Smart Education by Artificial Intelligence

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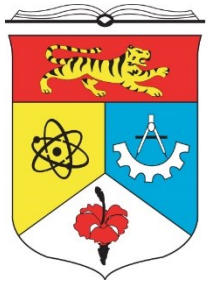
24 February 2022 – LaSalle College, Montreal, QC, Canada

BIO



UNIVERSITI KEBANGSAAN MALAYSIA
National University of Malaysia

AIESEC

SAMSUNG

UNIVERSITÄT DUISBURG ESSEN
Open-Minded

DAAD
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German Academic Exchange Service

ERICAN

M Medium

INTERACTIVE SYSTEMS

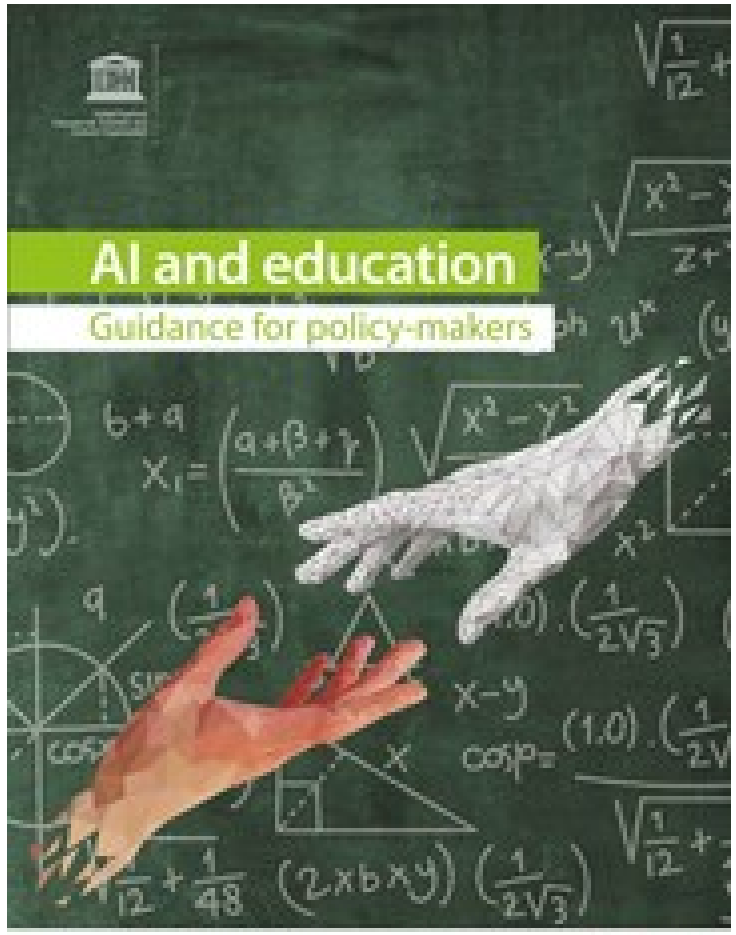
SSENSE

LaSalle College
Montréal

Outline

- What is Artificial Intelligence?
- Applications of AI
- Categories of AI
- AI – Fun vs. Dangerous
- AI and Education
- AI and Industries
- AI for Students
- How to learn AI?
- Future of AI
- Q&A

AI and education: guidance for policy-makers

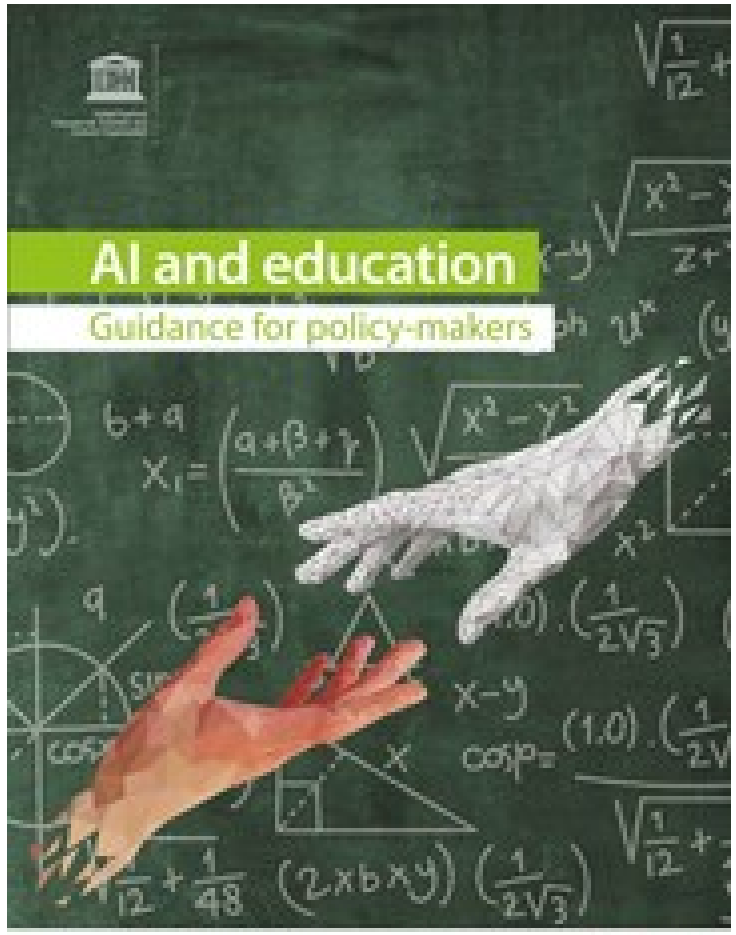


Fengchun Miao, Wayne Holmes,
Ronghuai Huang, Hui Zhang

Published by UNESCO

https://unesdoc.unesco.org/ark:/48223/pf0000376709.locale=en

AI and education: guidance for policy-makers

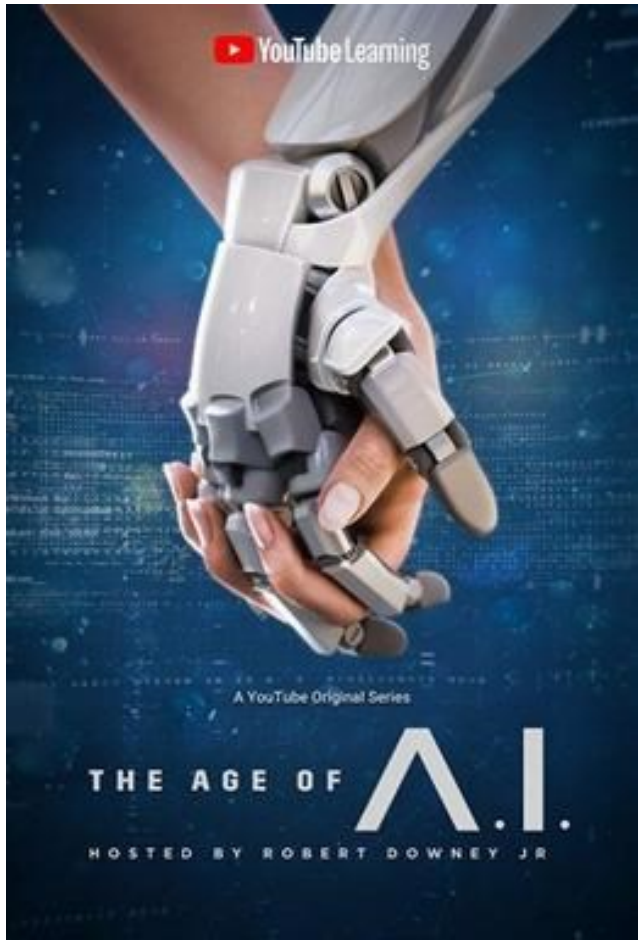


It offers guidance to policy-makers in understanding AI and responding to the challenges and opportunities in education presented by AI.

Specifically, it introduces the essentials of AI such as its definition, techniques, technologies, capacities and limitations.

It also portrays the emerging practices and benefit-risk assessment on leveraging AI to enhance education and learning, and to ensure inclusion and equity, as well as the reciprocal role of education in preparing humans to live and work with AI.

The age of A.I.



The Age of A.I. is a 8 part documentary series hosted by Robert Downey Jr. covering the ways Artificial Intelligence, Machine Learning and Neural Networks will change the world.

IMDb: 7.9

https://www.imdb.com/title/tt8421554

YouTube Originals
OFFICIAL TRAILER
THE AGE OF
A.I.

What is Artificial Intelligence?

Robots?

Artificial Human-being?

Artificial Animal?

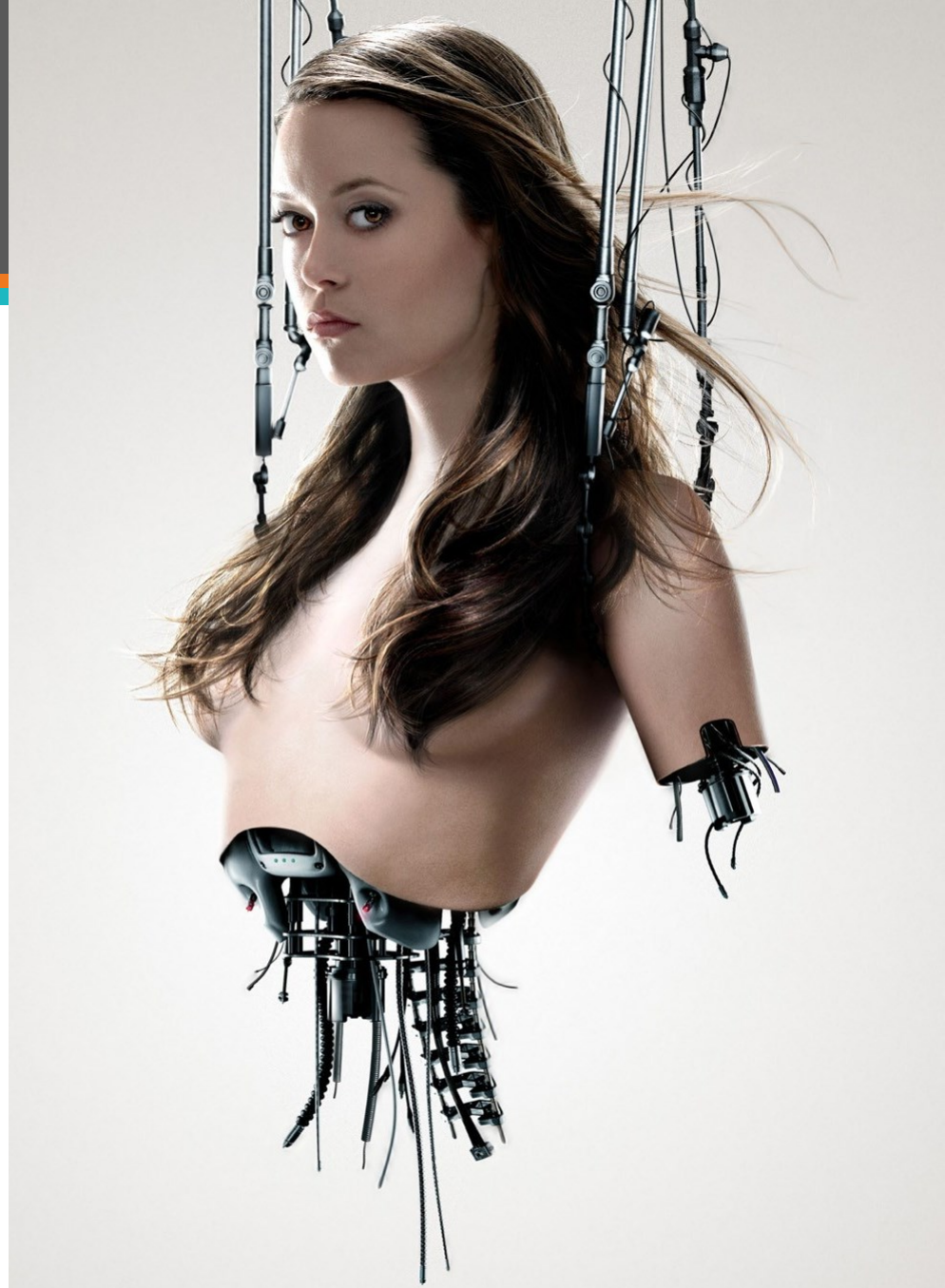
…

A threat to human being?

