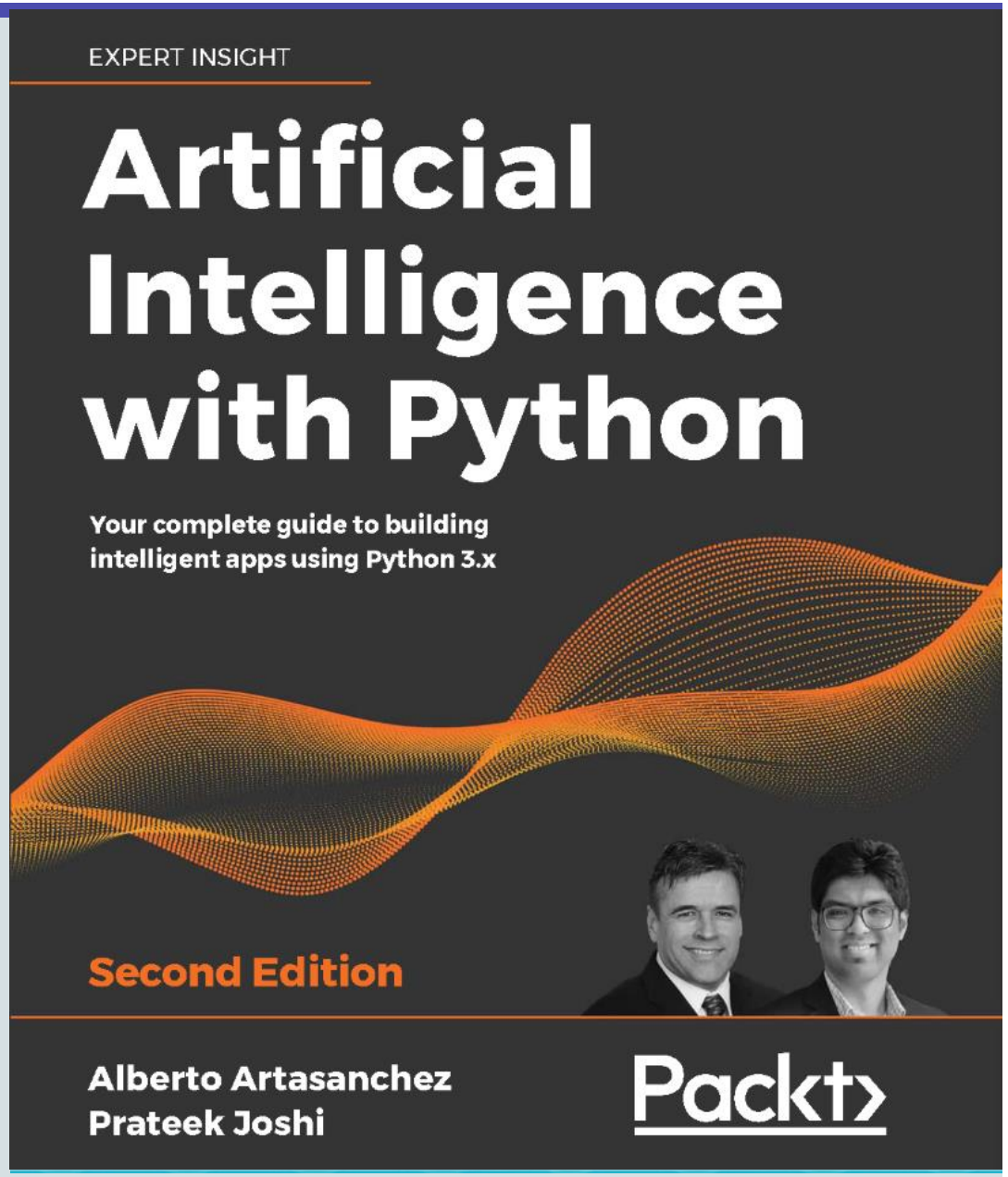
University of
South-Eastern Norway

University of South-Eastern Norway
School of Business

Lecture 1 Introduction to AI - Intelligent Agents

Sinuo Wu

Course: AI for Business Applications (AI3000)



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Course Plan

Course Structure		
Quiz	Knowledge from the previous course	15 min
Lecture Presentation	Topic-based	45 min
Break	\	15 min
Group discussion + Report	1. Discussion or practice based on topic. 2. Report or present the outcomes.	45 min
Break	\	15 min
Lecture Presentation	Topic-based	45 min
Break	\	15 min
Guidance + Group work	1. Guidance for working process of assignment. 2. Group work for final assignment.	45 min

11 Lectures + Assignment Presentation
Introduction
Machine learning pipelines and Feature selection
Supervised Learning
Unsupervised Learning
Natural Language Processing
Chatbots
Computer vision
Deep Learning
AI and big data
Philosophy, ethics and safety of AI
Summary

Exam

Compulsory activity
Two mandatory group assignments:
1 Written report of one group project
2. Presenting group project and contributing to feedback on your classmates' presentation.
Note: Written and mandatory group presentation must be approved before permission will be given to sit for the exam. Mandatory work requirement is valid this semester and the following re-sit examination.

Final assessment
Written individual examination, 4 hours.

