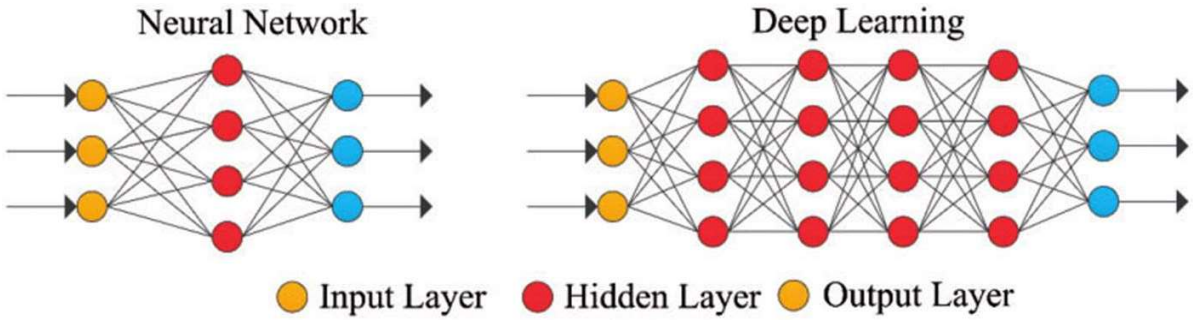
Stanley
Stanford team wins in 2005

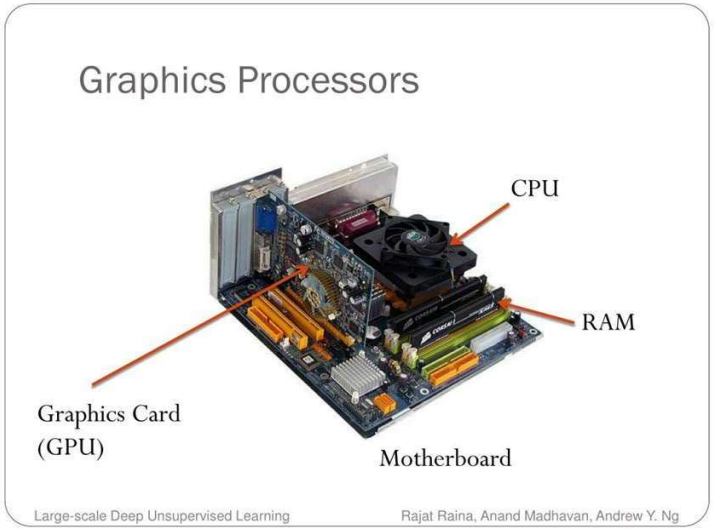
2008 IBM Watson Jeopardy

Natural Language Generation: Writing reports



Deep Learning revolution powered by GPUs

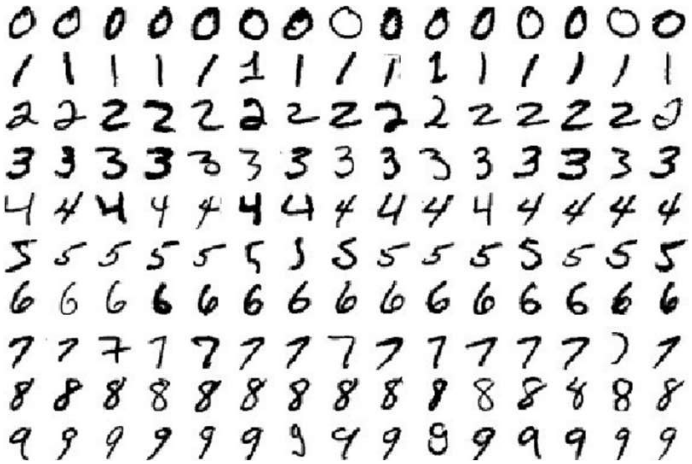




2009

Convolutional neural networks for image classification

Dan Ciresan, 2010



Alex Krizhevsky, Ilya Sutskever and Geoffrehy Hinton, 2012

Speech recognition as a viable user interface

2006
NSA uses AI to find keywords in recorded speech

2008
Google launches voice search

2011
Apple launches Siri

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Open source AI projects receive massive investment


