Pengenalan Artificial Intelligence (Bag. 1)

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Outlines

- What is AI (Artificial Intelligence)?
  - AI definition
  - AI history
  - AI today: AI applications. AI for healthcare,manufacturing, education
- Intelligent Agent
- AI and Programming

https://www.nanalyze.com/2016/11/artificial-intelligence-definition/

What is Artificial Intelligence (AI)

- Video “What is AI from Edureka”

- Source: https://www.youtube.com/watch?v=4jmsHaJ7xEA

So.. What is AI? 8 Definitions, 4 Approaches

Thinking humanly

Thinking rationally

Acting humanly

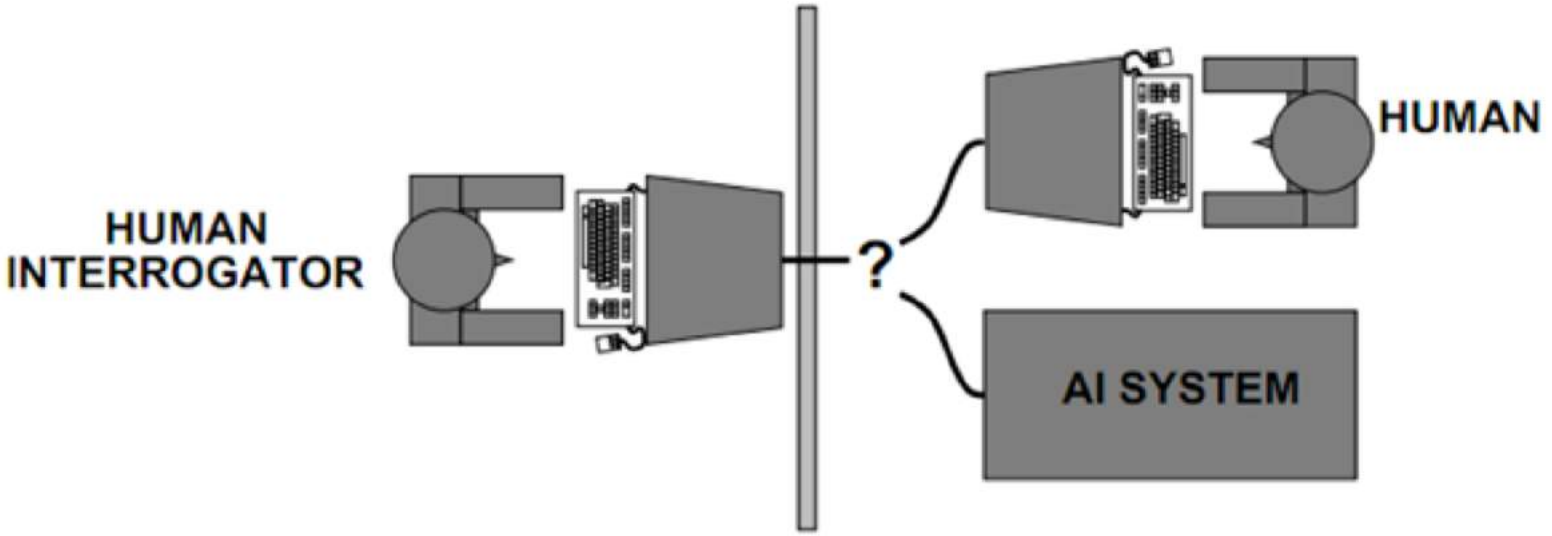
Acting rationally

Thinking Humanly	**Thinking Rationally**
"The exciting new effort to make computers think . . . *machines with minds*, in the full and literal sense." (Haugeland, 1985) "[The automation of] activities that we associate with human thinking, activities such as decision-making, problem solving, learning . . ." (Bellman, 1978)	"The study of mental faculties through the use of computational models." (Charniak and McDermott, 1985) "The study of the computations that make it possible to perceive, reason, and act." (Winston, 1992)
Acting Humanly	**Acting Rationally**
"The art of creating machines that perform functions that require intelligence when performed by people." (Kurzweil, 1990) "The study of how to make computers do things at which, at the moment, people are better." (Rich and Knight, 1991)	"Computational Intelligence is the study of the design of intelligent agents." (Poole *et al.*, 1998) "AI . . . is concerned with intelligent behavior in artifacts." (Nilsson, 1998)

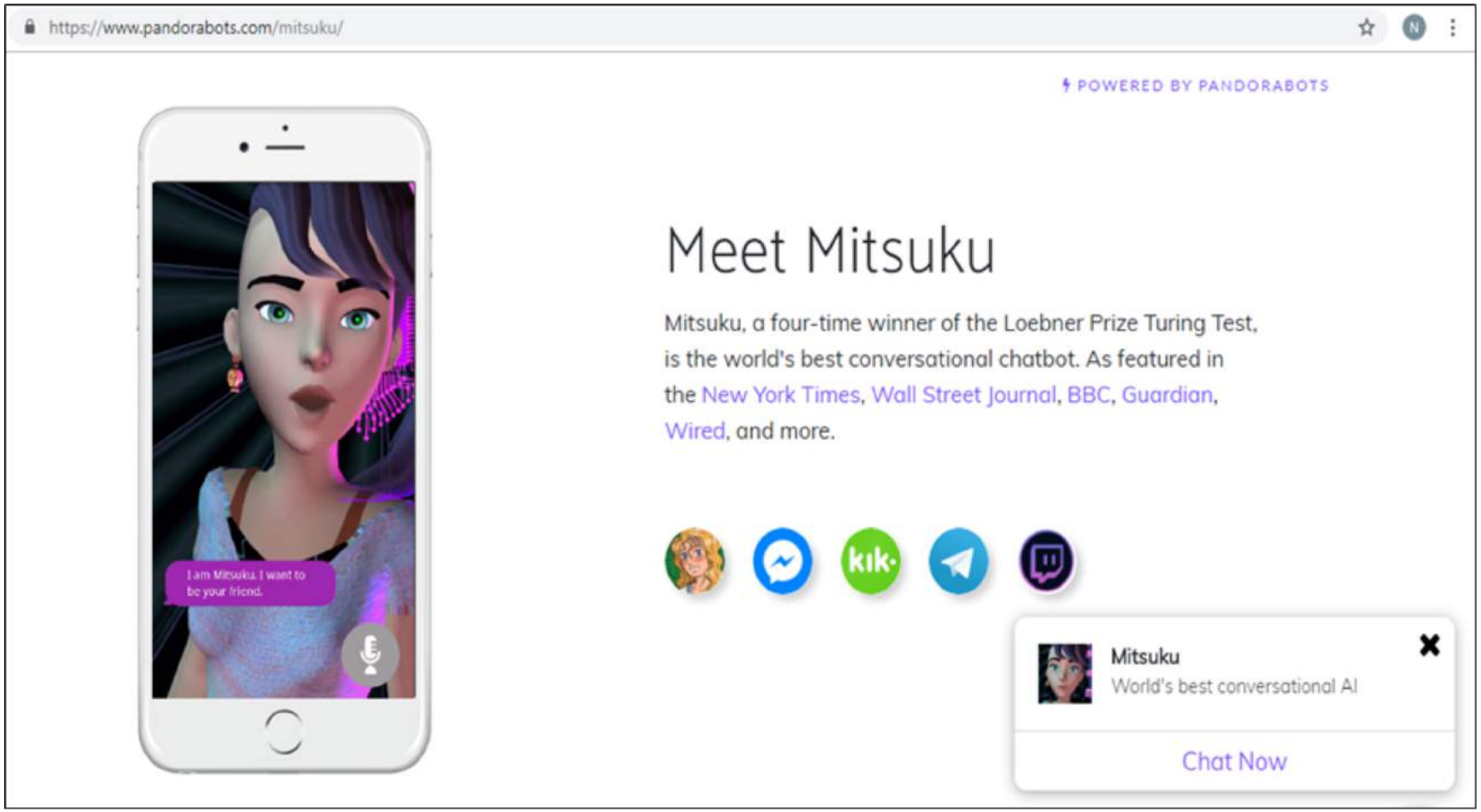
Figure 1.1 Some definitions of artificial intelligence, organized into four categories.

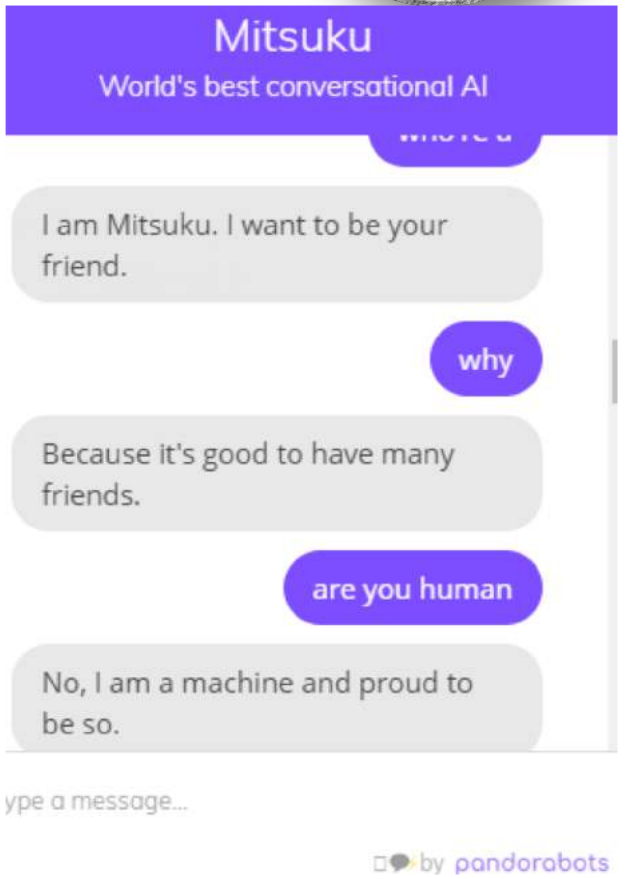
Acting Humanly: Turing Test Approach

- A satisfactory operational definition of intelligence
- Pass: human interrogator cannot tell whether the responses come from a person or from a computer