…

…

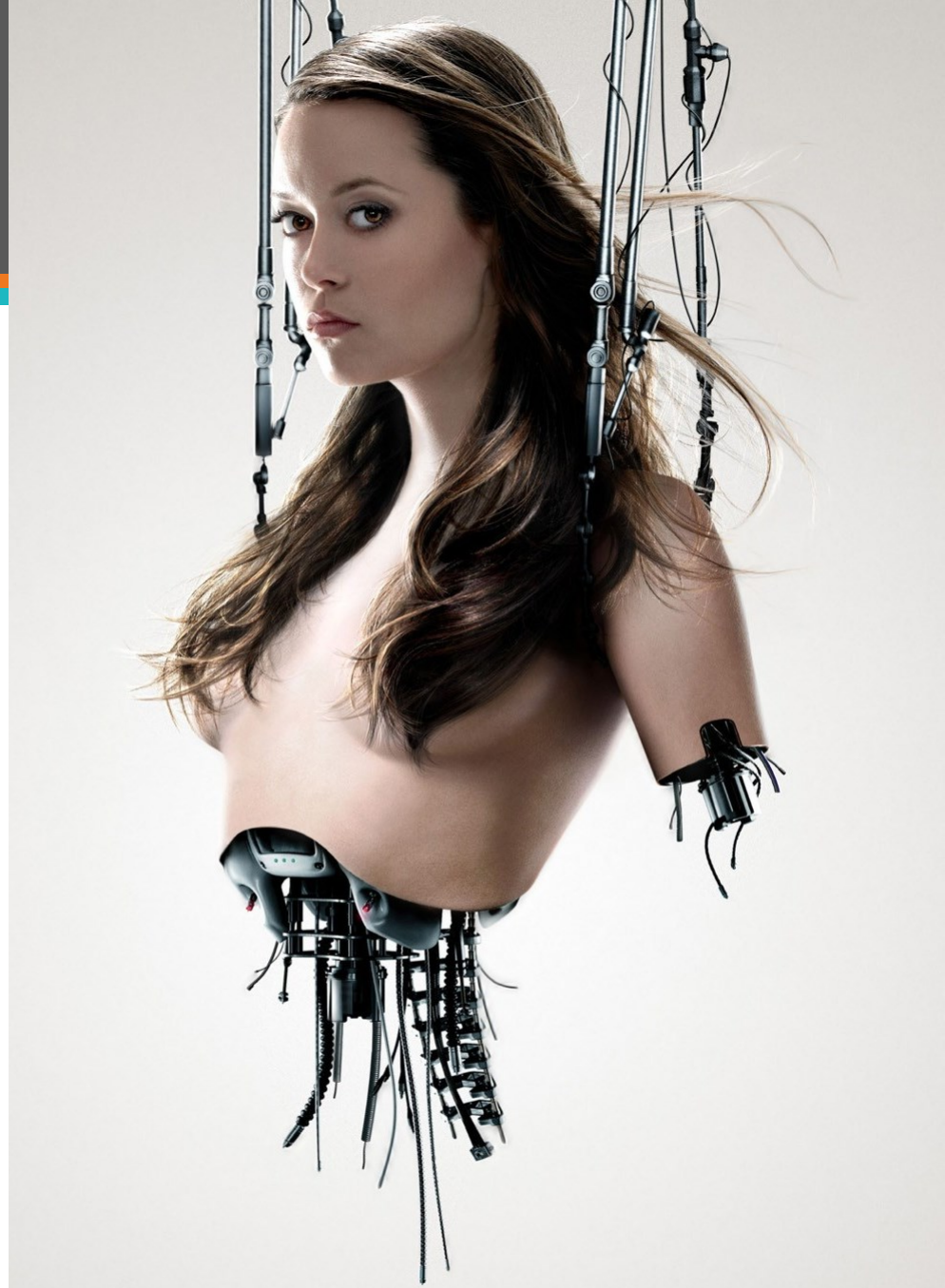
etc.?



What is Artificial Intelligence?

The term ‘**artificial intelligence**’ was first used at a 1956 workshop held at Dartmouth College, a US Ivy League university, to describe the "**science and engineering of making intelligent machines**, especially intelligent computer programs“

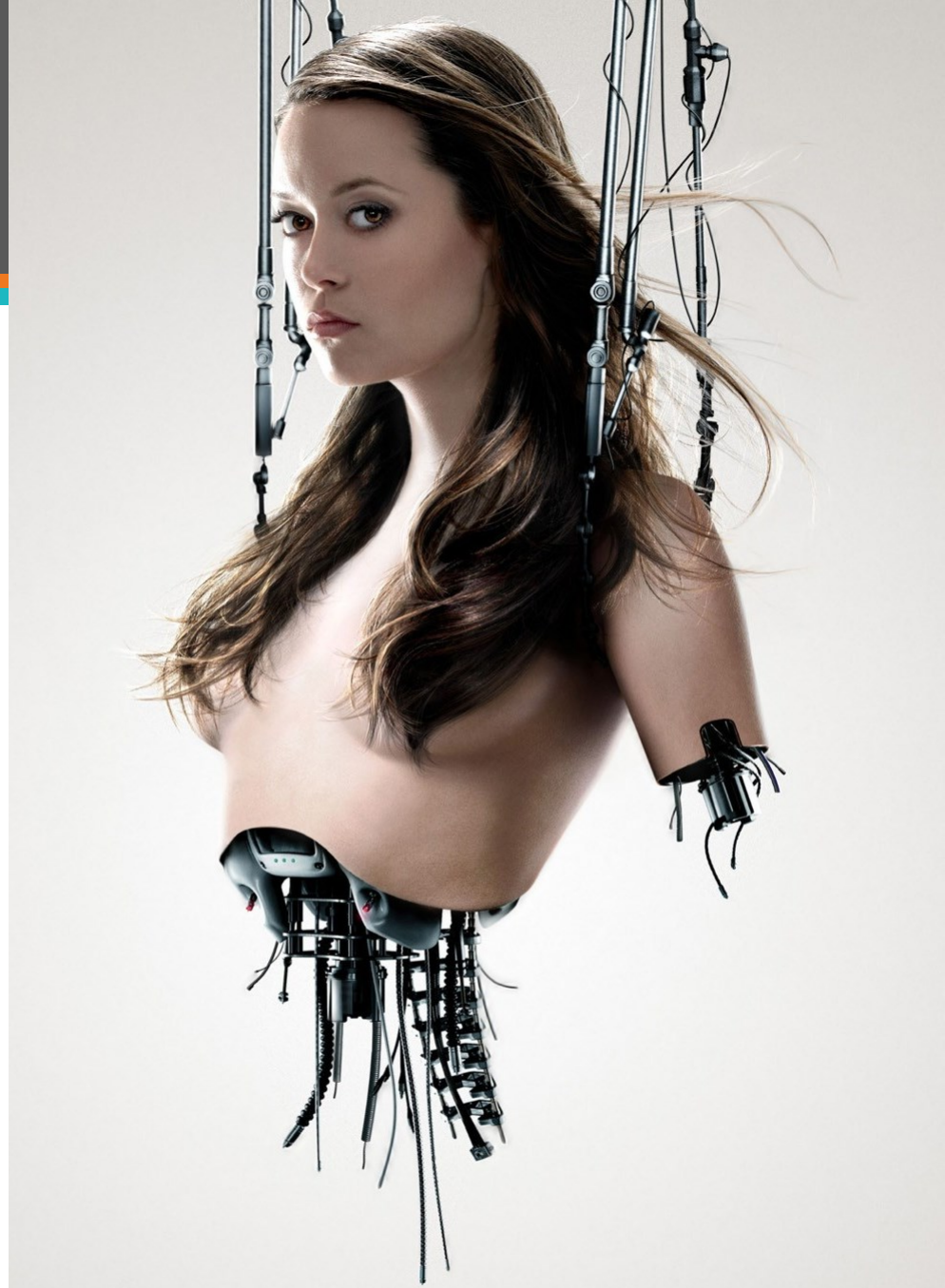
- McCarthy et al., 2006, p. 2



What is Artificial Intelligence?

A branch of modern science and technology aiming at the **exploration of the secrets of human intelligence** on one hand and the **transplantation of human intelligence to machines** as much as possible on the other hand, so that **machines would be able to perform functions as intelligently as they can**.

- Zhong, 2006, p. 90



What is Artificial Intelligence?

Machines capable of **imitating certain functionalities of human intelligence**, including such features as **perception, learning, reasoning, problem solving, language interaction, and even producing creative work**.

- COMEST, 2019

What is Artificial Intelligence?

Human being has two capabilities that makes him uniquely intelligent:

- **Learning**
- **Problem Solving**

Any system with these two abilities can mimic the cognitive functions associated to human mind.

Sony Aibo Robot

Information Overload

- "People read around 10 MB worth of material a day, hear 400 MB a day, and see 1 MB of information every second" - The Economist, November 2006.

- In 2015, consumption will raise to 74 GB a day - UCSD Study 2014

AI Applications

- **Personalization**
  - *Recommendation*
  - *Online Advertising*
  - *Gmail auto-complete*
  - *…*
- ***Map Routing***
- ***Autonomous Driving***
- ***Medical Image Processing***
- ***Banking Mortgage Approval***
- **Voice Assistance**
  - *Amazon Alexa*
  - *Apple Siri*
  - *Samsung Bixby*
  - *Text-2-Speech & Speech-2-Text*
- ***Weather Forecast***
- ***Auto Smile Photo Shooting***
- ***Online Security Systems***
- ***and many more…***

Personalization

Recommendation

Example:
Benefits of Recommender System

- **Netflix**: 2/3 of the movies watched are recommended
- **Google News**: recommendations generate 38% more click-through
- **Amazon**: 35% sales from recommendations
- **Choicestream**: 28% of the people would buy more music if they found out what they like.