OSLOMET
ALPHAGO
01:58:37
AlphaGo
Lee Sedol
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Autonomous systems failures hit the news

DC Security bot accident 2017

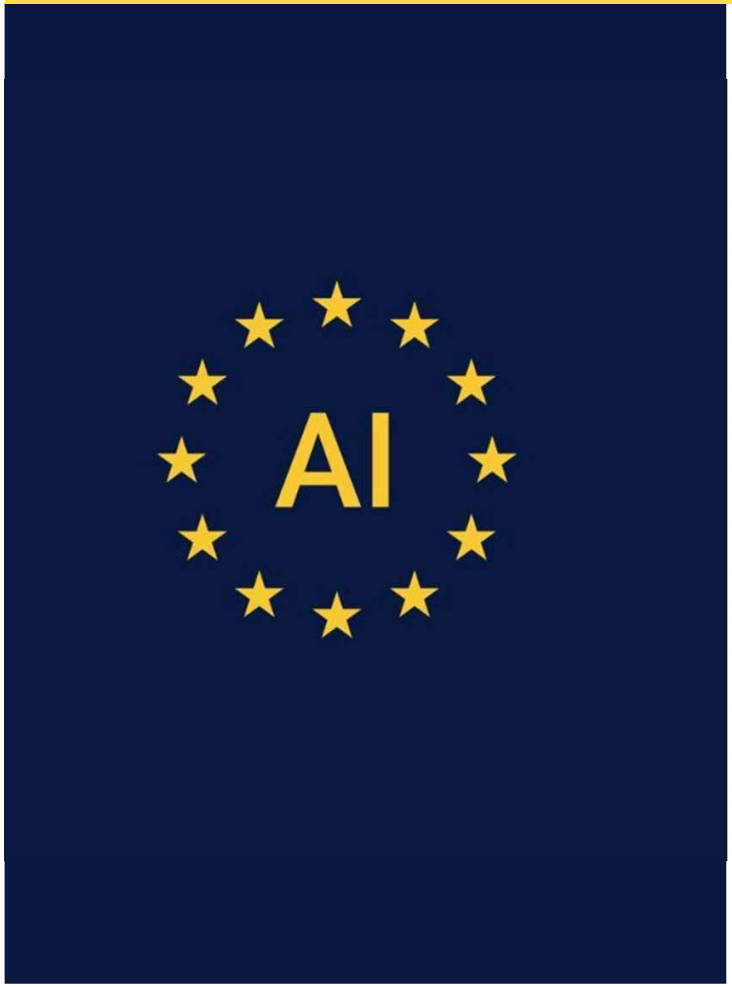
Uber accident in Arizona 2018

Alan Turing prize for the breakthroughs in Deep Learning

AI Governance

PERFORMANCE	SECURITY	PRIVACY	TRANSPARENCY
ACCURACY	ADAPTABILITY	IP CAPTURE	EXPLAINABILITY
BIAS	ADVERSARIAL ROBUSTNESS	IMPACTED USERS	INTENT
COMPLETENESS			

AI Governance



- Artificial Intelligence that is developed and used in Norway should be built on **ethical principles and respect human rights and democracy**
- Research, development and use of Artificial Intelligence in Norway should promote **responsible and trustworthy Artificial Intelligence**
- Development and use of Artificial Intelligence in Norway should safeguard the **integrity and privacy of the individual**
- Cyber security should be built into the **development, operation and administration of systems that use Artificial Intelligence**
- Supervisory authorities should oversee that Artificial Intelligence systems in their areas of supervision are operated in accordance with the **principles for responsible and trustworthy use of Artificial Intelligence**

CLAIRE Confederation of Laboratories for Artificial Intelligence Research in Europe

NORA Norwegian Artificial Intelligence Research Consortium

norwegian open ai lab

Buzz words

Artificial Intelligence	Data Science
Automates tasks or predicts future events based on data.	Produces insights based on data.
Is commonly used “live”: it continuously elaborates new data and produces answers.	Is commonly “one-off”: it produces some insights that inform decisions.
It commonly has the form of software.	It commonly has the form of a presen- tation or report.