Chatbot - Mitsuku





https://www.pandorabots.com/mitsuku/

Thinking/Acting Humanly/Rationally Approaches

- Acting humanly: turing test approach
- Thinking humanly: Computational models of human "thought" processes (cognitive modeling approach)
- Thinking rationally: computational systems that behave intelligently (reasoning approach)
- Acting rationally: computational systems that behave rationally (achieve the best outcome to reach goal)

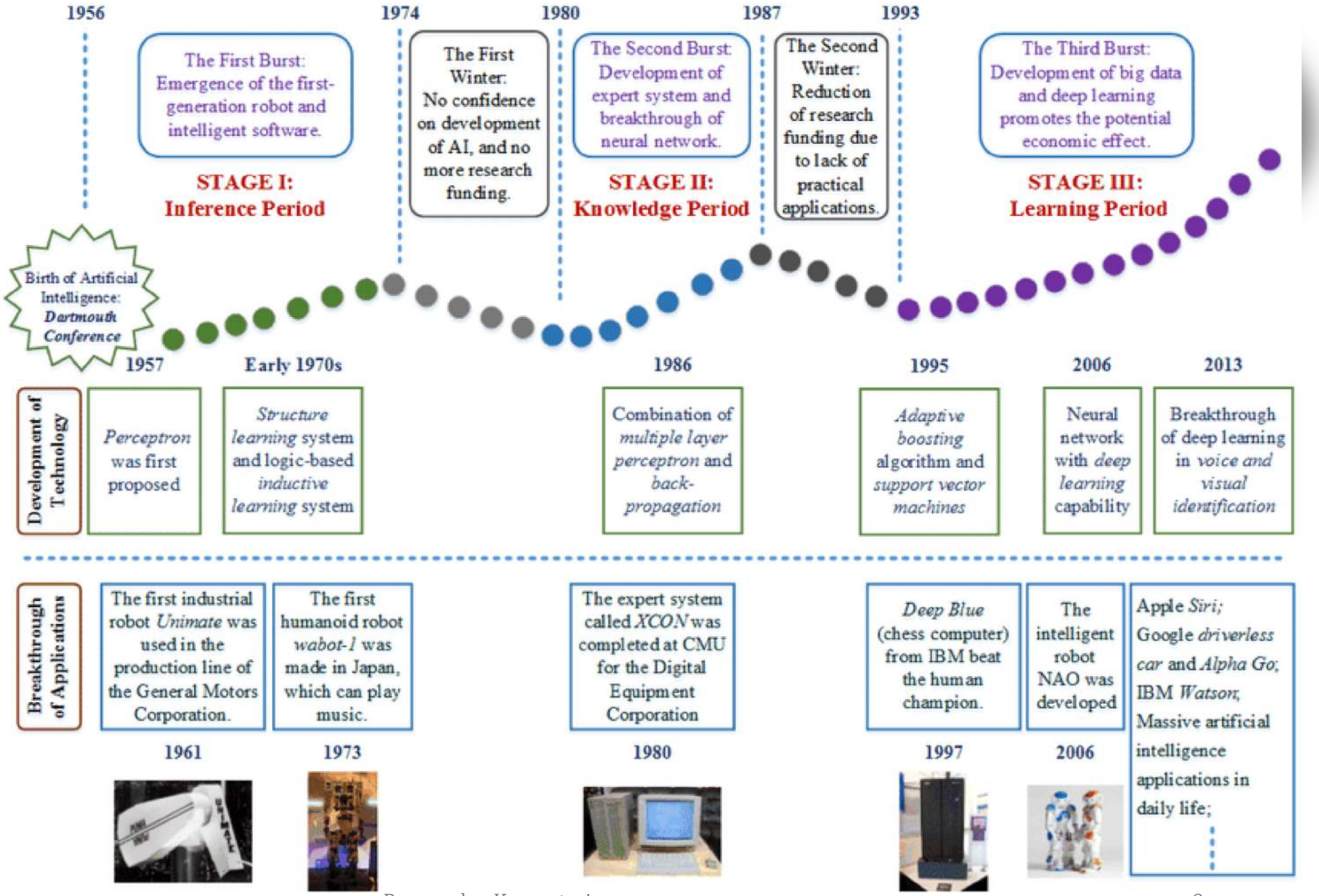
Foundation of AI

There are some disciplines that contributed ideas, viewpoints, and techniques to AI:

- **Philosophy** considers the nature of knowledge, thought, and learning
- **Mathematics** considers the notions of formal logic, algorithms, computational complexity, and probability
- **Economics** studies how agents attempt to maximize their own well-being, even when given uncertain information and in the presence of allies and adversaries
- **Neuroscience** studies the workings of the human brain
- **Psychology** studies how humans and animals think and act (process information)
- **Linguistics** deals with language in a formal-enough way that it can be processed by machine
- **Computer Engineering** looks to increase the efficiency of computing devices
- **Control Theory** and **Cybernetics** consider how autonomous machines can operate

https://cs.lmu.edu/~ray/notes/introai/

AI history



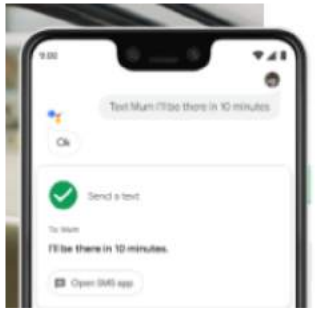
Source: Jin et al. (2018), State-of-the-Art Mobile Intelligence: Enabling Robots to Move Like Humans by Estimating Mobility with Artificial Intelligence

Today AI is in.....

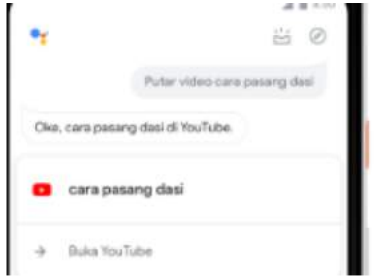
- Game playing (Chess, Go, Bridge, Dota 2, StarCraft,...)
- Cars (stability traction, braking assist, driving, ...)
- Systems that read handwritten addresses to speed mail sorting
- Search Engines
- Theorem Proving
- Aircraft autolanders
- Medical Diagnosis
- Expert Systems
- Information Retrieval Systems
- Story writers, poetry writers, ...
- Music Composition
- Annoying auto-correct agents in word processors
- Crisis management
- Space Exploration
- Finance
- Retailing
- Manufacturing
- Inventory Control
- Pharmaceutical Research
- Genetic Research
- (Micro)Surgery
- Insurance Underwriting
- Environmental Monitoring
- Protein Structure Determination
- Scheduling Systems
- Assisted Living Support
- Dispensing Legal Advice
- Essay Evaluation
- Detection of Steganography
- Cryptanalysis
- Translation
- Military Planning
- Surveillance
- Traffic Control

Can you mention some more...???

AI In Life: AI Assistant



"Hey Google, text Mum I'll be there in 10 minutes"



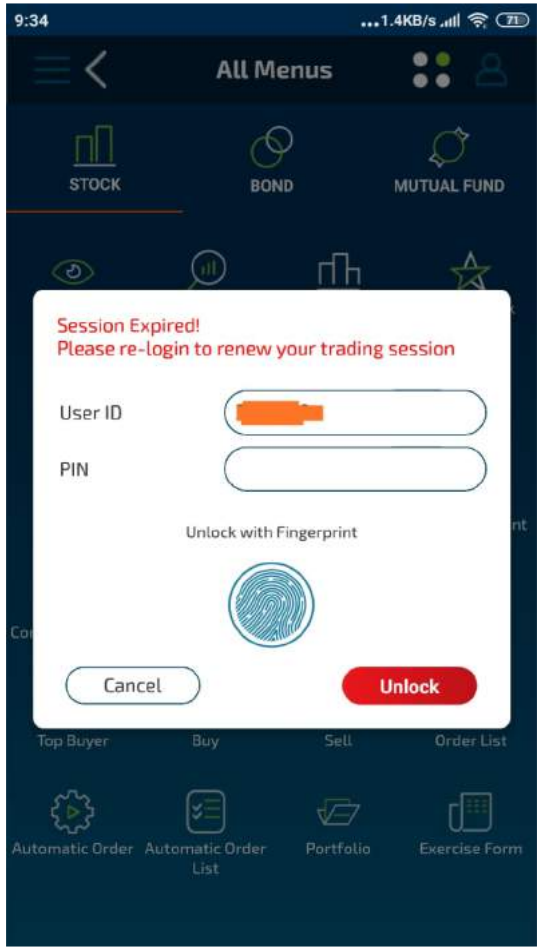
"Hey Google, play my morning playlist"

"Hey Google, dim the bedroom lights"

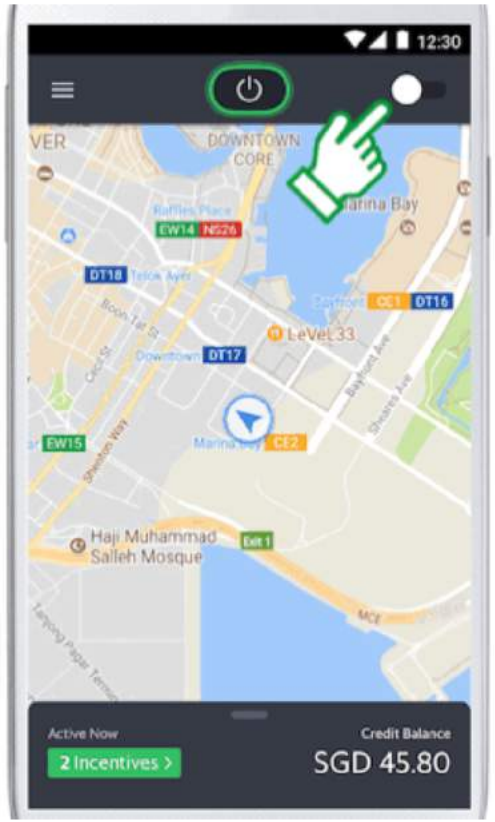
"Hey Google, set the temperature to 20 degrees"