Grading
Grading scale from A to F, where A is the highest grade and F is failed.

Assignment Inspiration

Recommendation: Cooperate with AI tools (eg:….)

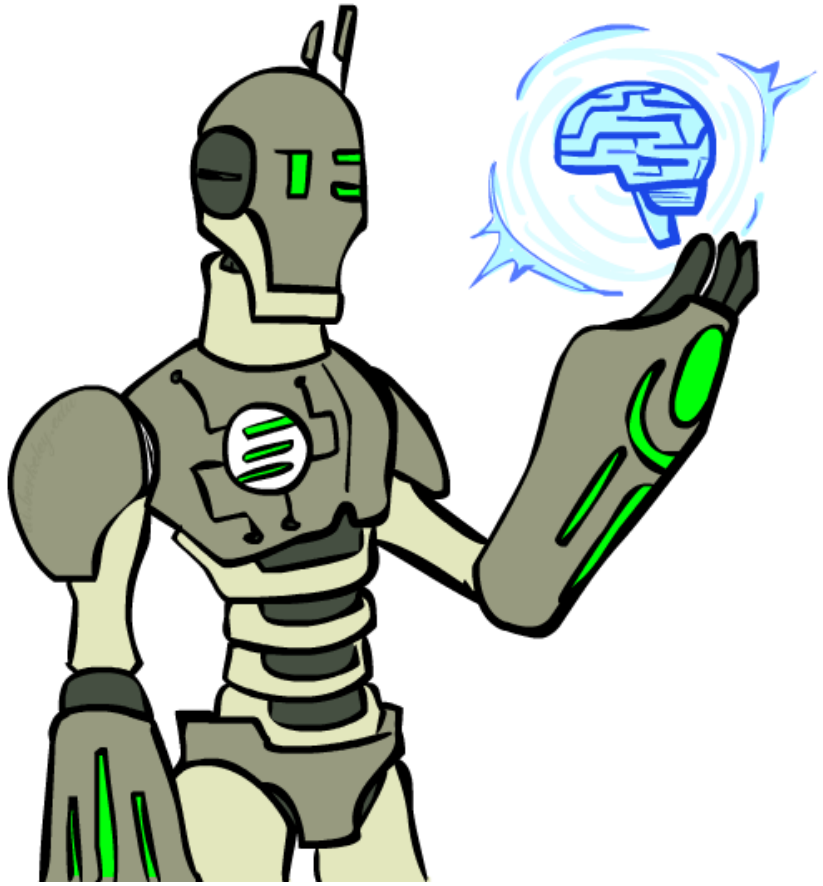
1. Group up, topic selection
2. Develop your business:

Field of the organization, team introduction, background (current state, competitors,…)

3. Develop the concept
4. **AI Technology (Why, what and how)**
   - **Data sources**
   - **Algorithms (Follow the steps)**
   - **Evaluation**
   - **How it works (or the system\plateform description)**
5. Business model
6. Implementation plan
7. Other aspects

Today

- What is Artificial Intelligence?
- What Can AI Do?
- AI for Business
- Intelligent Agents



Artificial Intelligence

What is AI?

"The area of computer science that studies how machines can perform tasks that would normally require a sentient agent"

"….With AI, we are attempting to reflect some of the systems and mechanics of the brain within computing, and thus find ourselves borrowing from, and interacting with, fields such as neuroscience"