Future of Advertising…

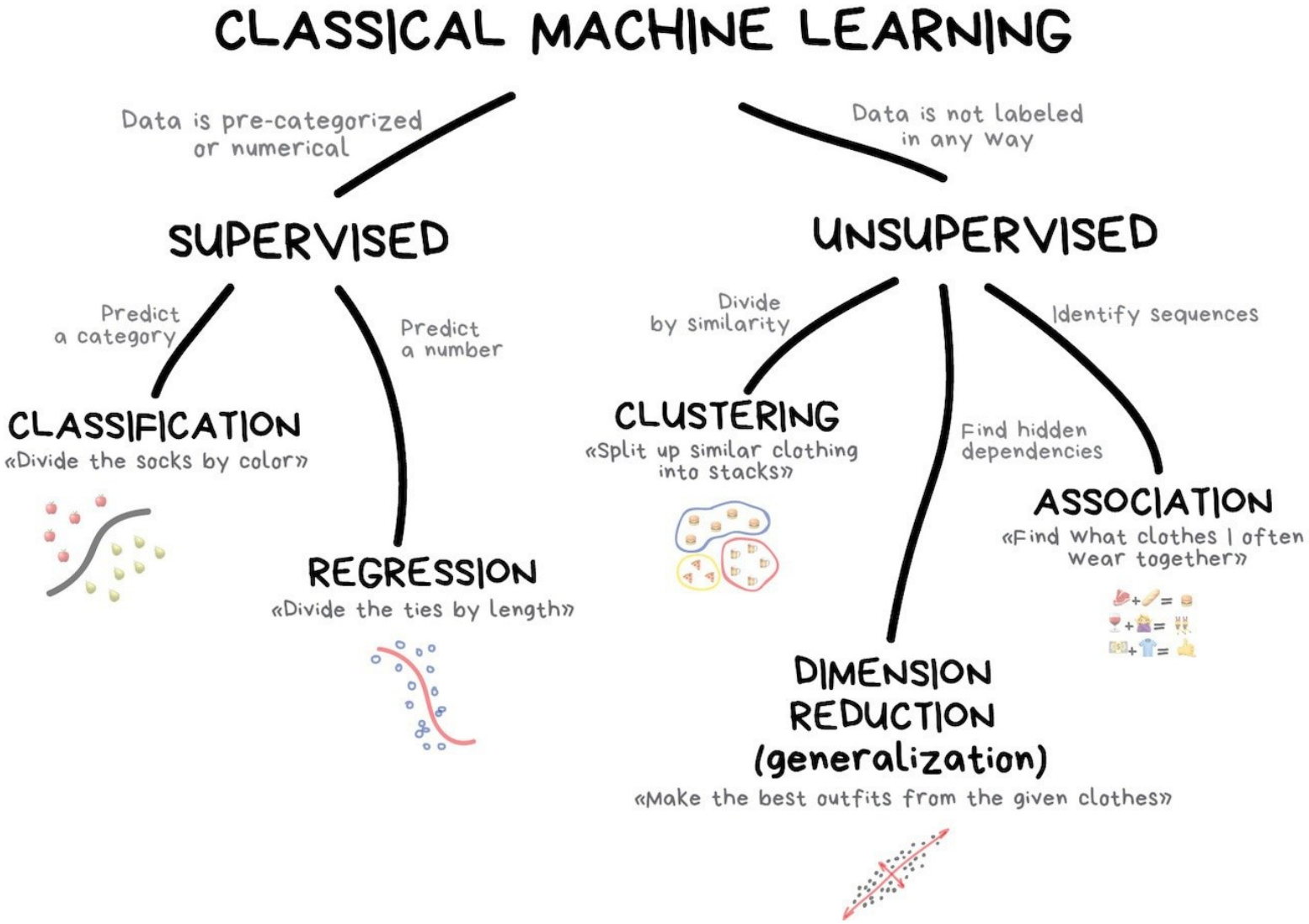
Minority Report (2002)

By Steven Spielberg

IMDb: 7.6/10

https://www.imdb.com/title/tt0181689/

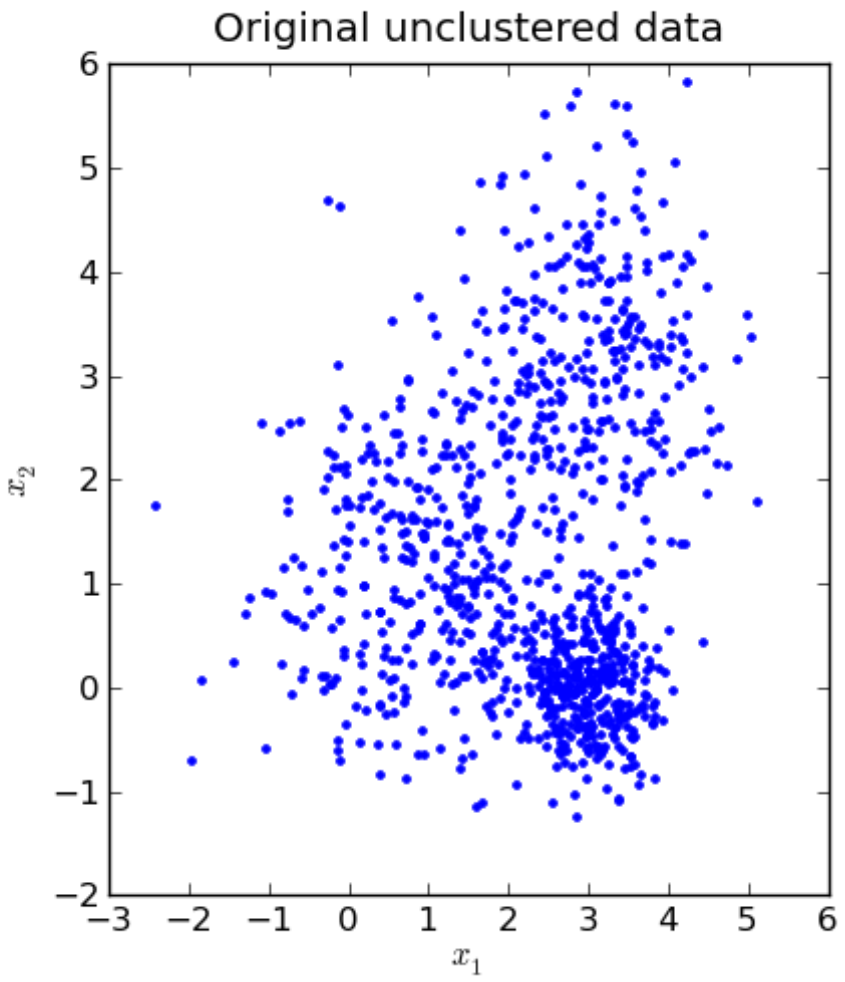
Categories in AI

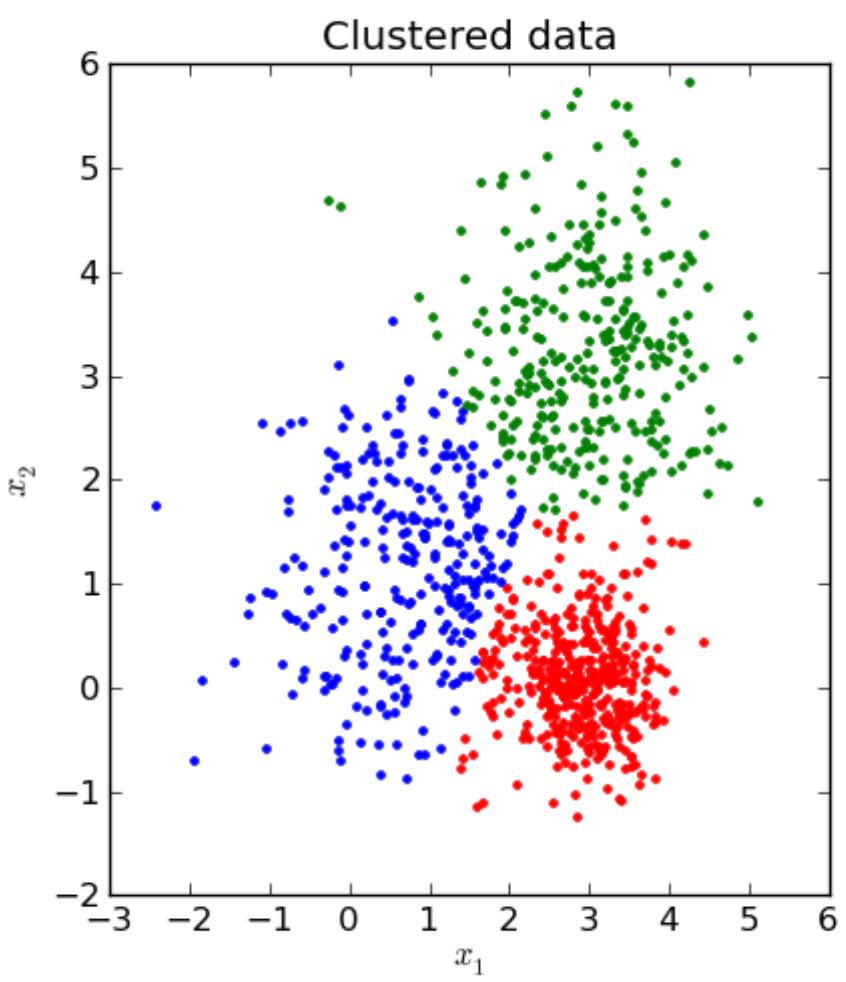


Categories in AI

- ***Clustering***
- *Classification*
- *Regression*
- *Optimization*
- *Association*
- *Reinforcement Learning*

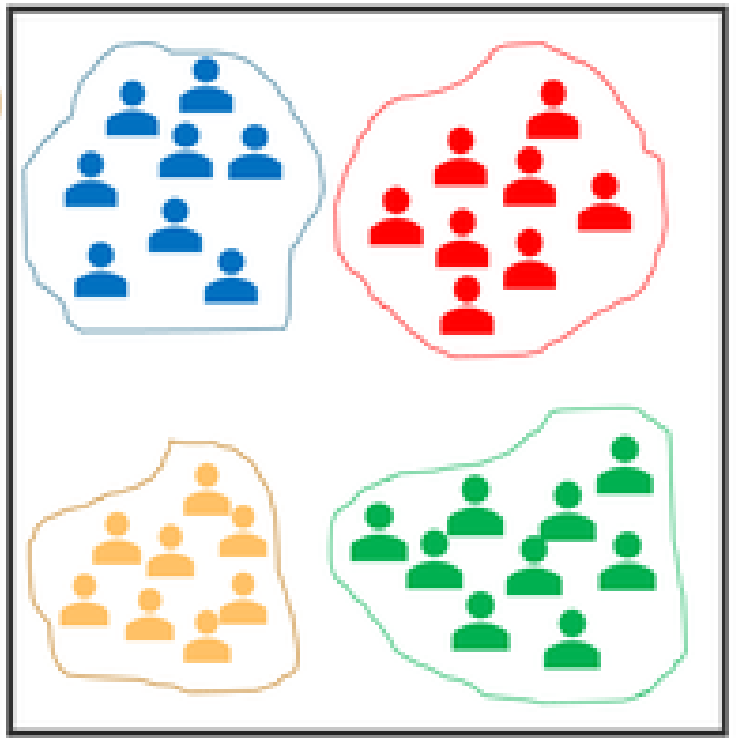
Clustering (Unsupervised Learning)