AI In Life: Biometric Verification

Fingerprint verification



Face verification



https://www.grab.com/sg/driver-2/selfieverification/

AI In Life: OpenAI untuk Dota 2

OpenAI Five

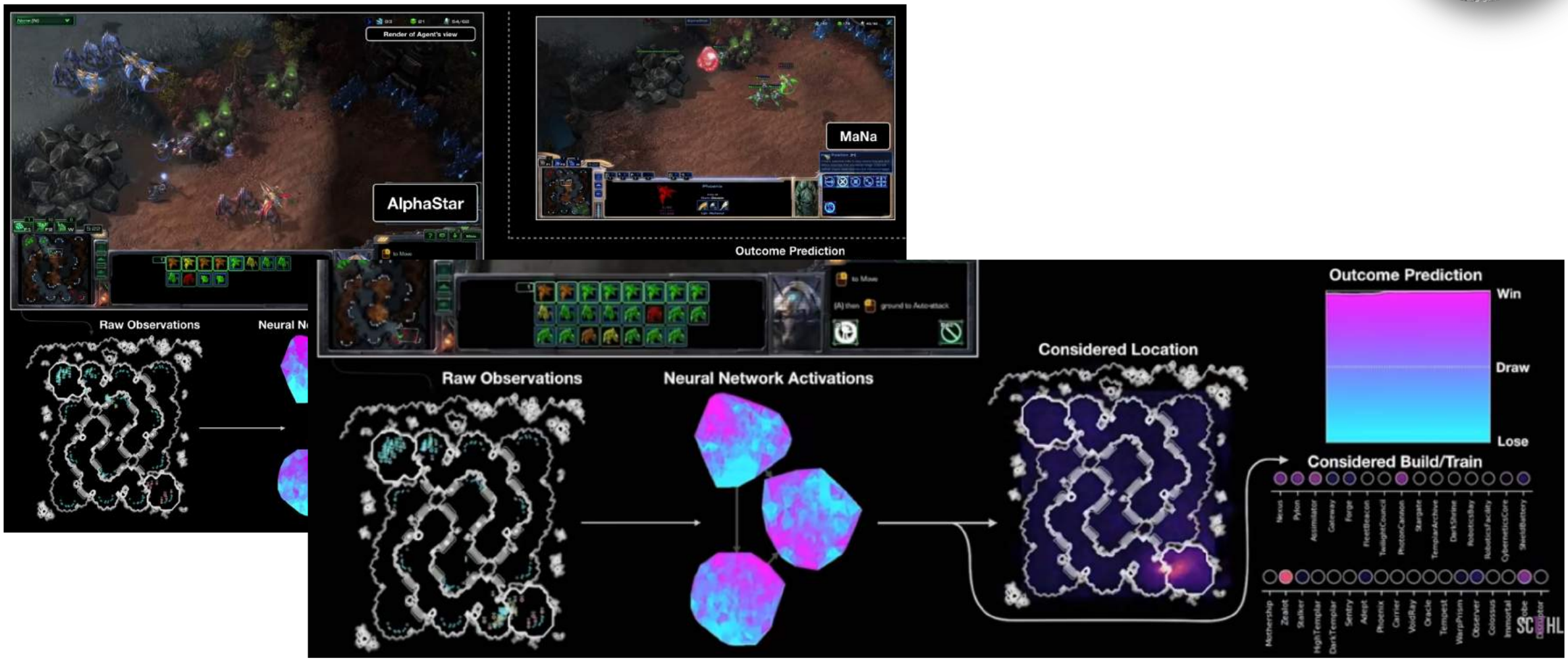
Competitive: 7.215–42 (99.4% winrate, 15.019 total players)

Note: During the live stream, the game count incorrectly omitted games abandoned by the human side.

Cooperative: 35.466 games (18.689 total players)

Source: https://i.ytimg.com/vi/6-UuJb8L8X8/maxresdefault.jpg

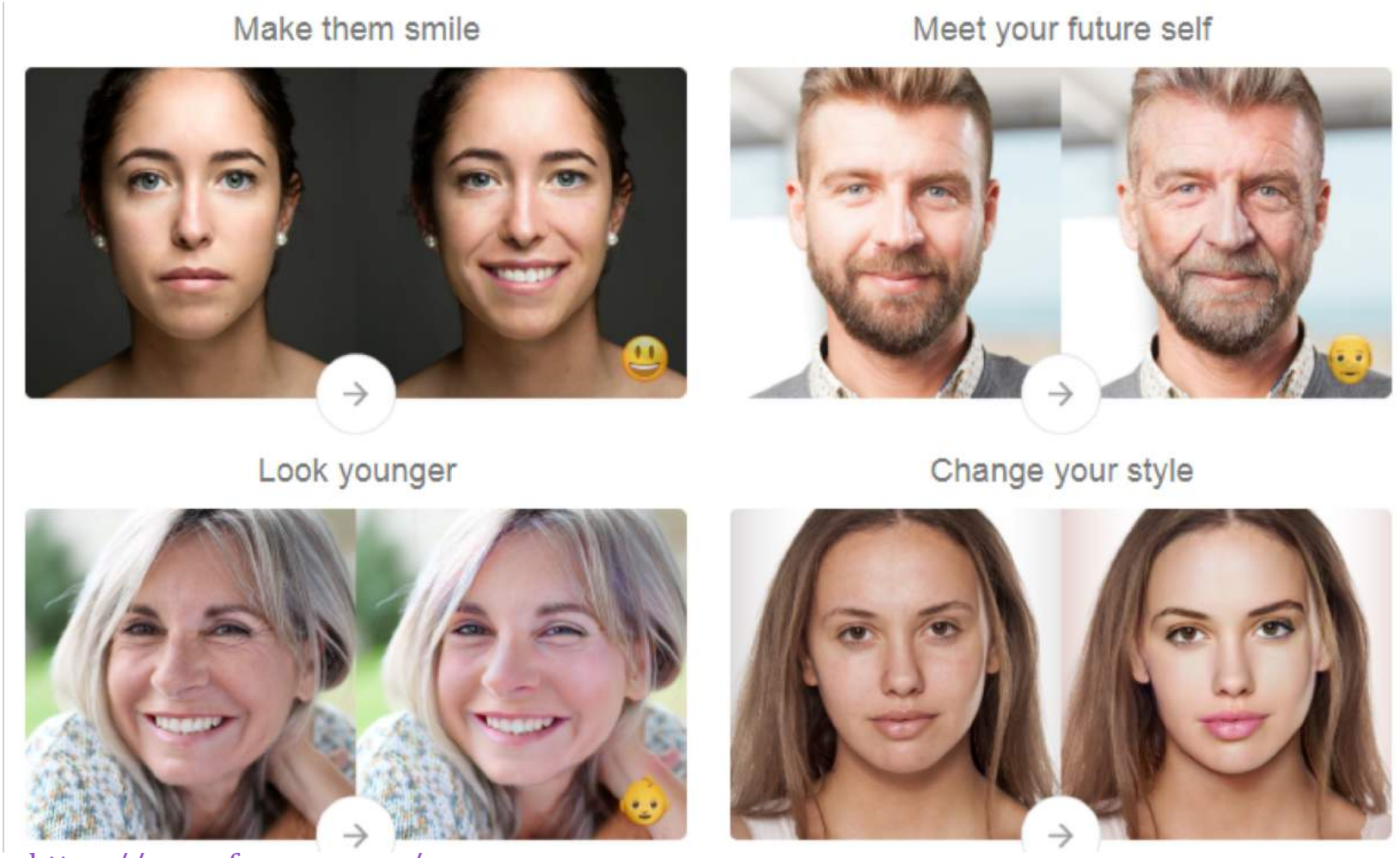
AI In Life: AI Alphastar StarCraft II



https://techcrunch.com/2019/01/24/starcraft-ii-playing-ai-alphastar-takes-out-pros-undefeated/

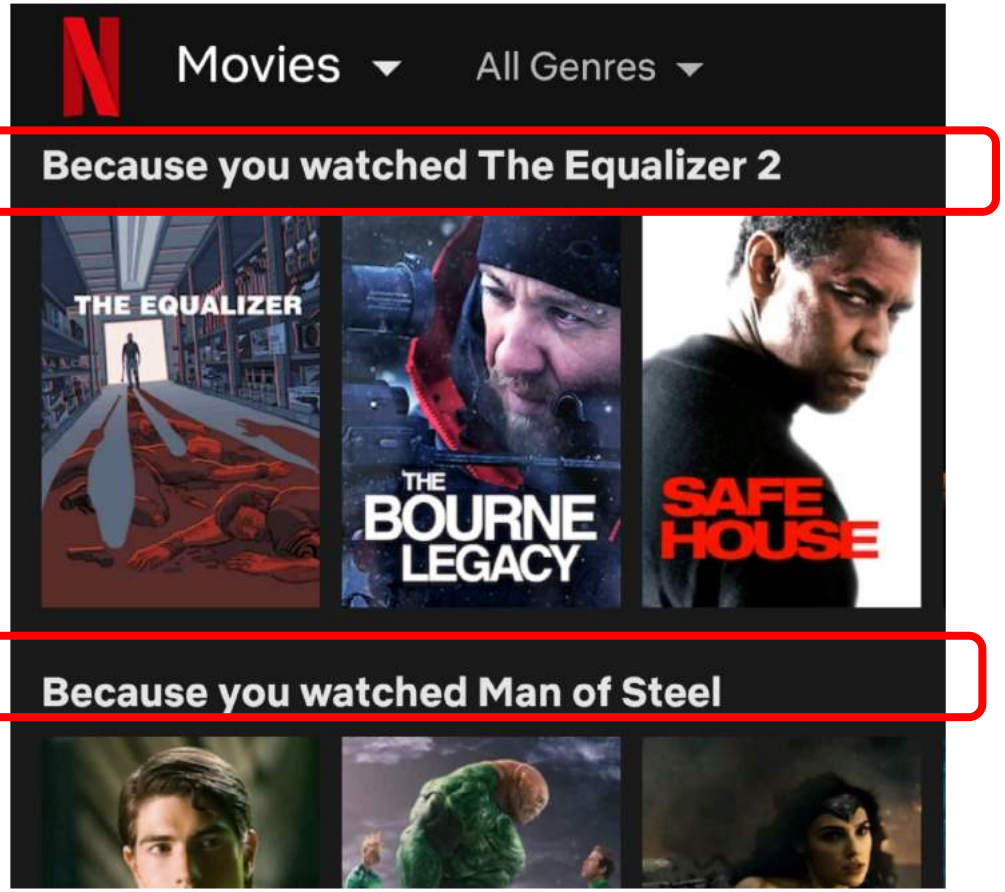
https://www.youtube.com/watch?v=PFMRDm_H9Sg