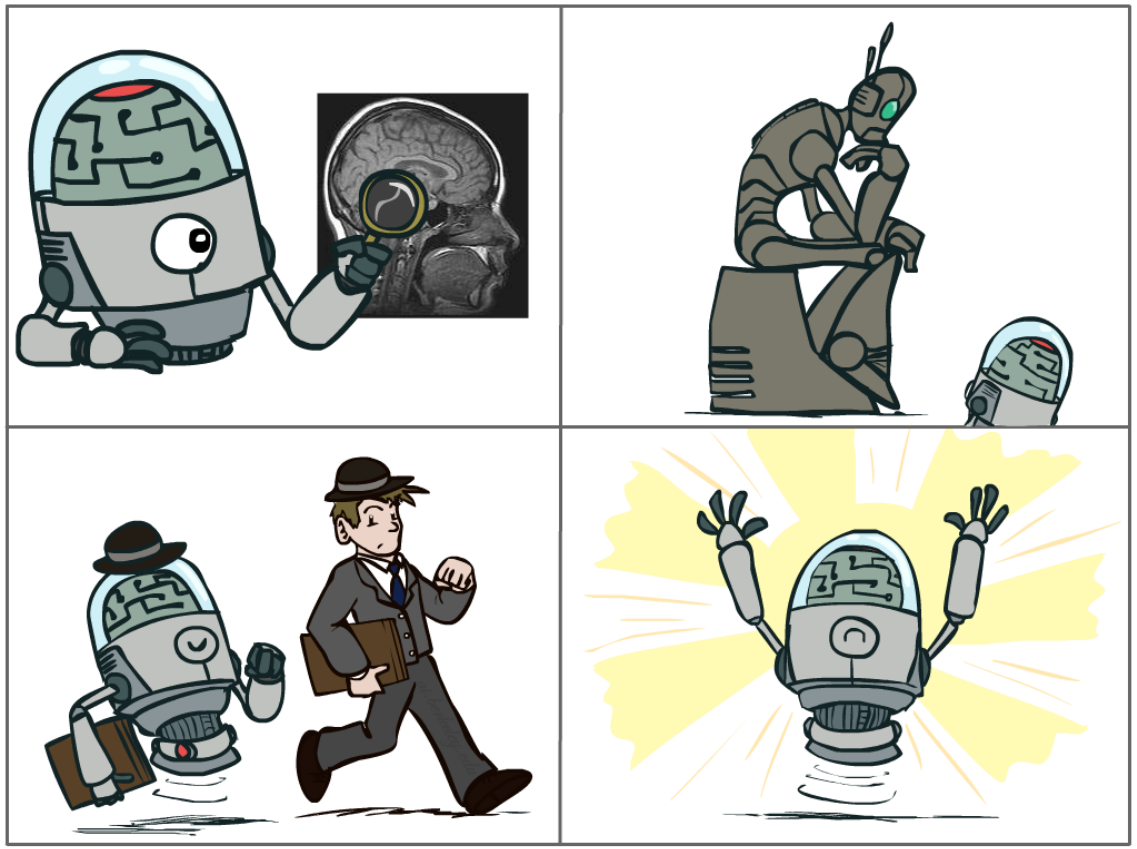
---- Alberto & Prateek, 2020

Your own understanding?

What is AI?

The science of making machines that:

Think like people

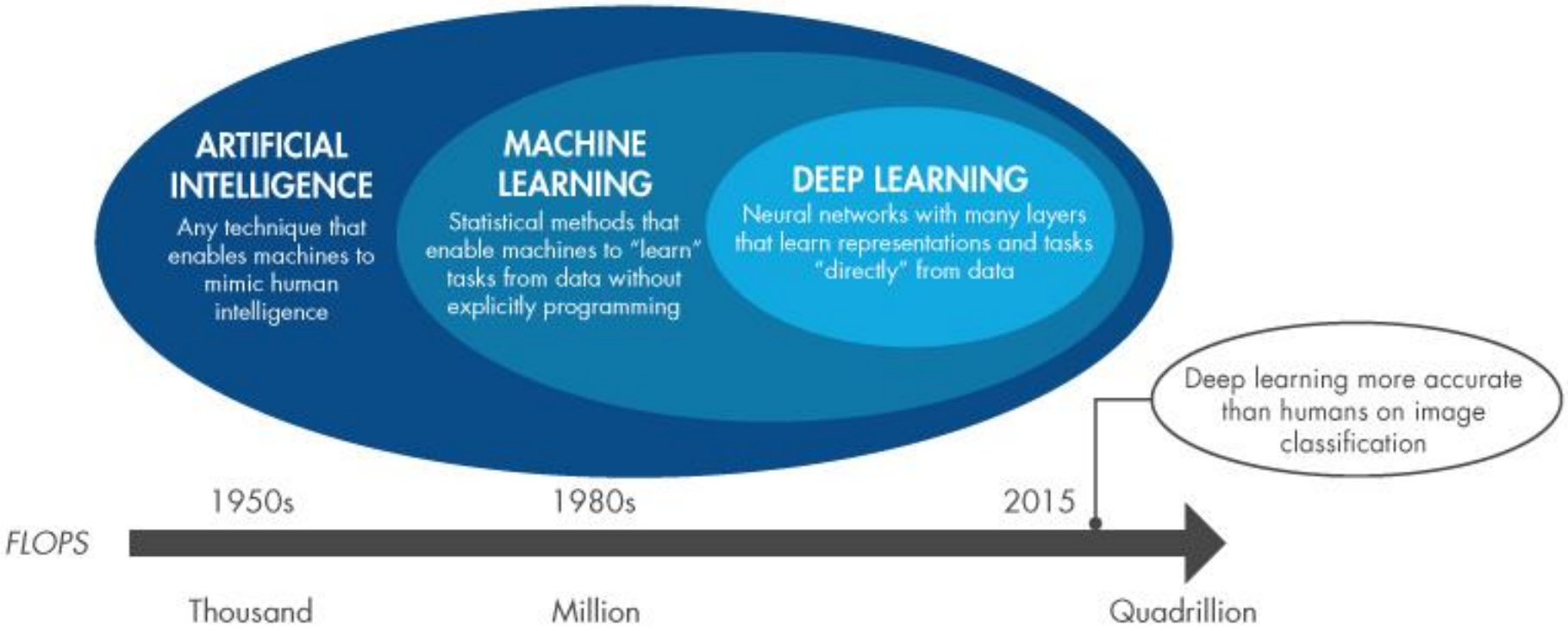


Think rationally

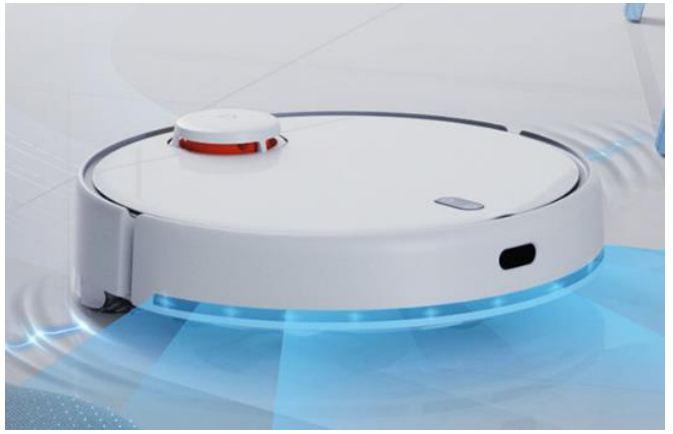
Act like people

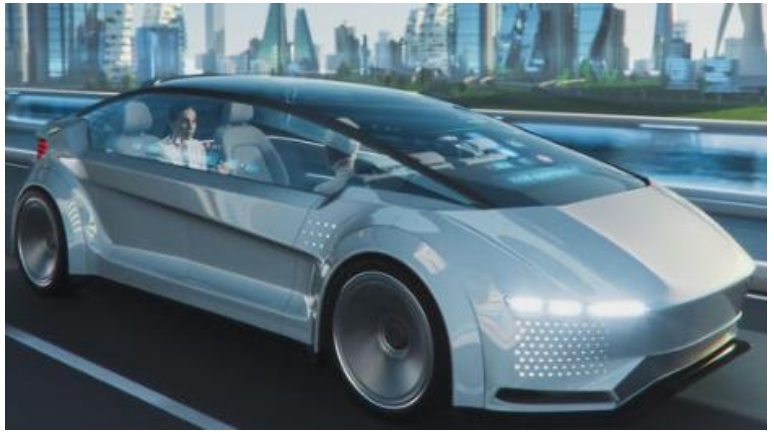
Act rationally

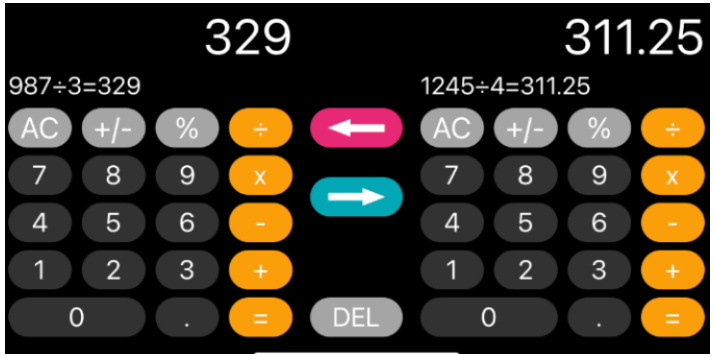
AI- ML- DL


ARTIFICIAL INTELLIGENCE
Any technique that enables machines to mimic human intelligence
MACHINE LEARNING
Statistical methods that enable machines to "learn" tasks from data without explicitly programming
DEEP LEARNING
Neural networks with many layers that learn representations and tasks "directly" from data
Deep learning more accurate than humans on image classification
1950s
1980s
2015
FLOPS
Thousand
Million
Quadrillion