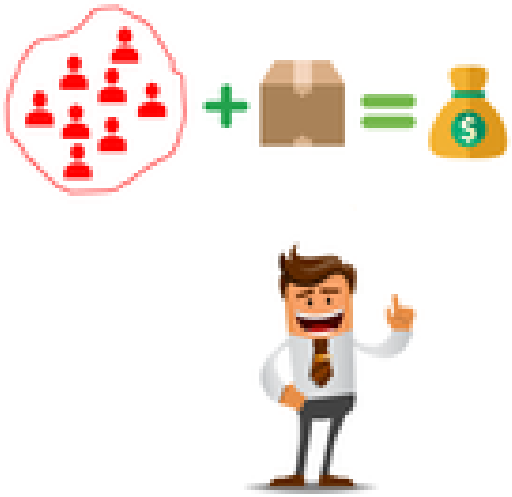


Clustering

Trying to determine the appropriate audience for the product



Using clustering algorithms on the customer base



Selling the product to the targeted audience

Categories in AI

- *Clustering*
- ***Classification***
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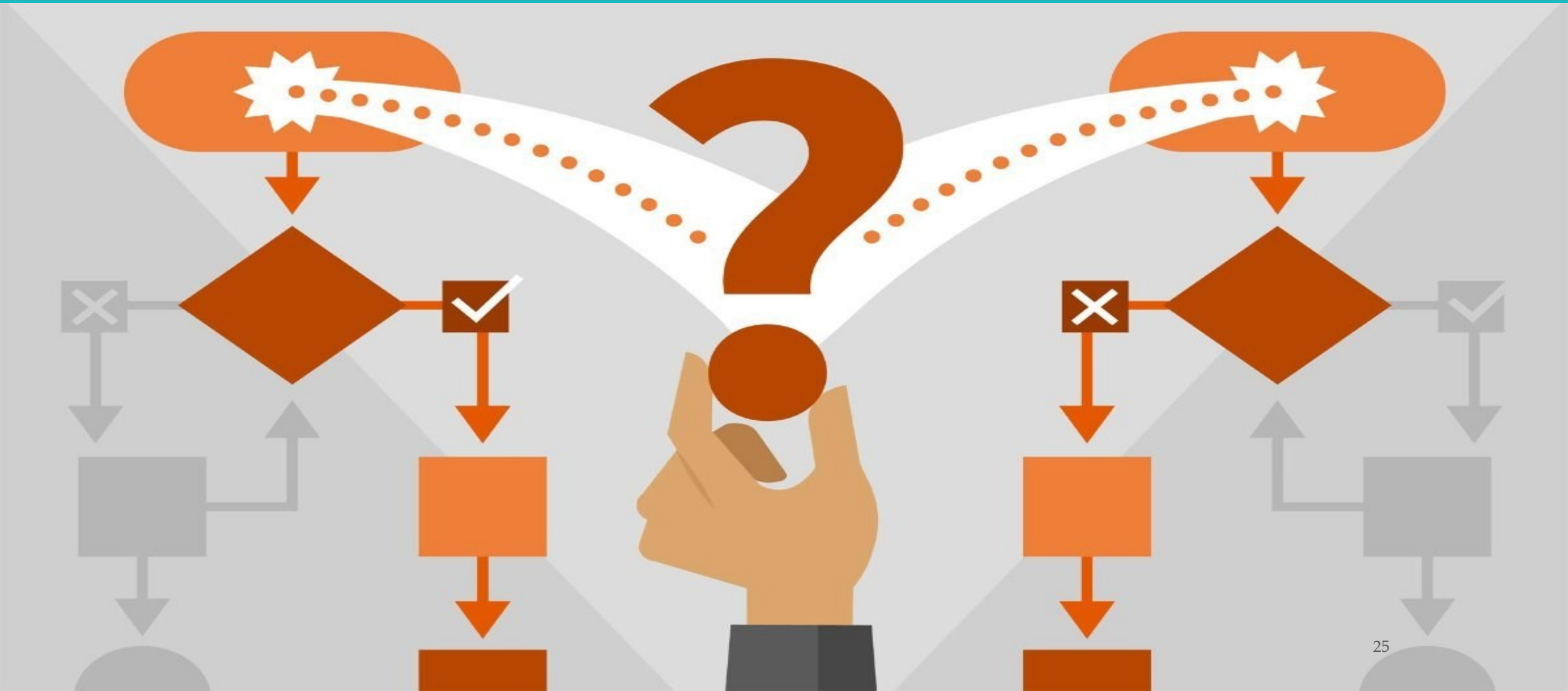
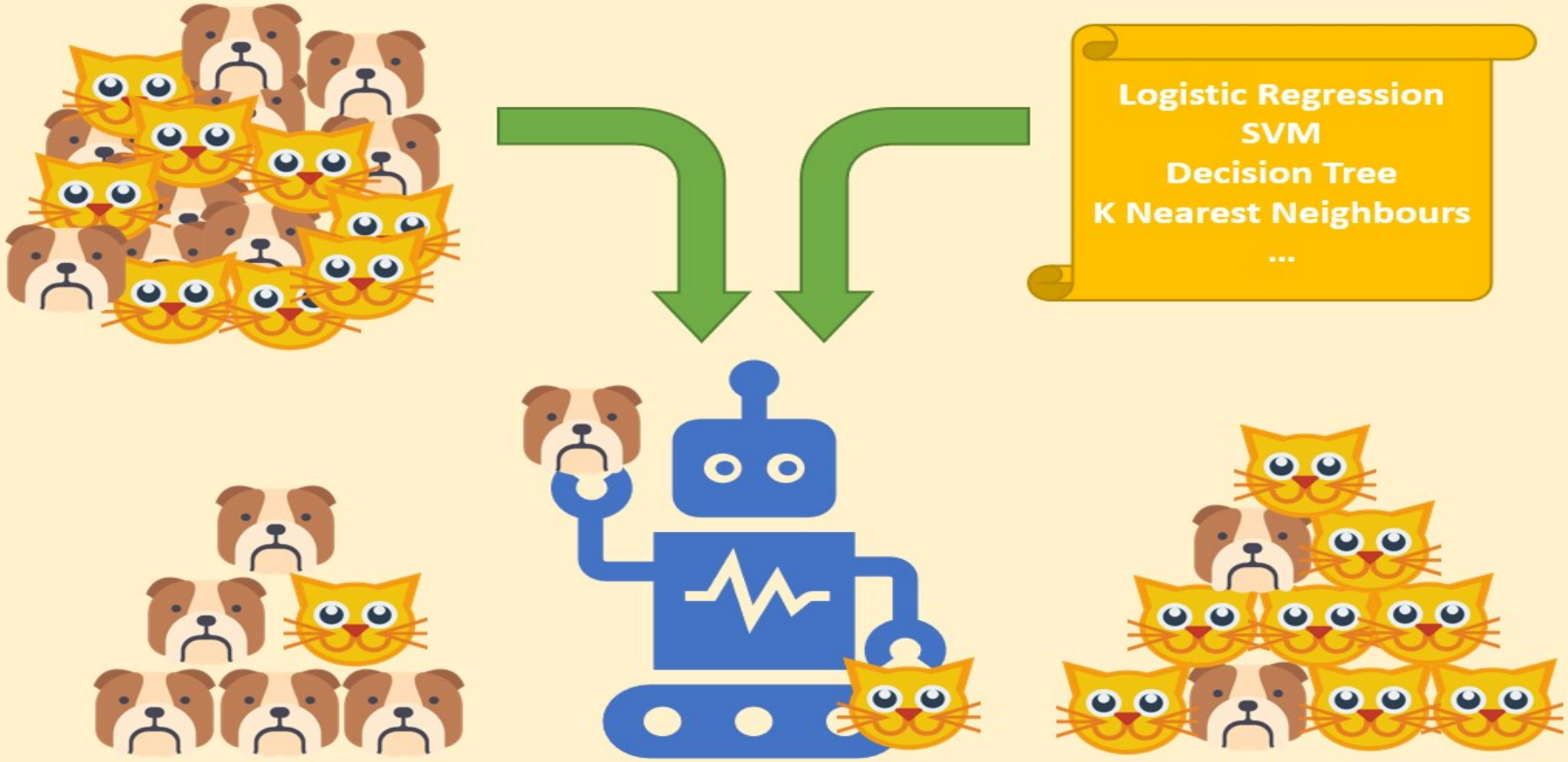
- *Association*
- *Reinforcement Learning*

Classification (Supervised Learning)



Classification (Supervised Learning)



Categories in AI

- *Clustering*
- *Classification*
- ***Regression***
- *Optimization*
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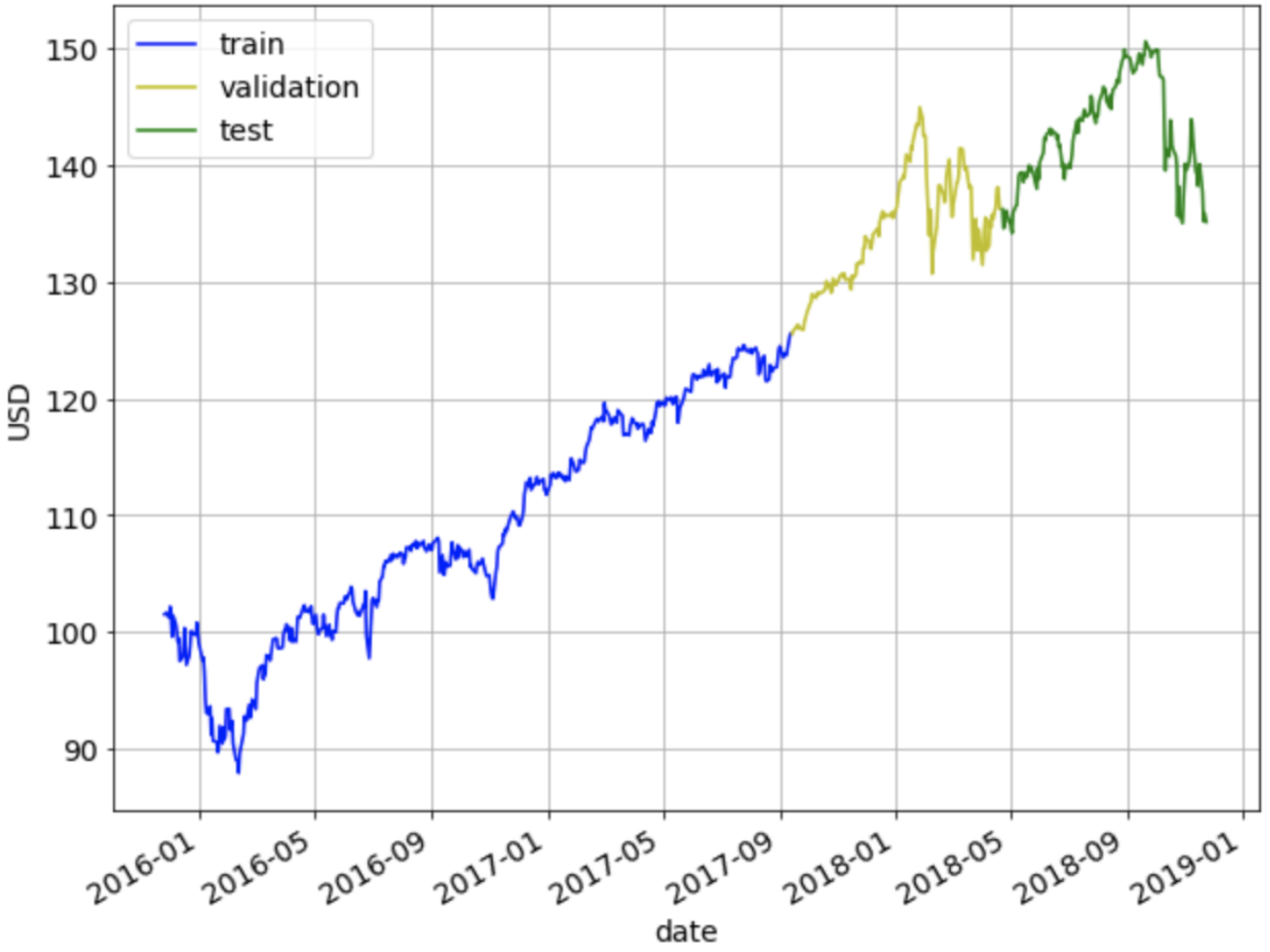
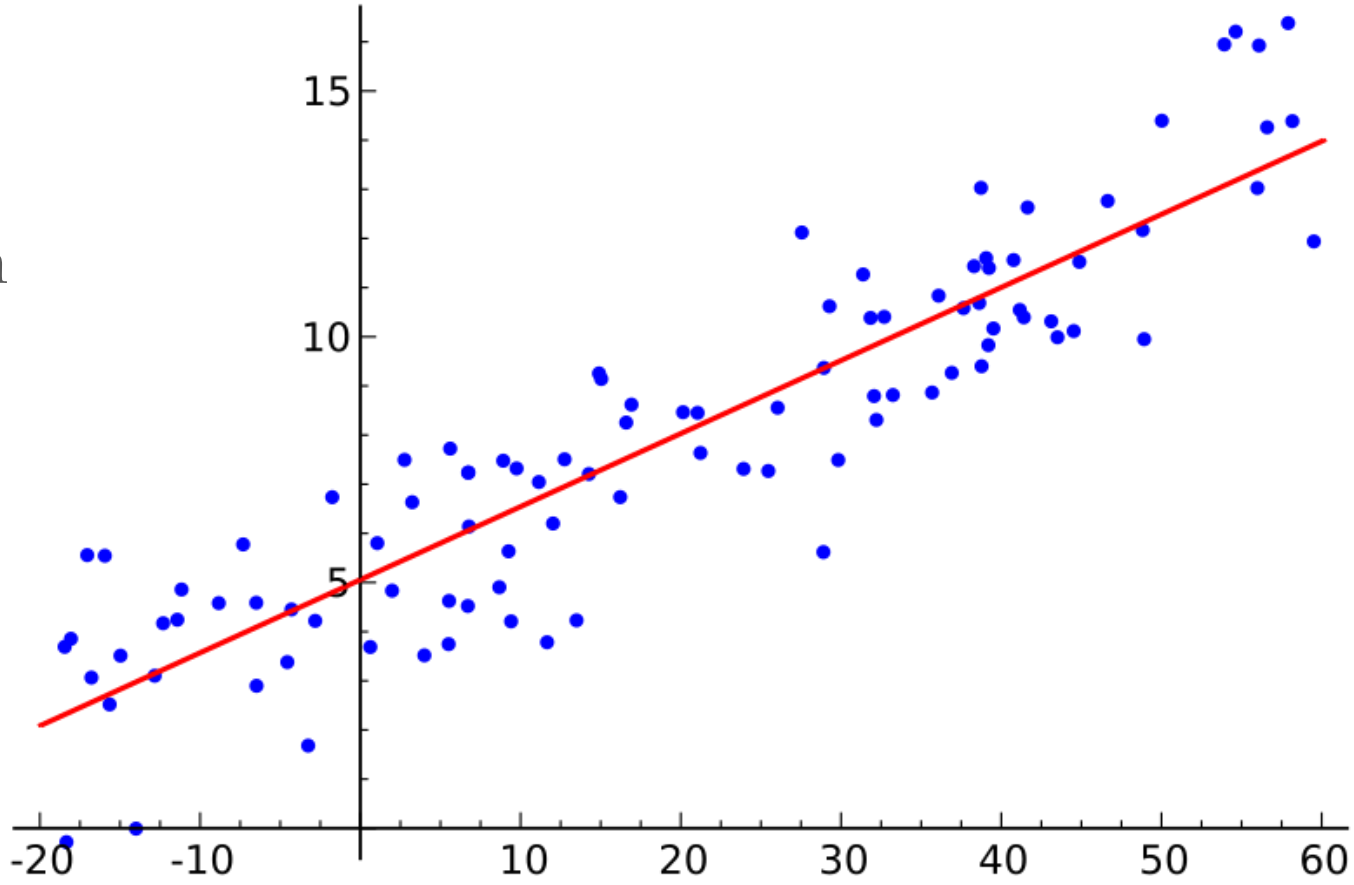
Regression