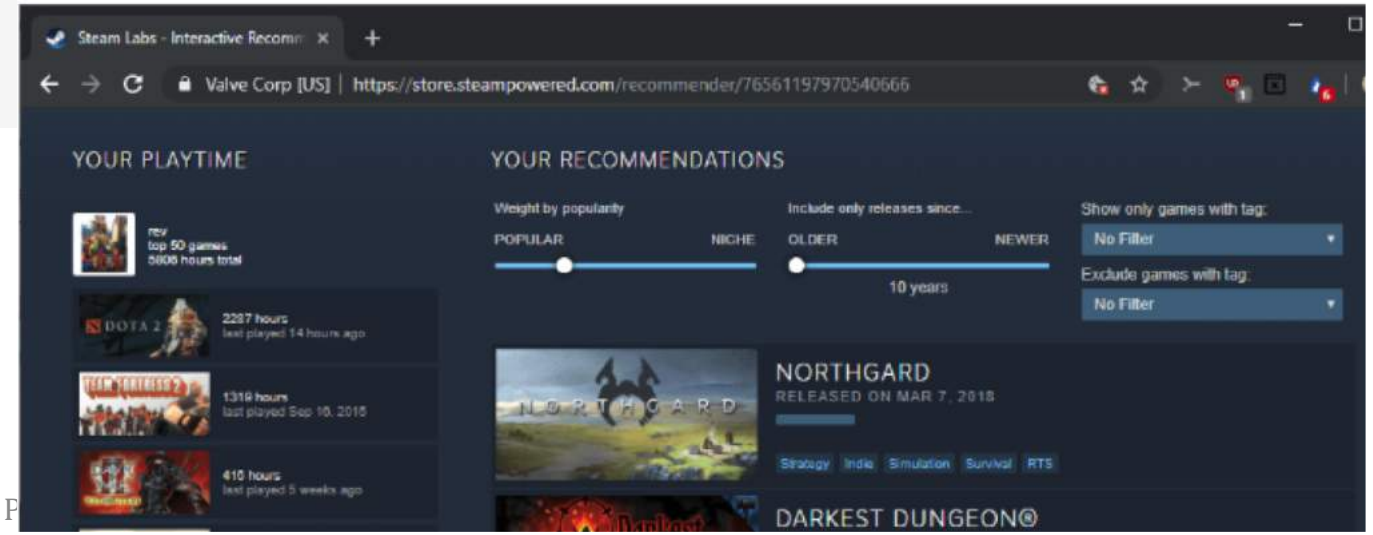
AI In Life: Transform Your Face



https://www.faceapp.com/

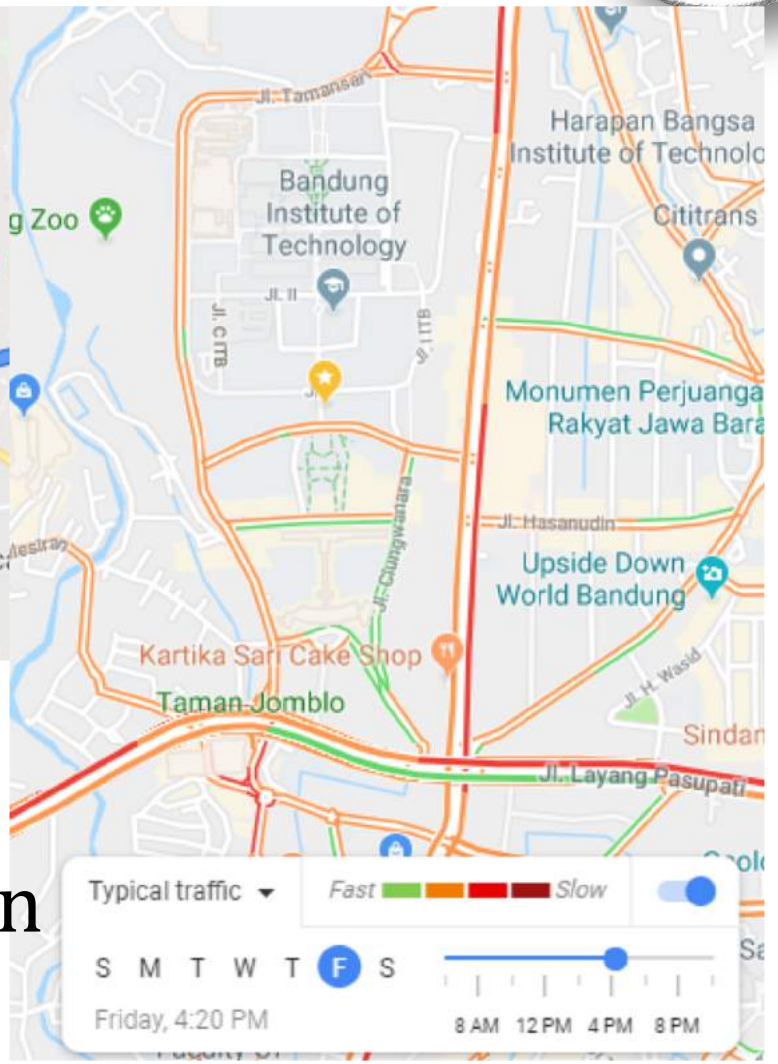
AI In Life:Recommender System





AI In Life:AI in Traffic

Path Finding / Direction



Traffic pattern

AI In Life:Fraud Detection

Input Data

- Transactions made by credit cards in September 2013 by European cardholders.

ML & AI

- Deep Learning Approach: Autoencoder is a neural network that is trained to attempt to copy its input to its output.

Intelligent Action

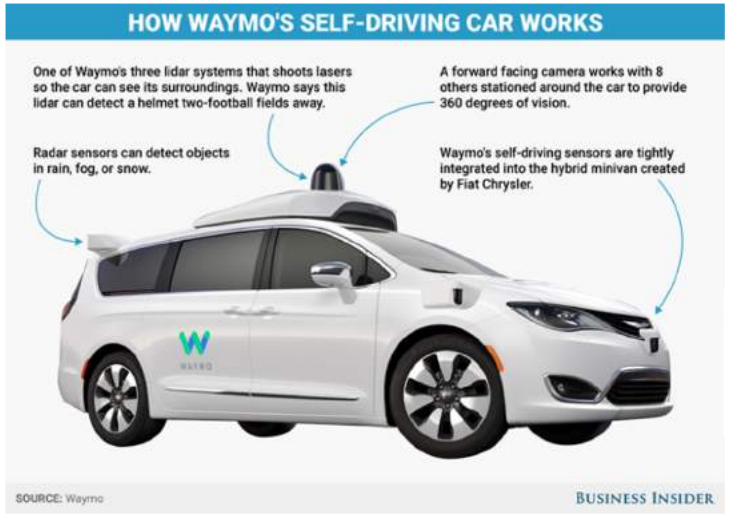
- Risk Analytics to prevent fraud.

Source: https://miro.medium.com/max/3848/1*3R2cLLJ349O5G6V5rZJXxw.png

Self Driving Car

Q2 2018: paid Singapore self-driving car rides
https://www.reuters.com/article/us-nutonomy-singapore-idUSKCN1AY2IC

https://www.techradar.com/news/uber-self-driving-cars
(May 25, 2018)