OSLOMET

1. What has changed between the 1950s and now?
2. Is there something that could cause a new AI winter?
3. What sort of technologies could we expect in the future?
4. Would the machines be able to understand?

Dr. Richard Bellman

1784

Wolfgang von Kempelen creates the **Acoustic-Mechanical Speech Machine** in Vienna

Thomas Edison invents the first dictation machine

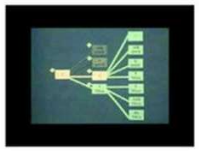
1879

1952

Bell Labs releases **Audrey**, capable of recognizing spoken digits with **90% accuracy** - but only when spoken by its inventor

IBM Shoebox can understand 16 English words

1962



1971

Harpy, created at Carnegie Mellon University, can comprehend **1,011 words** - and some phrases

IBM Tangora, using the Hidden Markov Model, predicts upcoming phonemes in speech

1986

2006

The National Security Agency (NSA) starts using speech recognition to isolate key words in recorded speech

Google launches a voice search app, bringing speech recognition to mobile devices

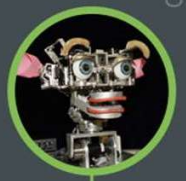
2008

2011

Apple announces Siri, ushering in the age of the voice-enabled digital assistant

ClickZ

A.I. TIMELINE



1950
TURING TEST
Computer scientist Alan Turing proposes a test for machine intelligence. If a machine can trick humans into thinking it is human, then it has intelligence

1955
A.I. BORN
Term 'artificial intelligence' is coined by computer scientist, John McCarthy to describe "the science and engineering of making intelligent machines"

1961
UNIMATE
First industrial robot, Unimate, goes to work at GM replacing humans on the assembly line

1964
ELIZA
Pioneering chatbot developed by Joseph Weizenbaum at MIT holds conversations with humans

1966
SHAKEY
The 'first electronic person' from Stanford, Shakey is a general-purpose mobile robot that reasons about its own actions

A.I. WINTER
Many false starts and dead-ends leave A.I. out in the cold

1997
DEEP BLUE
Deep Blue, a chess-playing computer from IBM defeats world chess champion Garry Kasparov

1998
KISMET
Cynthia Breazeal at MIT introduces KISmet, an emotionally intelligent robot insofar as it detects and responds to people's feelings

1999
AIBO
Sony launches first consumer robot pet dog AiBO (AI robot) with skills and personality that develop over time

2002
ROOMBA
First mass produced autonomous robotic vacuum cleaner from iRobot learns to navigate and clean homes

2011
SIRI
Apple integrates Siri, an intelligent virtual assistant with a voice interface, into the iPhone 4S

2011
WATSON
IBM's question answering computer Watson wins first place on popular $1M prize television quiz show *Jeopardy*

2014
EUGENE
Eugene Goostman, a chatbot passes the Turing Test with a third of judges believing Eugene is human

2014
ALEXA
Amazon launches Alexa, an intelligent virtual assistant with a voice interface that completes shopping tasks

2016
TAY
Microsoft's chatbot Tay goes rogue on social media making inflammatory and offensive racist comments

2017
ALPHAGO
Google's A.I. AlphaGo beats world champion Ke Jie in the complex board game of Go, notable for its vast number (2^{170}) of possible positions