train
validation
test
150
140
130
120
110
100
90
USD
2016-01
2016-05
2016-09
2017-01
2017-05
2017-09
2018-01
2018-05
2018-09
2019-01
date

Regression

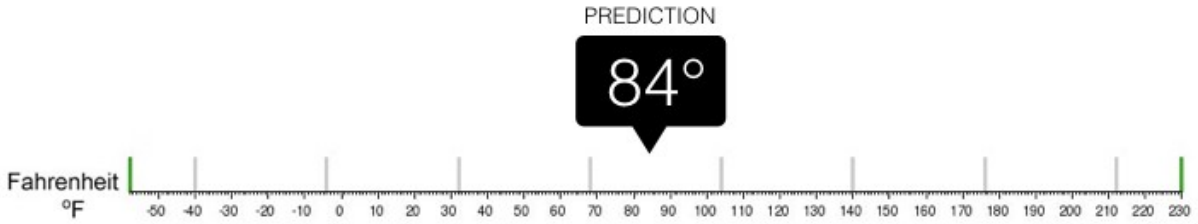
- Sale's Prediction
- Weather Forecast
- Stock Exchange Prediction
- …



Regression

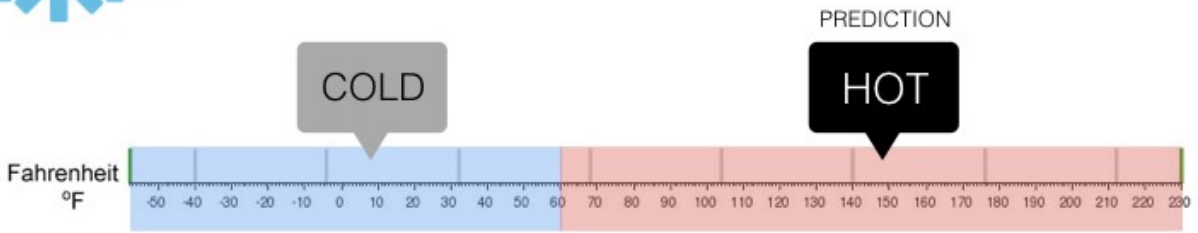
Regression

What is the temperature going to be tomorrow?



Classification

Will it be Cold or Hot tomorrow?



Categories in AI

- *Clustering*
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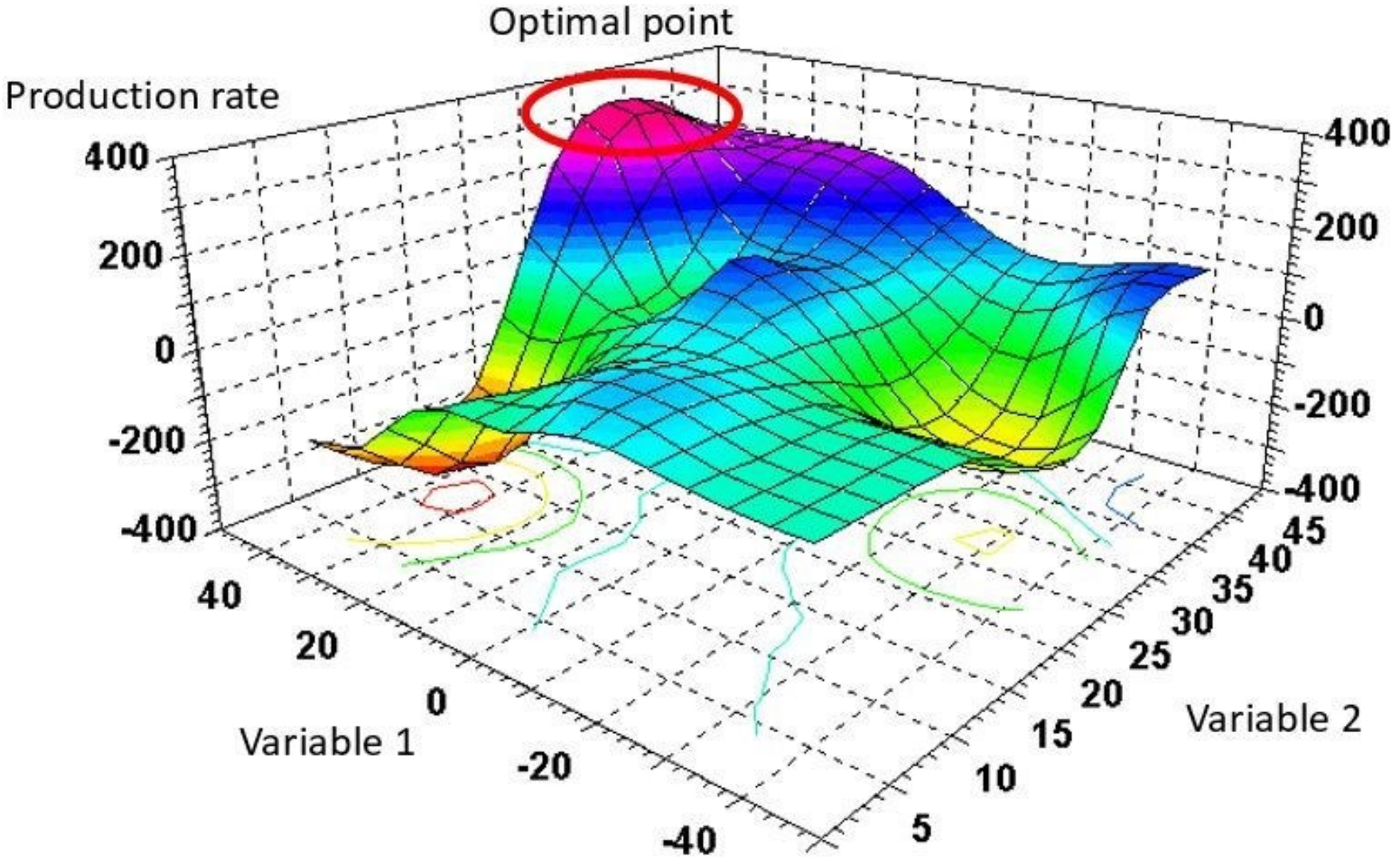
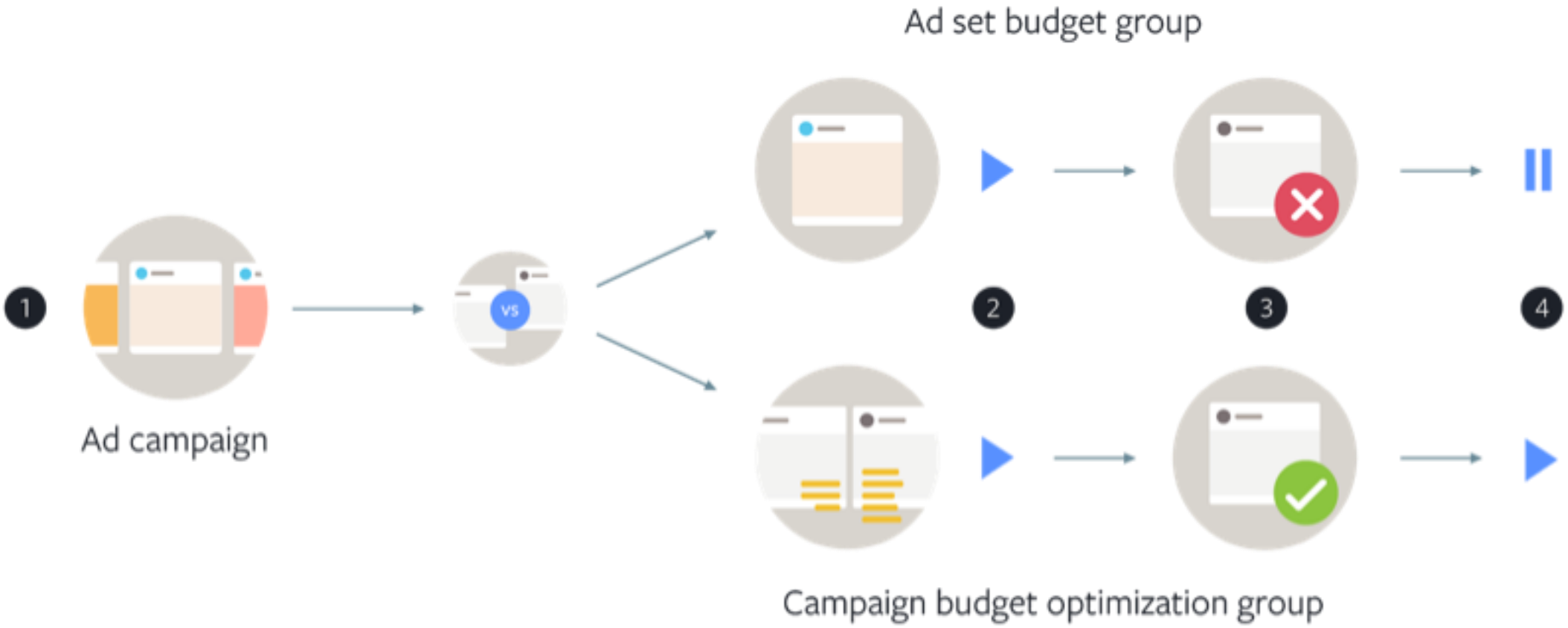
- *Regression*
- ***Optimization***
- *Association*
- *Reinforcement Learning*