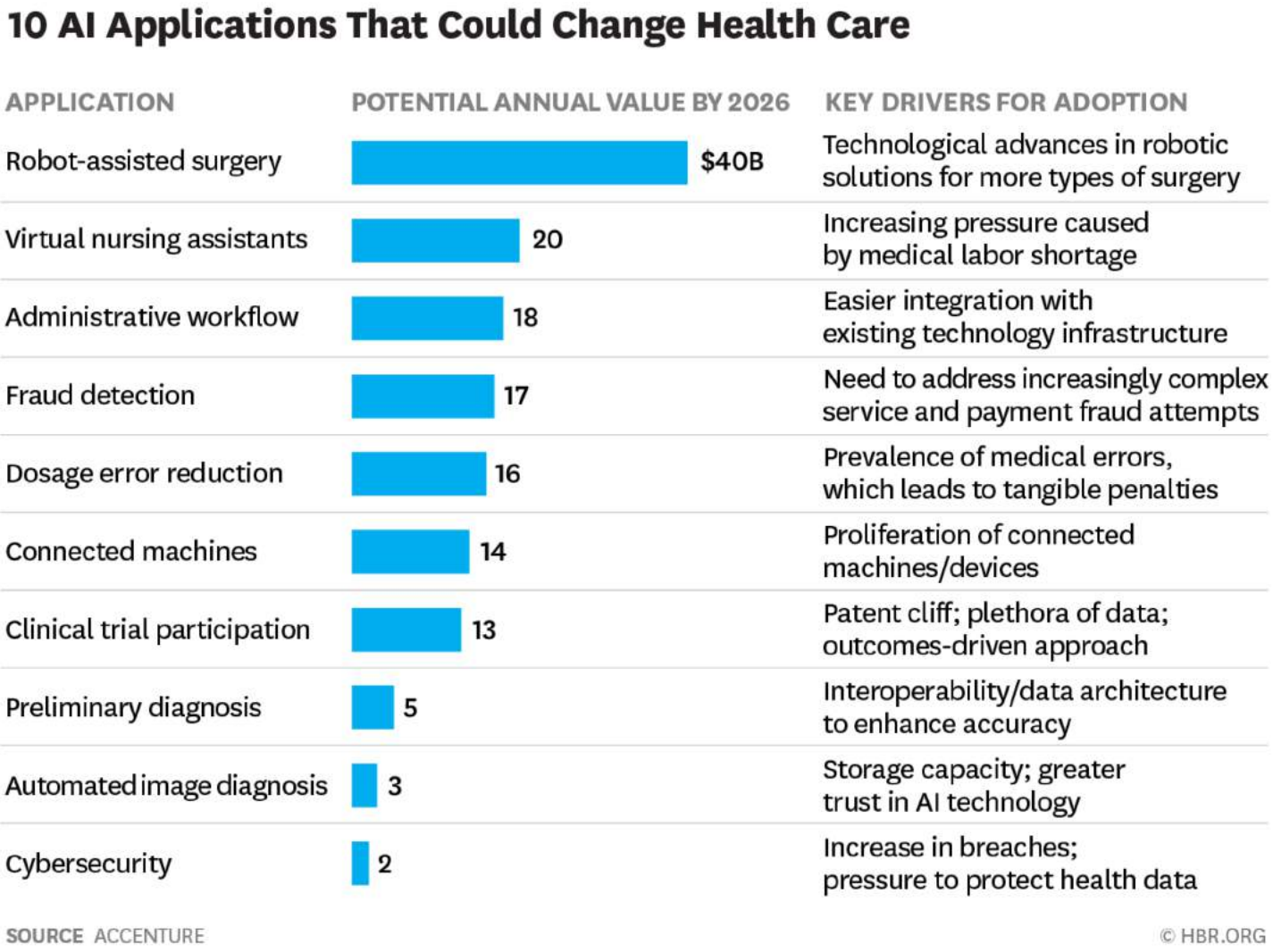


http://www.businessinsider.sg/how-does-googles-waymo-self-driving-car-work-graphic-2017-1/?r=US&IR=T

Kiva: Amazon Warehouse Robot

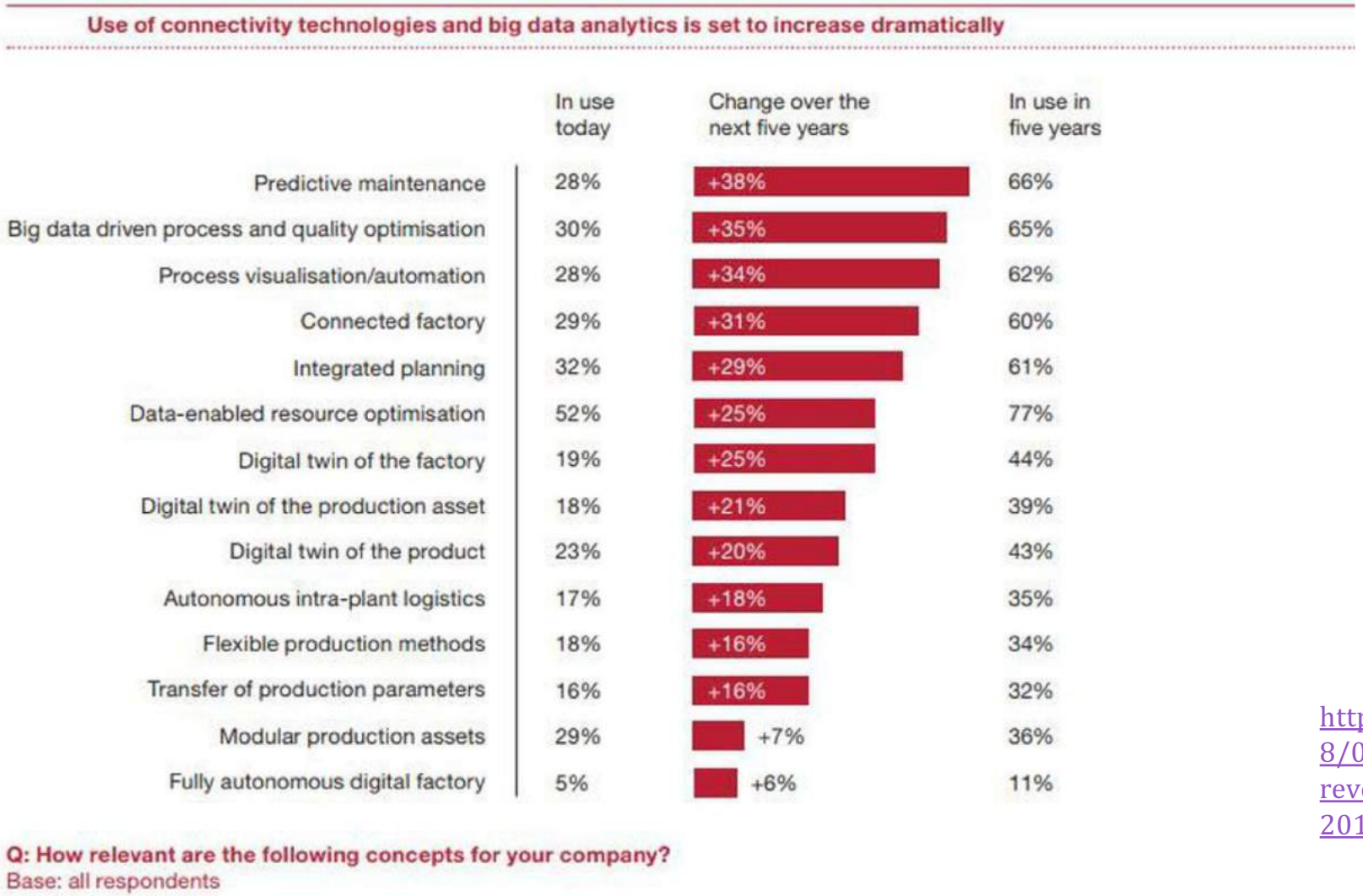
Source: https://image.cnbcfm.com/api/v1/image/104877775-An_employee_packs.jpg?v=1529476926&w=1400&h=950

AI for Health Care



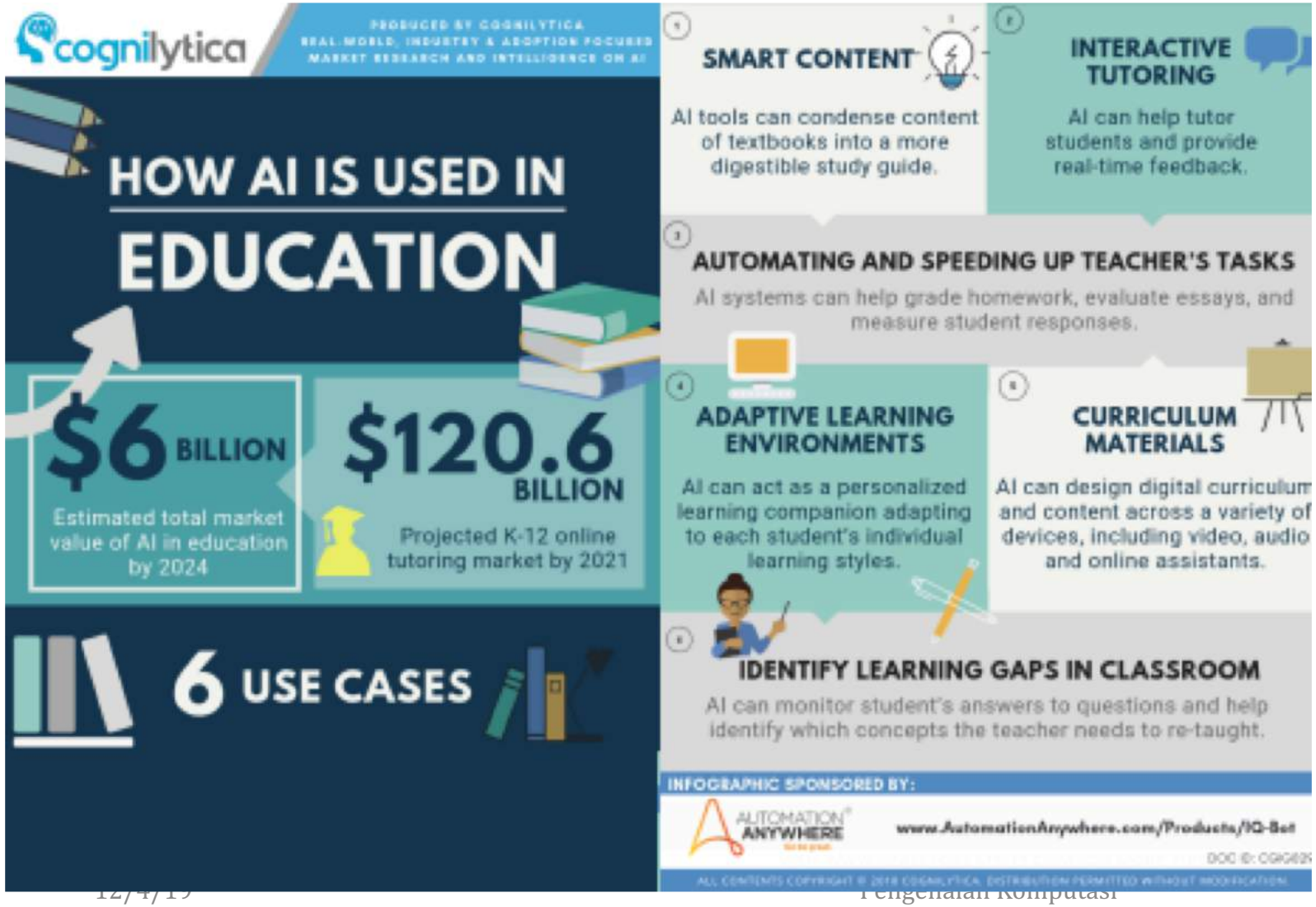
https://hbr.org/2018/05/10-promising-ai-applications-in-health-care