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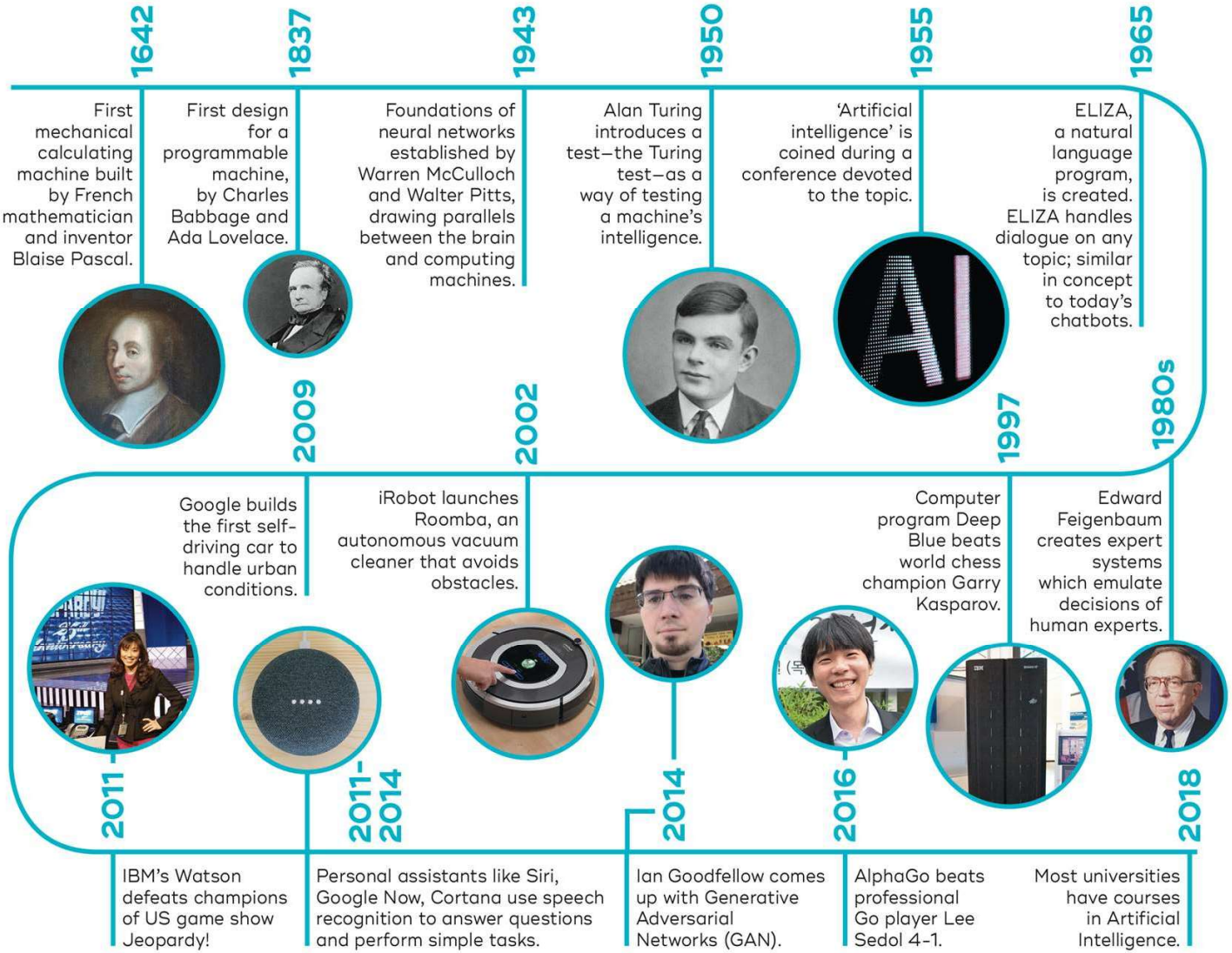
OSLOMET