Optimization



Optimization



Categories in AI

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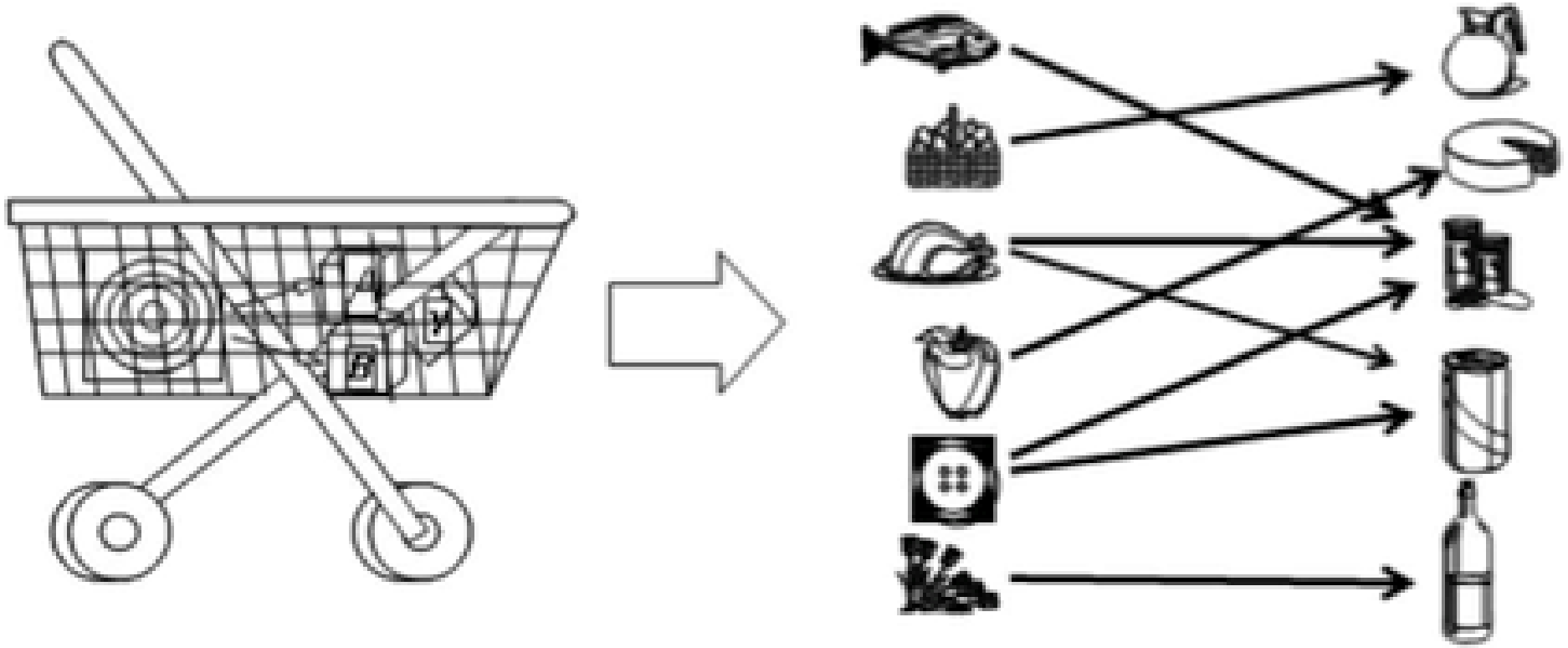
- *Optimization*
- ***Association***
- *Reinforcement Learning*

Categories in AI



98% of people who purchased items A and B also purchased item C

Categories in AI

- *Clustering*
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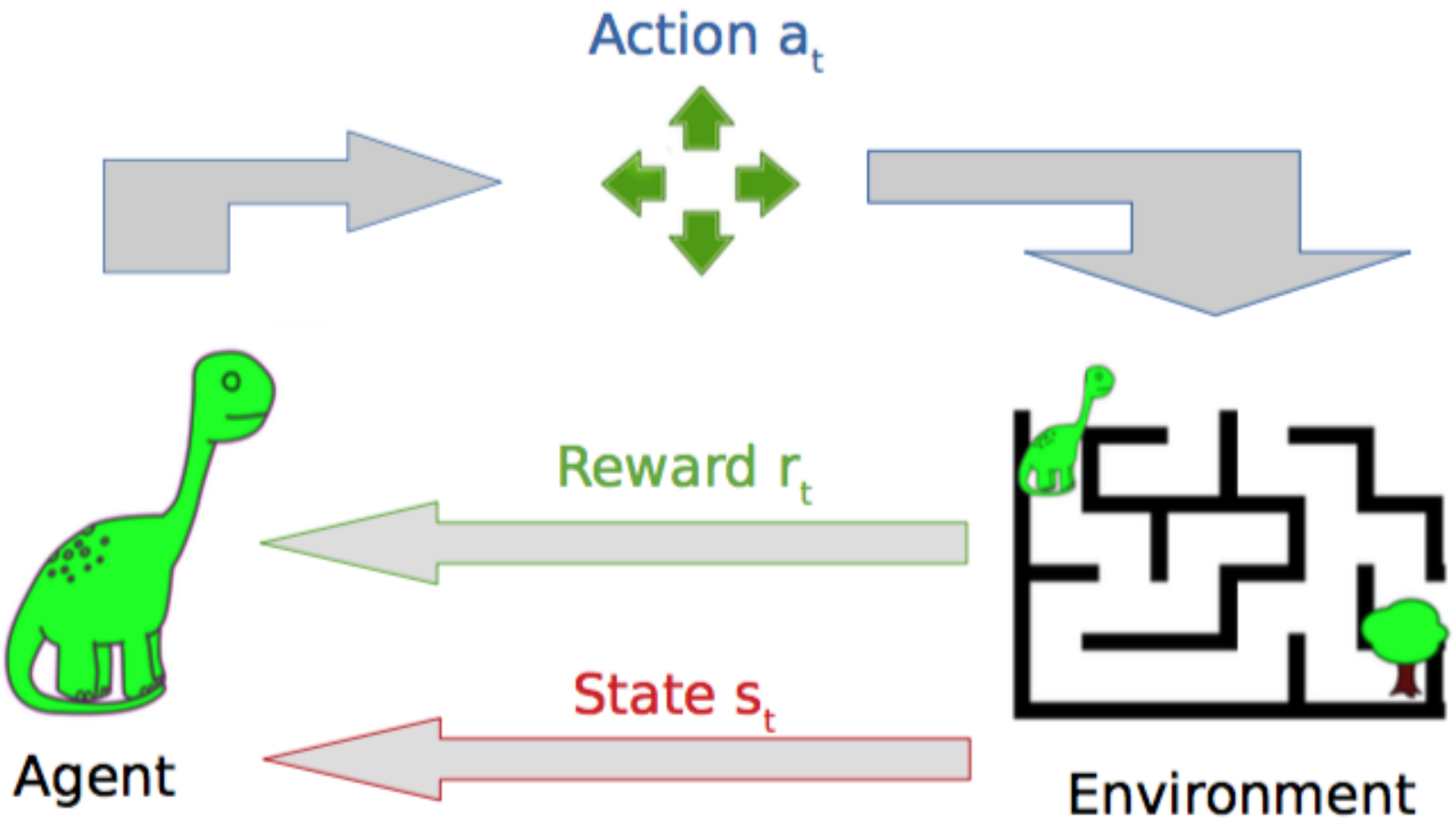
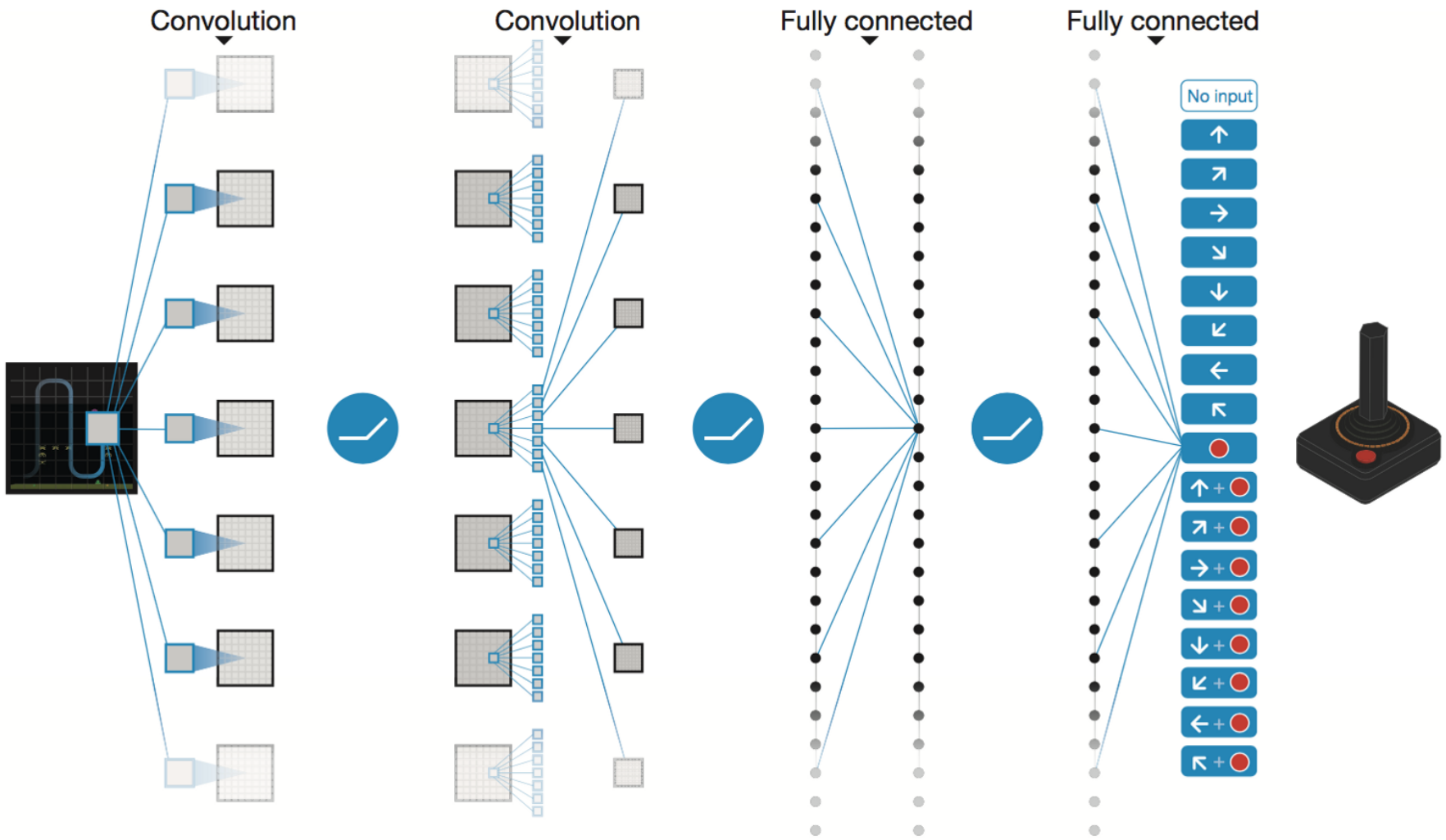
- ***Reinforcement Learning***