AI for Manufacturing



https://www.forbes.com/sites/louiscolumbus/2018/03/11/10-ways-machine-learning-is-revolutionizing-manufacturing-in-2018/#61e28f2523ac

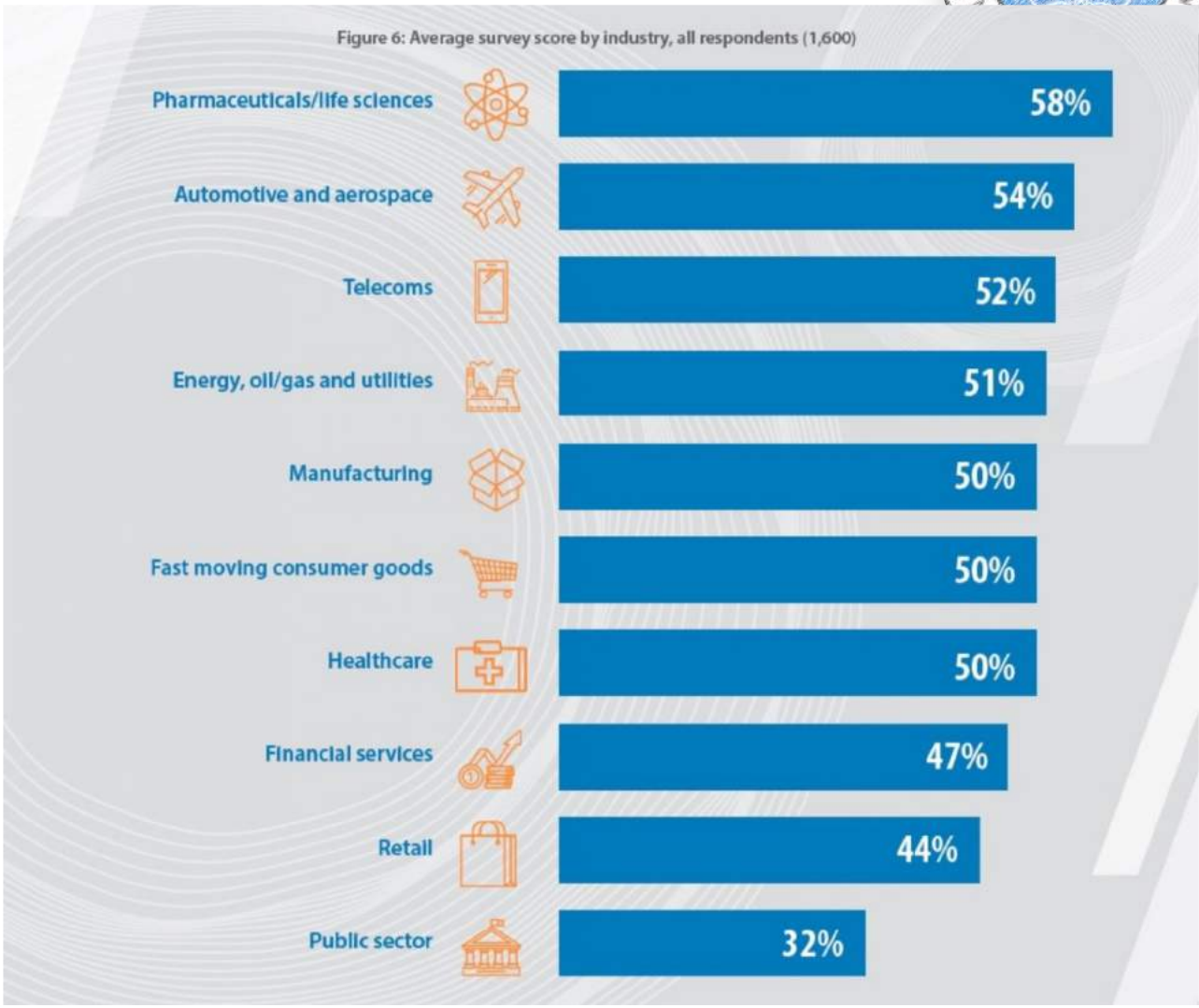
AI for Education



https://www.cognilytica.com/2019/03/28/infographic-ai-in-education/

AI Adoption by Industry

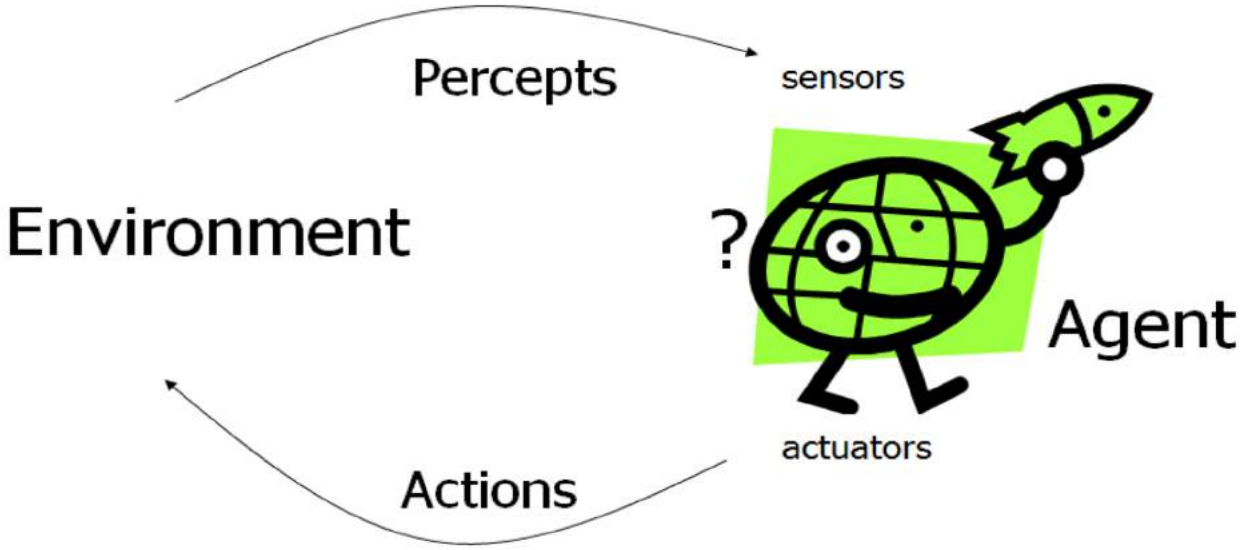
Percentage of market players who plan to adopt AI in next two years across various business verticals (Infosys Survey, 2018)



https://existek.com/blog/ai-programming-and-ai-programming-languages/

Intelligent Agent

Computer system that is *situated* in some *environment*, and that is capable of *autonomous action* in this environment in order to meet its design objectives



Types of Intelligent Agent

- Problem Solving Agent:
  - agent has to 'search' the path that can lead agent to the goal
  - Searching algorithms: DFS, BFS, IDS, UCS, A*, Greedy Best First, Minmax search, Genetic Algorithm, Hill Climbing, Simulated Annealing, ...
- Knowledge Based Agent
  - Deducting premises with percepted fact. When agent percept a state, it will try to reason new facts/ states. This is how agent will step by step collecting all of the states of wumpus world in order to achieve its goal
- Learning Agent
  - There are many learning algorithms, that suitable for certain purposes, and the 'availability' of the data/ feedback: supervised learning, unsupervised learning, reinforcement learning