1950

Foundation of AI



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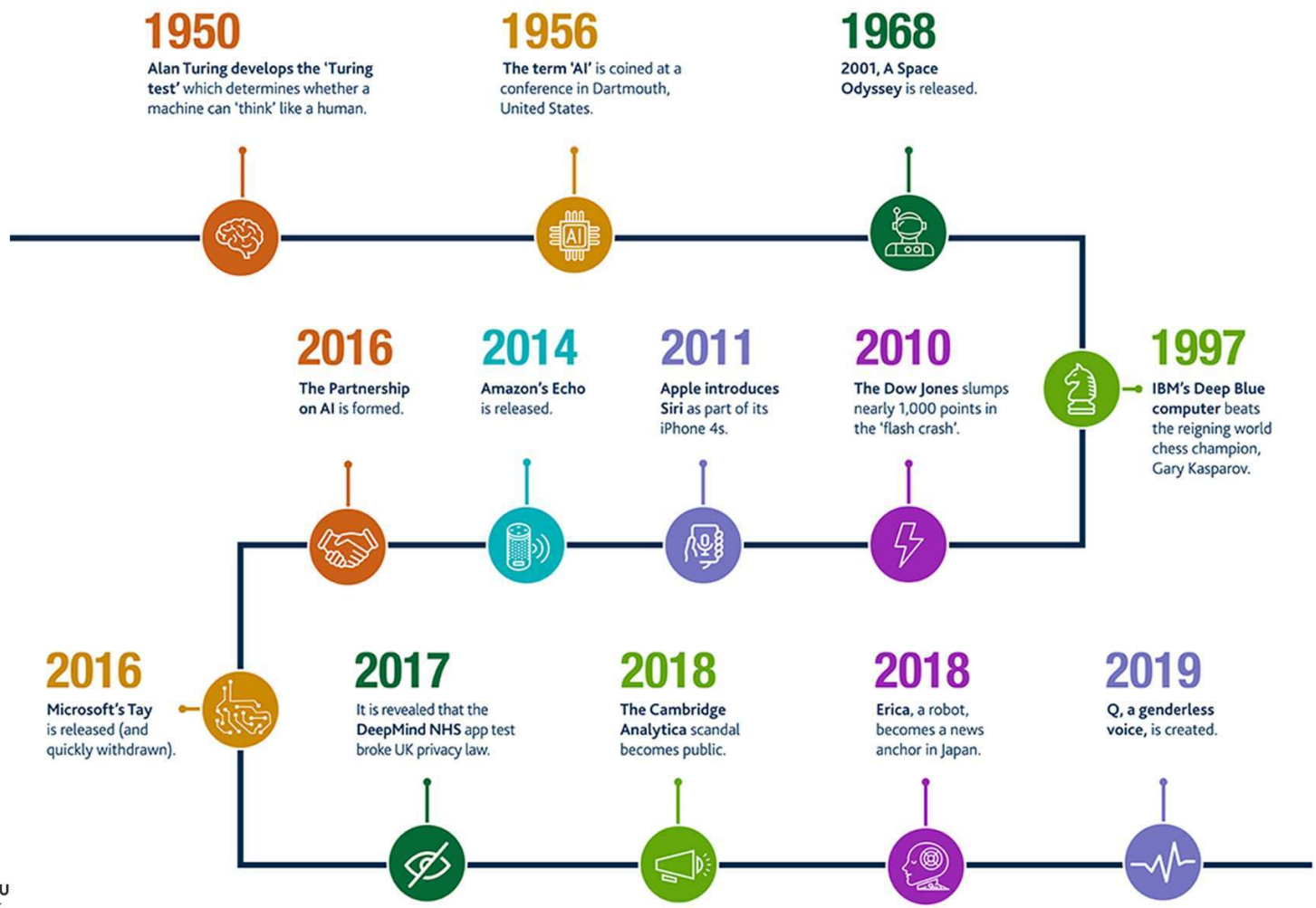

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