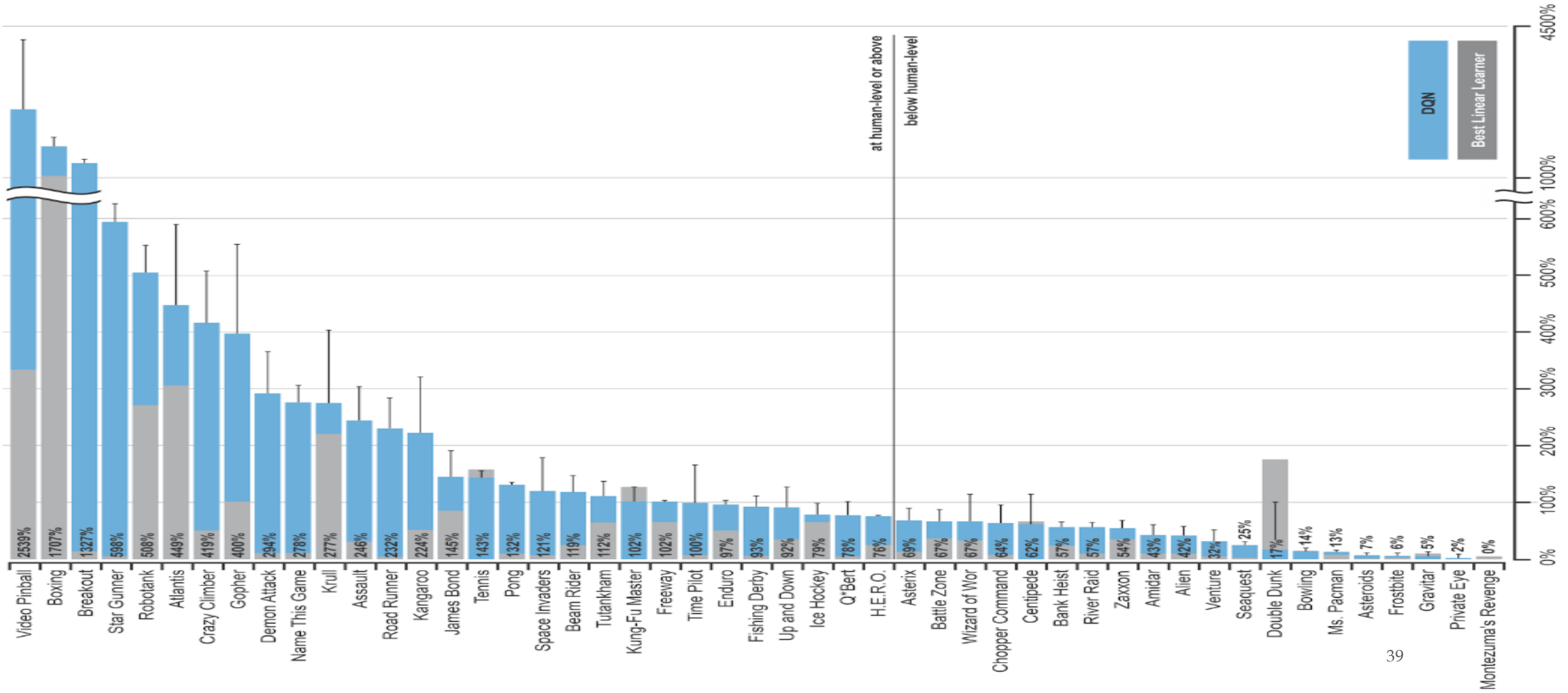
Reinforcement Learning



Reinforcement Learning



Reinforcement Learning



Autonomous Self-Driving Cars

Autonomous Self-Driving Cars

Autonomous Driving

Cars are becoming more and more intelligent to bring more comfort and safety.

- *Pedestrian Detection*
- *Intelligent Cruise Control*
- *Voice Assistance*
- *Auto Parallel Park*

How to Learn Artificial Intelligence

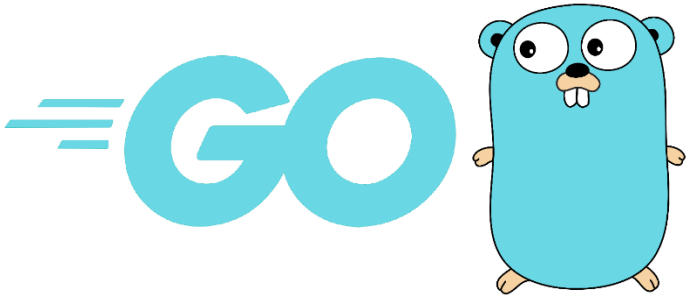
Start with Math & Statistics

- *Math, Math, Math*
- *If you want to learn AI, and apply them efficiently, you need to be friend with "MATH".*

How to Learn Artificial Intelligence

Programming Languages

- *Intelligent system is nothing other than a software, therefore you need to learn computer programming.*
- *Today, the following programming languages are being used the most for Artificial Intelligence:*
  - ***Python***
  - *Go! Lang*
  - *R*
  - *Julia*
  - *etc.*



How to Learn Artificial Intelligence

Supplementary Tools

- ***Database / Big Data****: Using data is inevitable in AI, so, the knowledge of database and SQL is mandatory.*
- ***AI / Stats / Math tools****: There are various tools that can be a help to implement intelligent systems:*
  - *Rapid Miner*
  - *Weka*
  - *SPSS*
  - *Matlab*

AI in Education

2022 Skills Outlook

WORLD ECONOMIC FORUM

COMMITTED TO IMPROVING THE STATE OF THE WORLD

Growing

1. Analytical thinking and innovation
2. Active learning and learning strategies
3. Creativity, originality and initiative
4. Technology design and programming
5. Critical thinking and analysis
6. Complex problem-solving
7. Leadership and social influence
8. Emotional intelligence
9. Reasoning, problem-solving and ideation
10. Systems analysis and evaluation

Declining

1. Manual dexterity, endurance and precision
2. Memory, verbal, auditory and spatial abilities
3. Management of financial, material resources
4. Technology installation and maintenance
5. Reading, writing, math and active listening
6. Management of personnel
7. Quality control and safety awareness
8. Coordination and time management
9. Visual, auditory and speech abilities
10. Technology use, monitoring and control

Source: Future of Jobs Report 2018, World Economic Forum

AI in Education

Helping Teachers

- Helping them to focus on creativity
- Helping them to focus on social communication
- Helping them with administrative tasks

Helping Students

- Providing personalized context
- Learning based on the students' characteristics
- Focusing on the students' weaknesses

AI in Fashion

GLITCH

AI in Fashion

AI can:

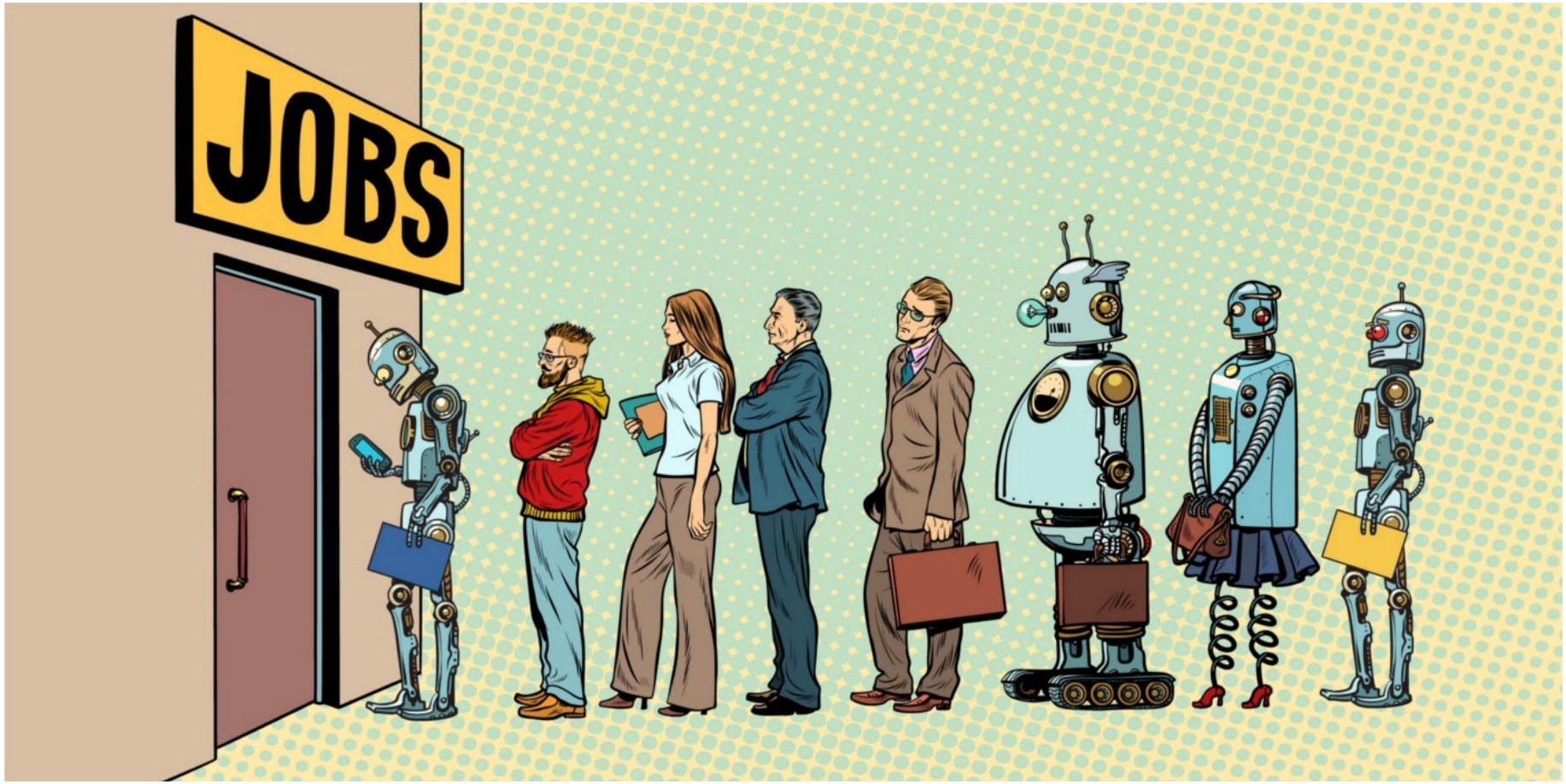
- Style
- Design
- Manufacture
- Be creative to some degree

AI can not:

- Understand
- Feel
- Experience

Image Credits: Syte

Good, Bad and Ethics

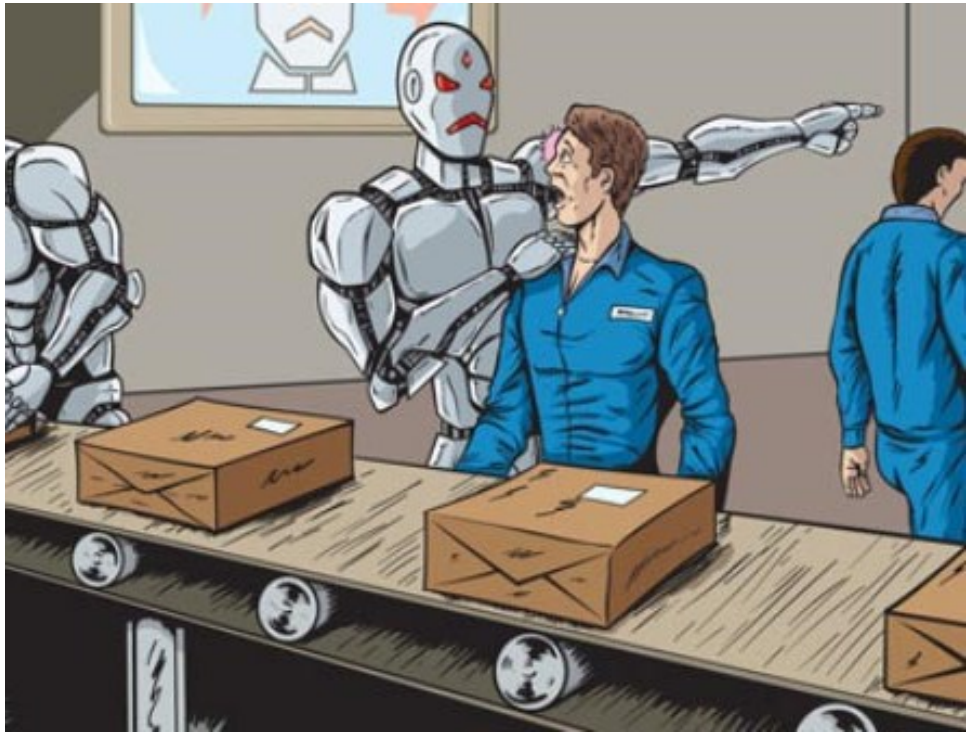


AI can be FUN…

FaceApp

and Dangerous!