Problem Solving Agent: search from initial to goal state

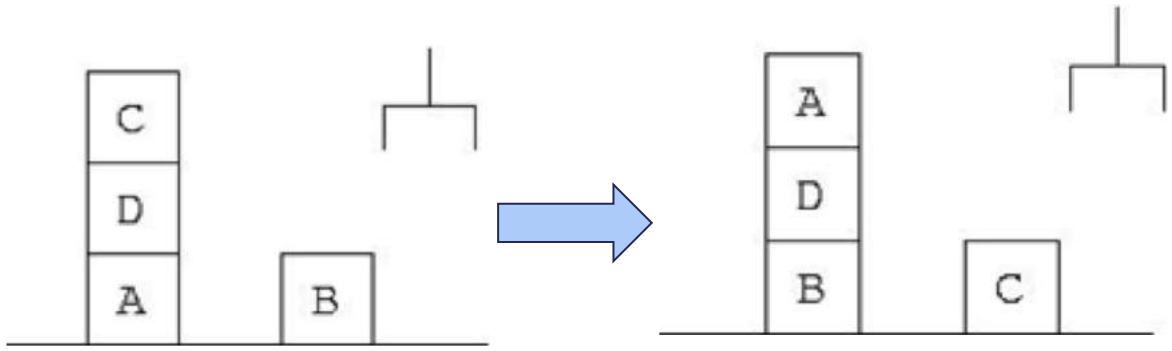
N puzzle problem

2	8	3
1	6	4
7		5

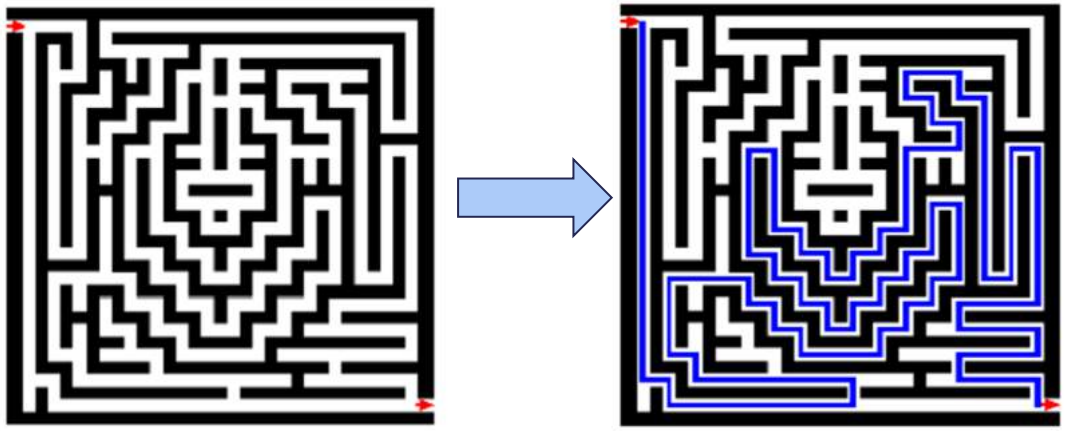
→

1	2	3
8		4
7	6	5

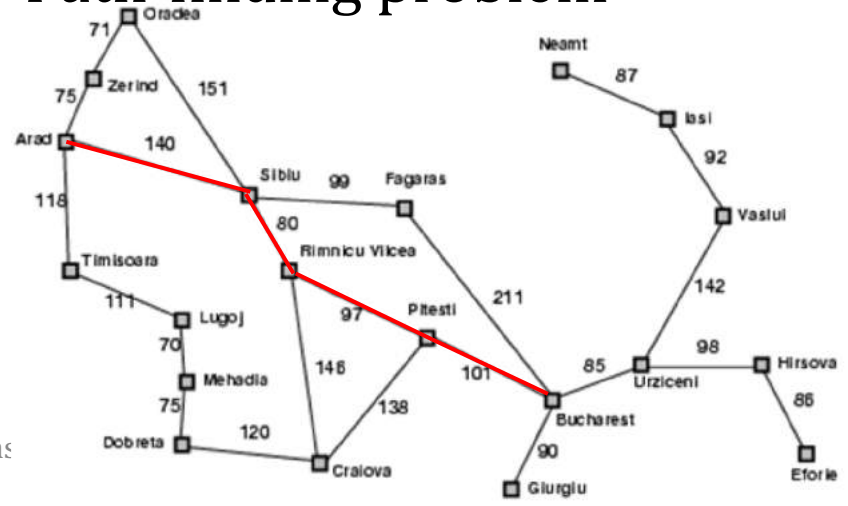
Block-world problem



Maze problem

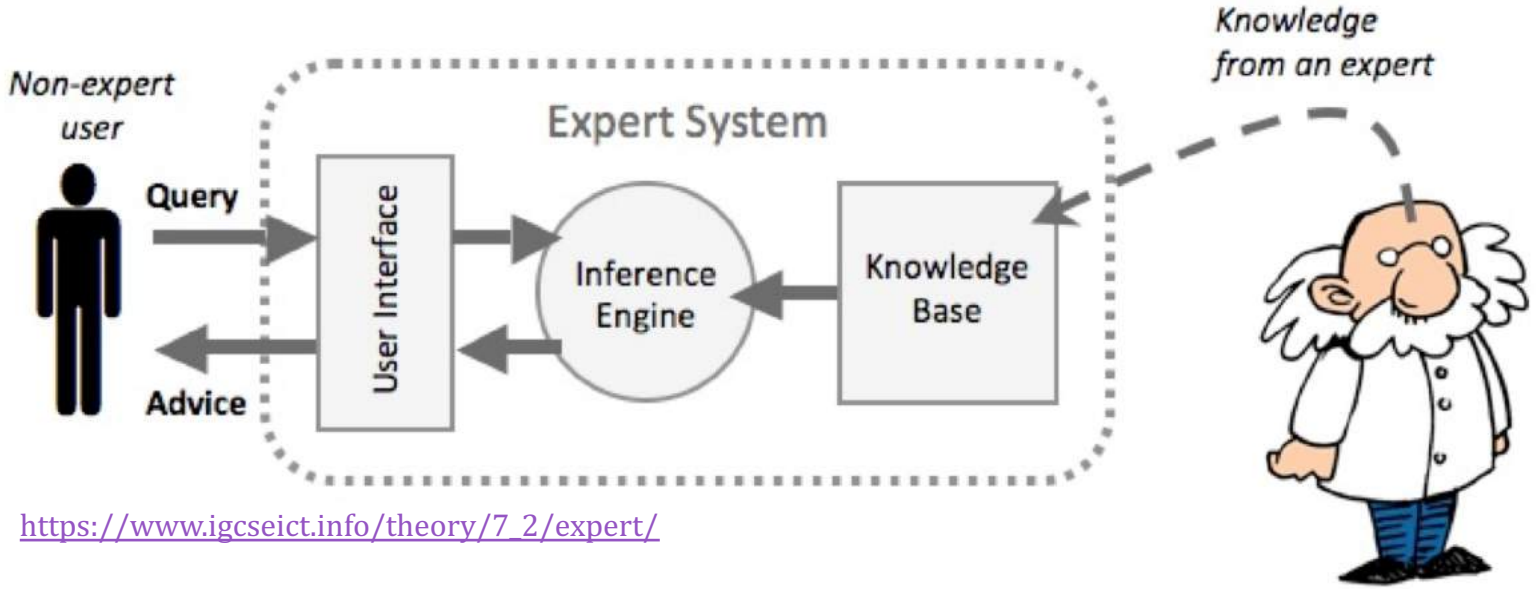


Path-finding problem

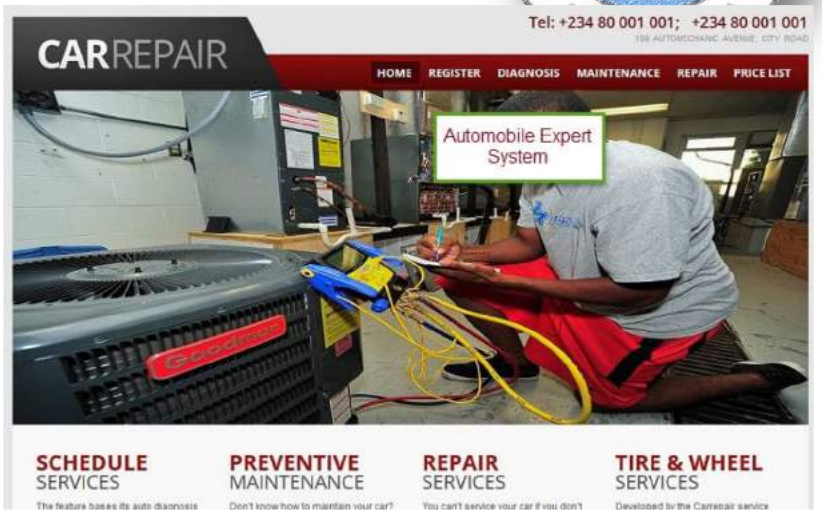


Straight-line distance to Bucharest	
Arad	366
Bucharest	0
Craiova	160
Dobreta	242
Eforie	161
Fagaras	176
Giurgiu	77
Hirsova	151
Iasi	226
Lugoj	244
Mehadia	241
Neamt	234
Oradea	380
Pitesti	10
Rimnicu Vilcea	193
Sibiu	253
Timisoara	329
Urziceni	80
Vaslui	199
Zerind	374

Knowledge-based agent

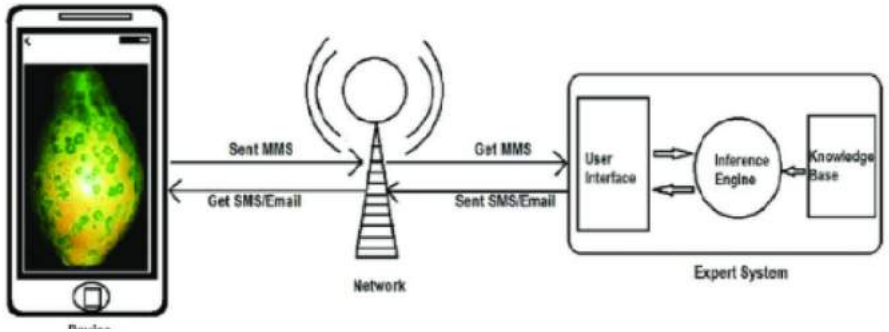


https://www.igcseict.info/theory/7_2/expert/



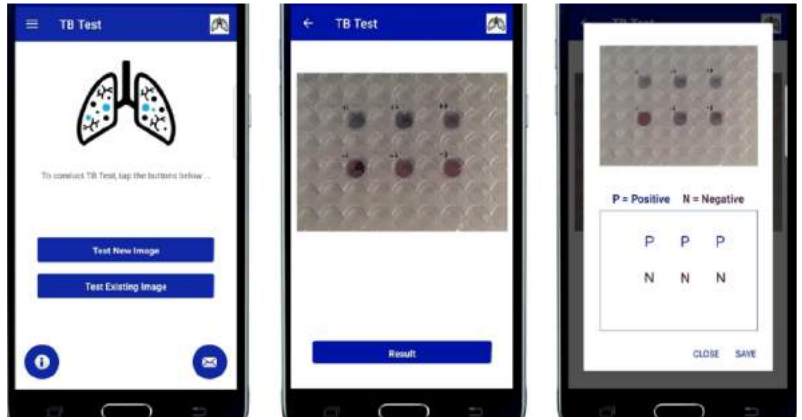
http://www.classgist.com/blogs/169/online-expert-system-for-car-repair-and-maintenance-php-source-codes.aspx

vision-based agro-medical expert system



https://www.researchgate.net/figure/The-architecture-of-online-machine-vision-based-agro-medical-expert-system_fig2_325849466