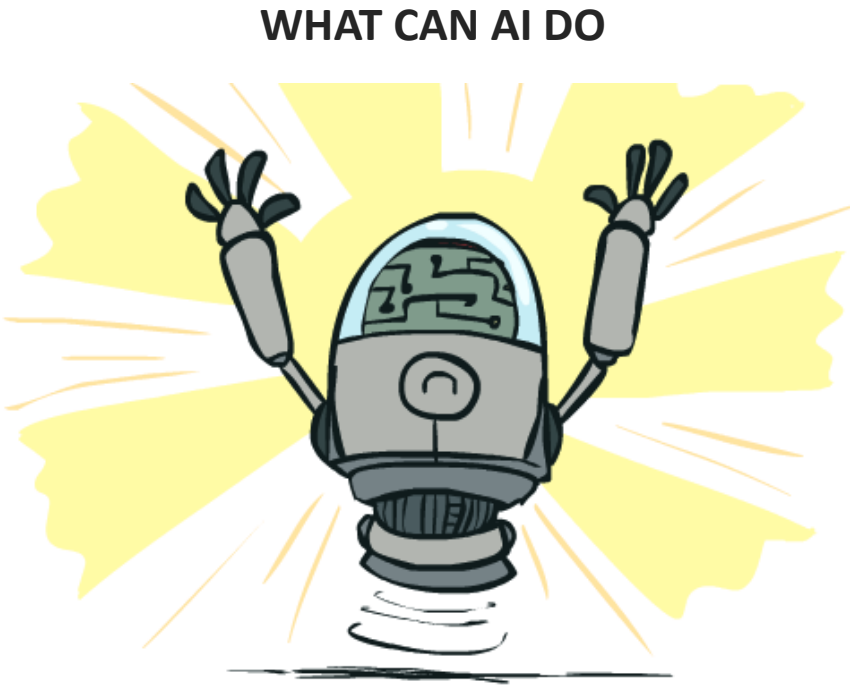
What is AI







Discussion



Inspiration

How AI could empower any business

https://www.youtube.com/watch?v=reUZRyXxUs4

Report

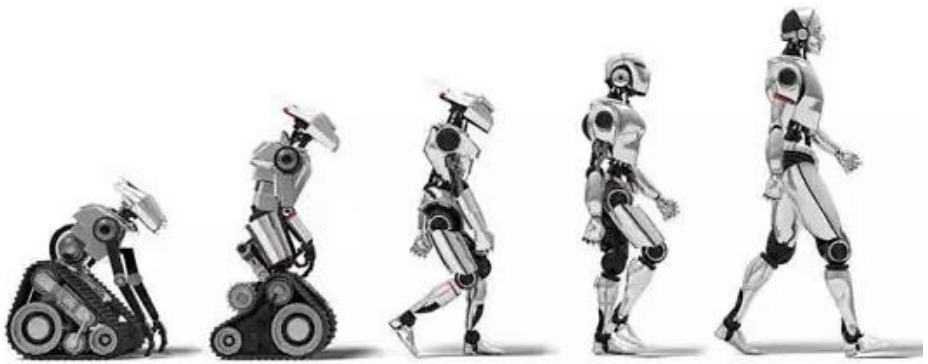
One representative from each group report for:

1. What can AI do?
2. Your idea of using AI

Have a Break!