AI can become unethical and dangerous if it is trained and used for those purposes.

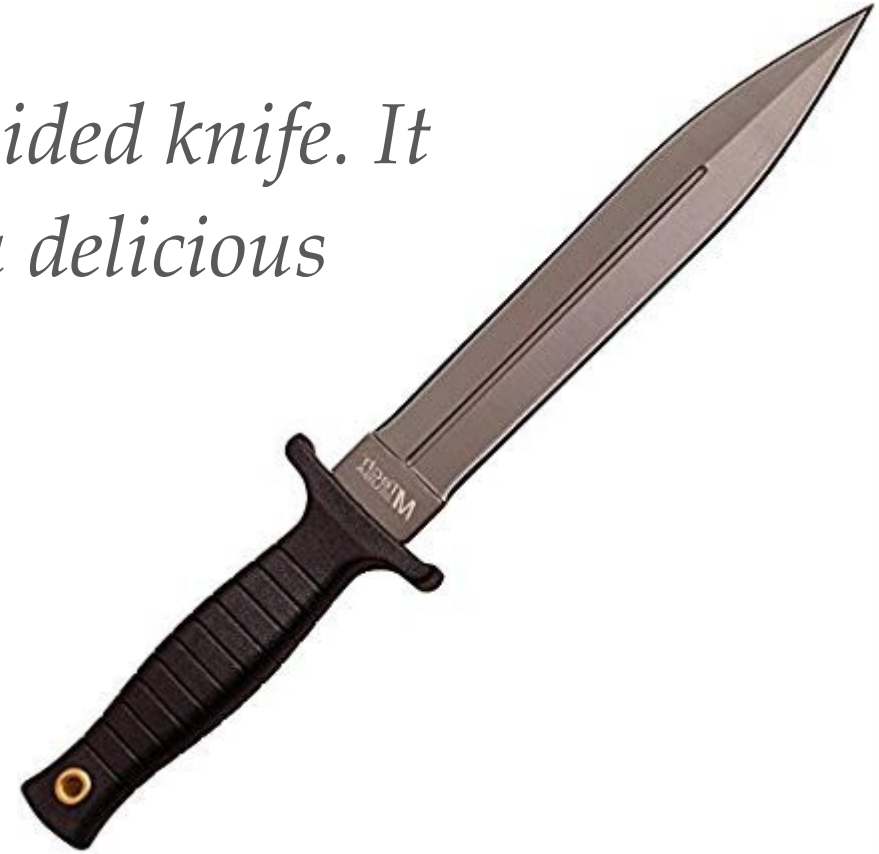


Deepfakes – Deep Nude

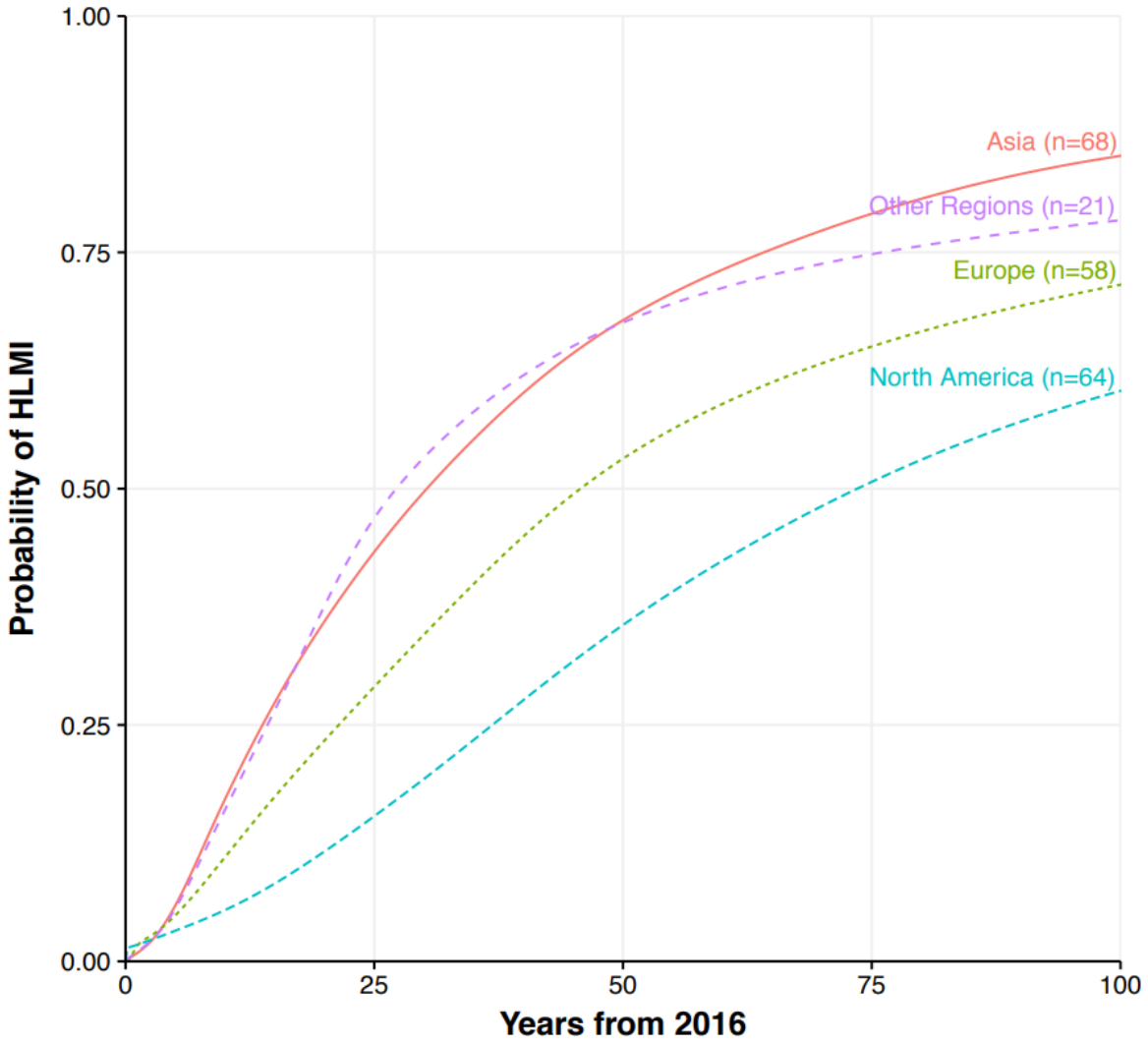
Super Users
CBS World News

Ethics

"Artificial Intelligence is a double-sided knife. It is up to you how to use it. To cook a delicious meal, or to threat and kill."



High Level Machine Intelligence (HLMI)



Grace, Katja, et al. "When will AI exceed human performance? Evidence from AI experts." *Journal of Artificial Intelligence Research* 62 (2018): 729-754.

When should we start?

How much time do we have?

Moore Law

Moore's law, prediction made by American engineer Gordon Moore ***in 1965****, co-founder of Intel Corp. that* ***the number of transistors per silicon chip (IC) doubles every year****.*

In 1975*, he revised the forecast to* ***doubling every two years****.*

His prediction with the ***average of 18 months*** *held since 1975 and has since become known as a* ***"law"****.*

Wheat and Chessboard Problem

The story is first known to have been recorded in ***1256*** *by* ***Ibn Khallikan****. Another version has the inventor of chess (in some tellings* ***Sessa****, an ancient* ***Indian Minister****) request his ruler give him wheat according to the wheat and chessboard problem.* ***The ruler laughs it off as a meager prize for a brilliant invention****, only to have court treasurers report the unexpectedly huge number of wheat grains would outstrip the ruler's resources.*

Wheat and Chessboard Problem

On the entire chessboard there would be 2^64 − 1 = 18,446,744,073,709,551,615 grains of wheat, weighing about 1,199,000,000,000 metric tons.

This is over 2,000 times the annual world production of wheat, which in the period 2020-21 was an estimated 772.64 million metric tones.

Hint: Eighteen quintillion, four hundred and forty-six quadrillion, seven hundred and forty-four trillion, seventy-three billion, seven hundred and nine million, five hundred and fifty-one thousand and six hundred and fifteen

Wheat and Chessboard Problem

Versions differ as to whether the inventor becomes ***a high-ranking advisor*** *or is* ***executed****.*

Future of Artificial Intelligence

Artificial General Intelligence (AGI)

Having an intelligent system which can be suitable for anything and any purpose.

- *Assistant Robots*

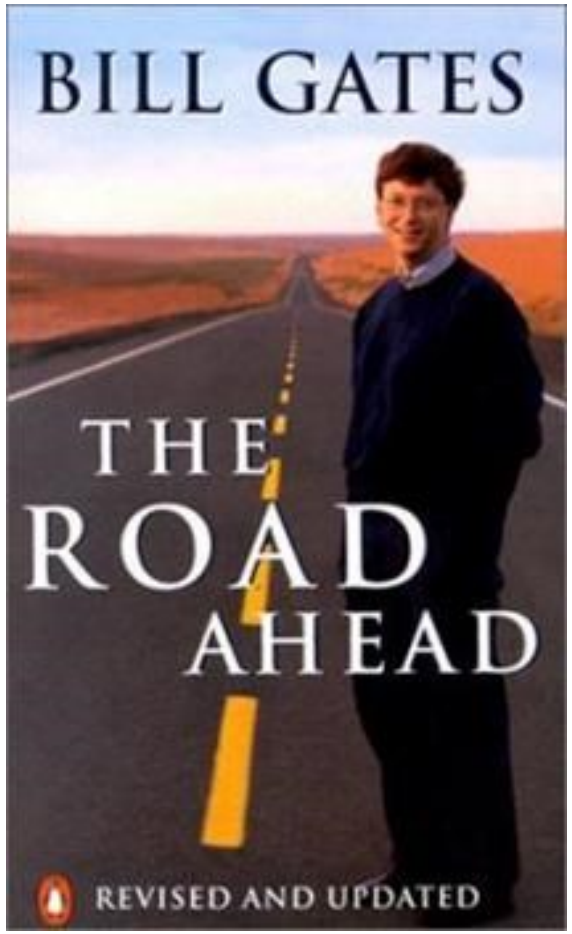
Future of Artificial Intelligence

Emotional Intelligence

Intelligent systems are becoming more emotional aware to interact with human being effectively.

They tend to understand you and your emotions and mimic a proper emotion in response.

Last word…



But **we can no more imagine** what the information highway will carry in **twenty-five years** than a **Stone Age man using a crude knife** could have envisioned **Ghiberti's Baptistery doors in Florence**.

Only when the highway arrives will all its possibilities be understood.

However, the last twenty years of experience with digital breakthroughs allow us to understand some of the key principles and possibilities for the future.

This is part of Ghiberti's Baptistery door…

Q&A

WHY?
WHAT?
WHERE?
WHEN?
WHO?
HOW?
WHICH?
WHOSE?
WHERE?
HOW? WHO?
WHO? WHERE? WHAT? HOW?
WHAT? HOW? WHY?
HOW?