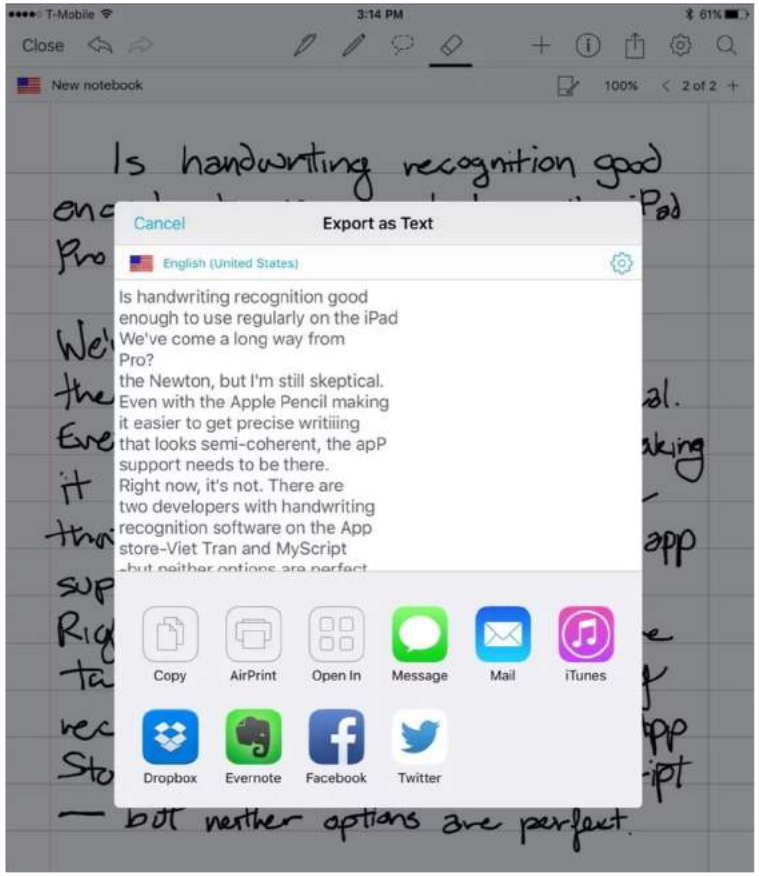
TB disease detection application



https://www.sciencedirect.com/science/article/pii/S0957417418304214

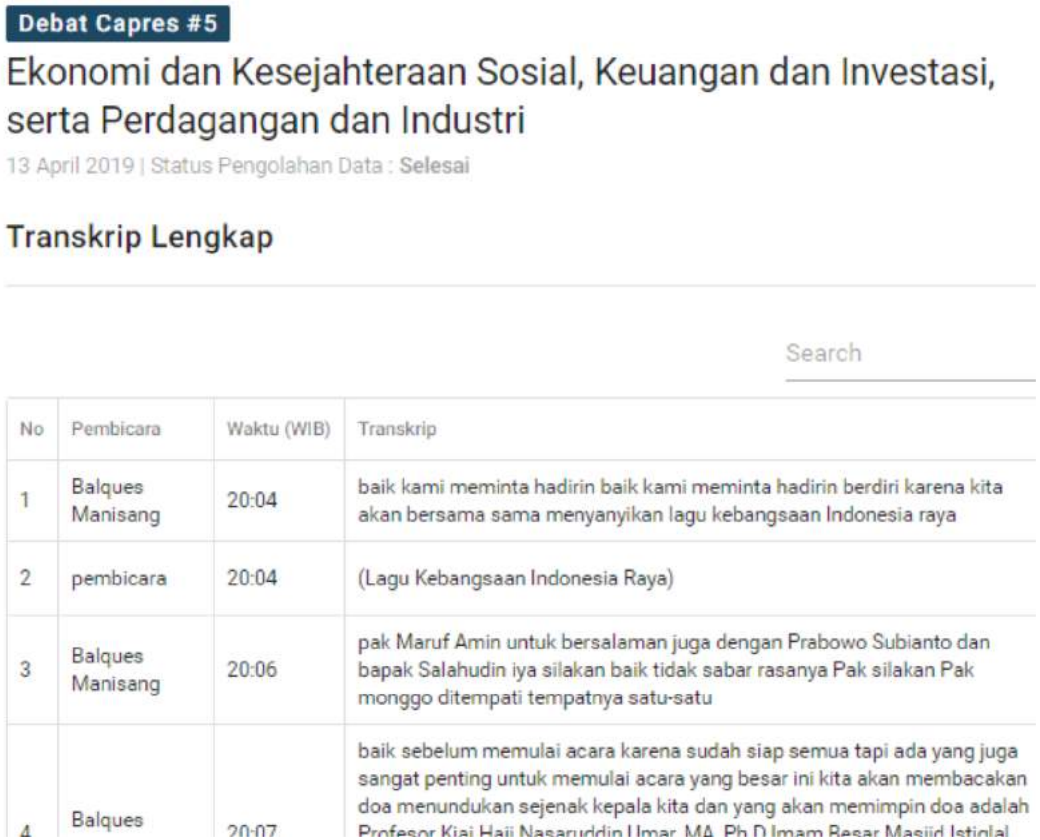
Learning Agent

Hand-writing recognition



https://www.imore.com/i-want-handwriting-recognition-iphone-and-ipad-even-if-it-stinks

Speech recognition

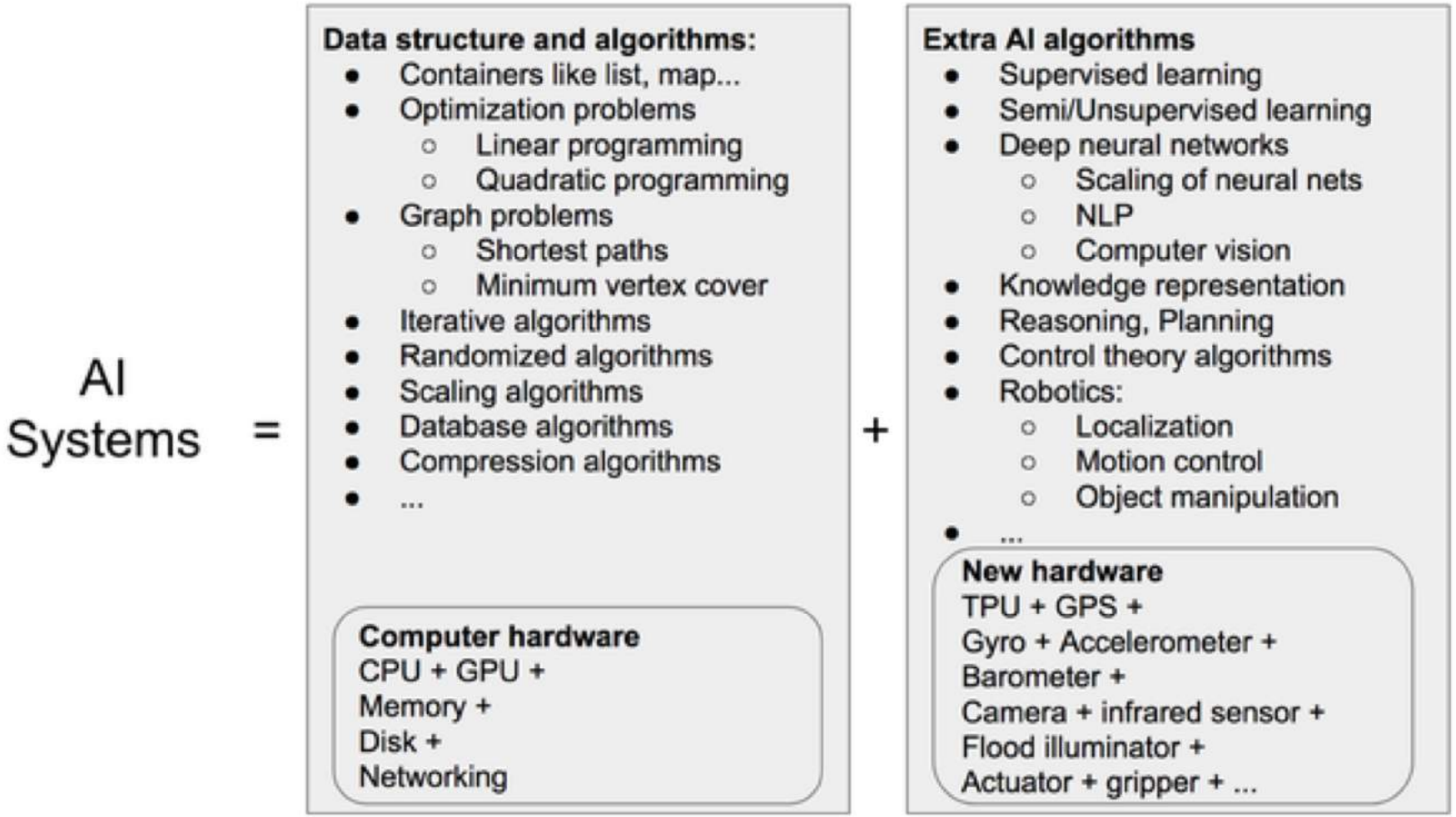


http://debatcapres.bahasakita.co.id/

Face recognition

https://www.nec.com/en/global/solutions/safety/face_recognition/NeoFaceWatch.html

AI and Programming



https://www.quora.com/Are-data-structures-and-algorithms-necessary-if-I-want-to-get-into-artificial-intelligence

Tugas dan Diskusi

- Berikan contoh-contoh penggunaan teknologi AI dalam kehidupan di bidang studi fakultas/sekolah.
- Diskusikan: apa dampak penggunaan teknologi tersebut dalam berbagai aspek, misalnya:
  - Apakah mengurangi penggunaan tenaga manusia
  - Apakah dampaknya pada lingkungan hidup
  - Apakah menyebabkan kinerja sistem/proses menjadi lebih efisien
  - …