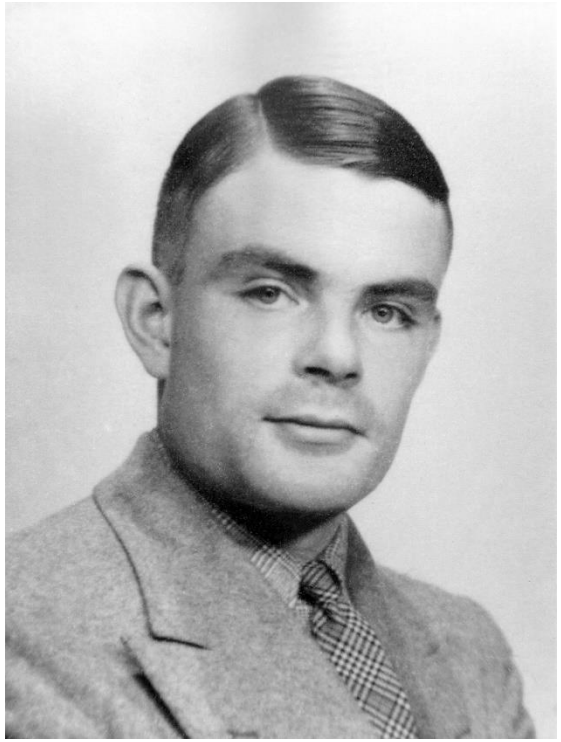
What Can AI Do

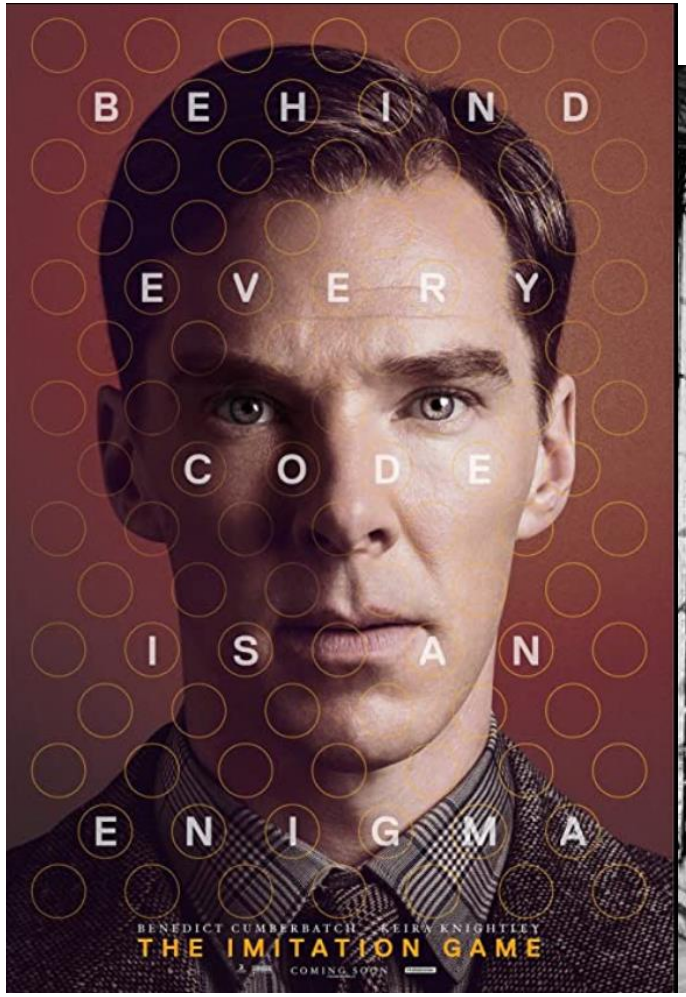
History of AI

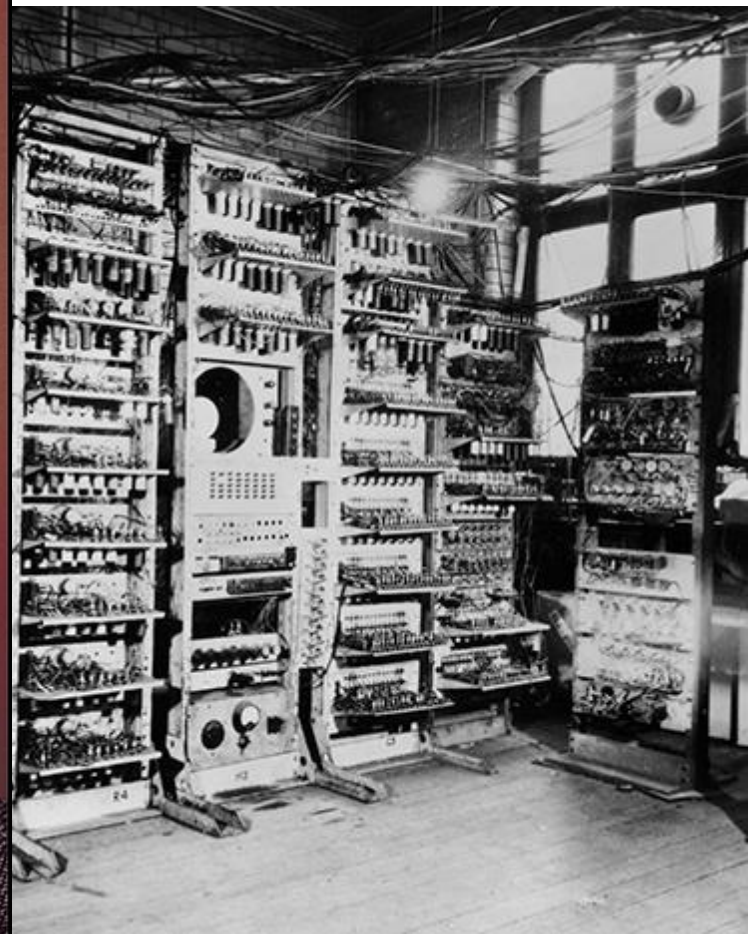


- 1940-1950: Early days
  - 1943: McCulloch & Pitts: Boolean circuit model of brain
  - 1950: Turing's “Computing Machinery and Intelligence”
- 1950—70: Excitement: Look, Ma, no hands!
  - 1950s: Early AI programs, including Samuel's checkers program, Newell & Simon's Logic Theorist, Gelernter's Geometry Engine
  - 1956: Dartmouth meeting: “Artificial Intelligence” adopted
  - 1965: Robinson's complete algorithm for logical reasoning
- 1970—90: Knowledge-based approaches
  - 1969—79: Early development of knowledge-based systems
  - 1980—88: Expert systems industry booms
  - 1988—93: Expert systems industry busts: “AI Winter”
- 1990—: Statistical approaches
  - Resurgence of probability, focus on uncertainty
  - General increase in technical depth
  - Agents and learning systems… “AI Spring”?
- 2000—: Where are we now?

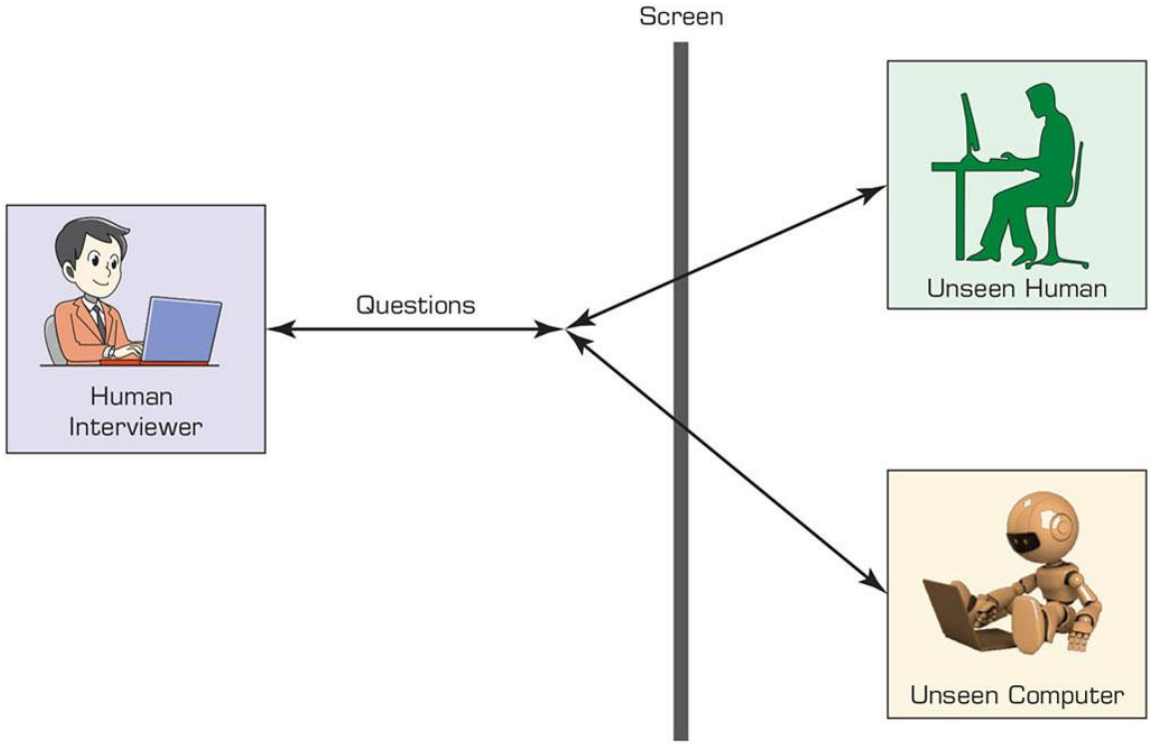
AI




BEHIND
EVERY
CODE
IS AN
ENIGMA
BENEDICT CUMBERBATCH KEIRA KNIGHTLEY
THE IMITATION GAME
COMING SOON



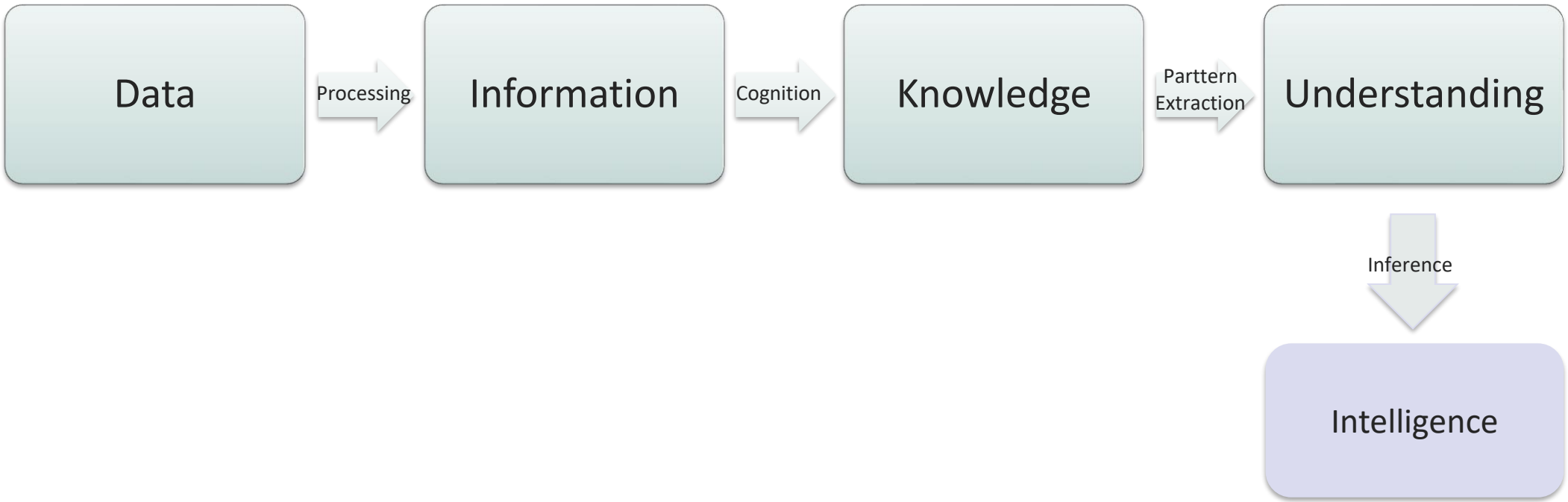
Turing Test



Define intelligence using Turing test

- **Types of intelligence:**
  - Linguistic and verbal, logical, spatial, body/movement, musical, interpersonal, intrapersonal, naturalist
- **Content of intelligence**
  - Reasoning, learning, logic, problem-solving, perception, and linguistic ability

From Data to Intelligence



Capabilities of Intelligence

- Learning or understanding from experience
- Making sense out of ambiguous, incomplete, or even contradictory messages and information
- Responding quickly and successfully to a new situation (i.e., using the most correct responses)
- Understanding and inferring in a rational way, solving problems, and directing conduct effectively
- Applying knowledge to manipulate environments
- Recognizing and judging the relative importance of different elements in a situation

Human and Computer Intelligence

Comparing human intelligence with AI

Area	AI	Human
Execution	Very fast	Can be slow
Emotions	Not yet	Can be positive or negative
Computation speed	Very fast	Slow, may have trouble
Imagination	Only what is programmed for	Can expand existing knowledge
Answers to questions	What is in the program	Can be innovative
Flexibility	Rigid	Large, flexible

Artificial Intelligence VS Human Intelligence.

Branches of AI

Machine learning and pattern recognition

Logic-based AI

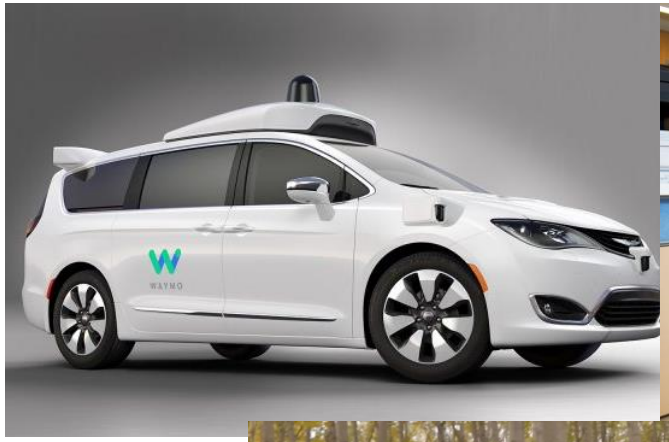
Search

Knowledge representation

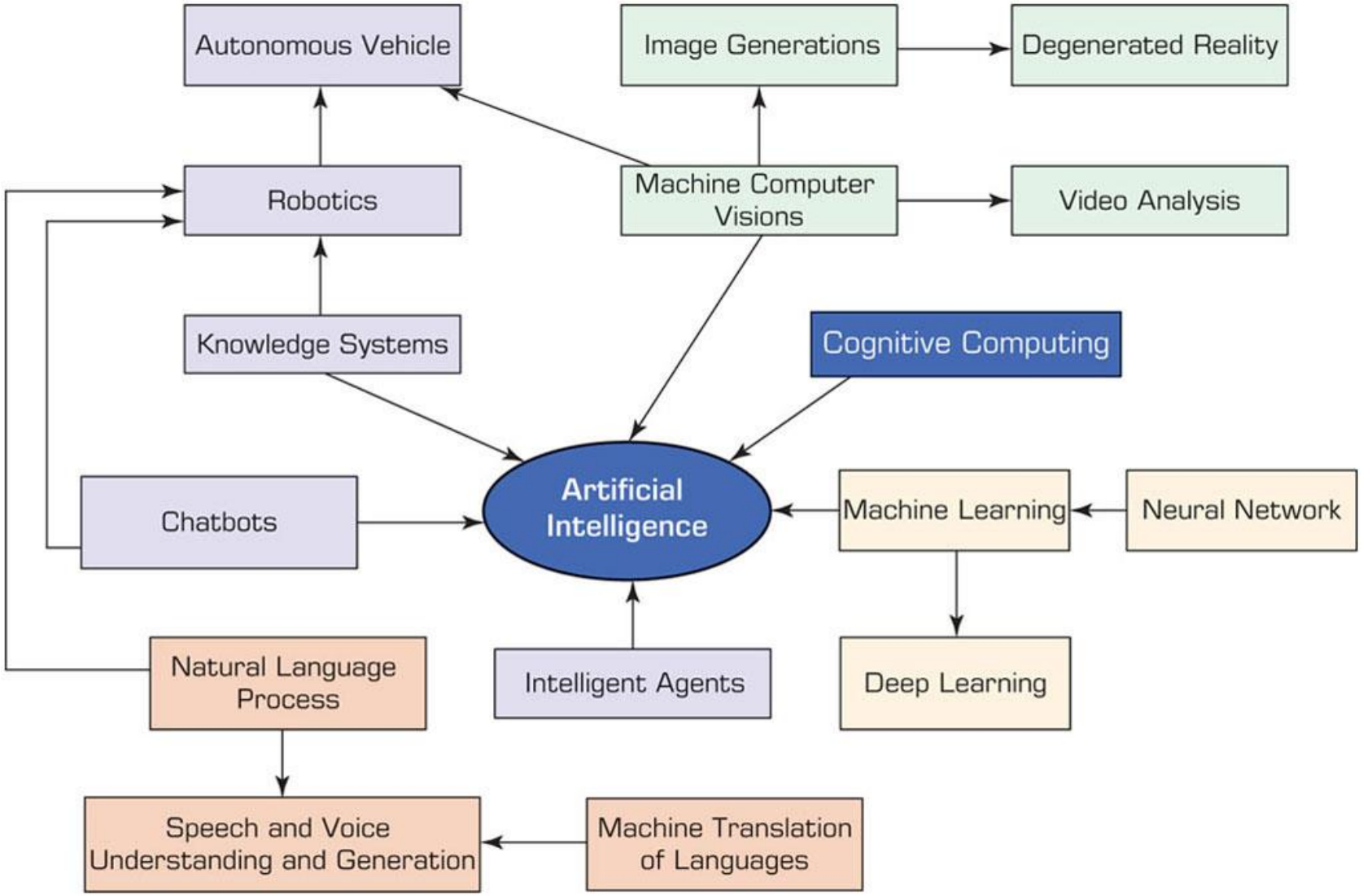
Planning

Heuristics

Genetic programming



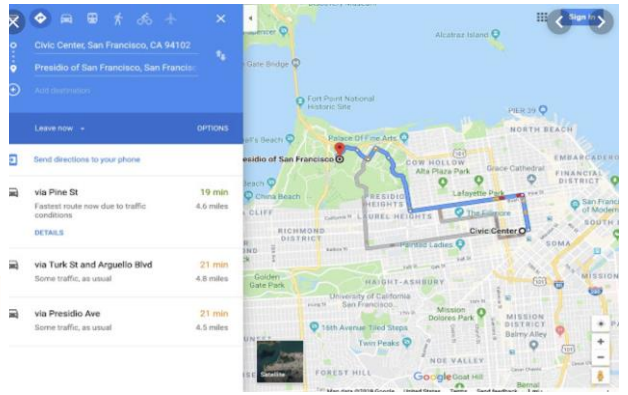
Major Tech


Autonomous Vehicle
Image Generations
Degenerated Reality
Robotics
Machine Computer Visions
Video Analysis
Knowledge Systems
Cognitive Computing
Chatbots
Artificial Intelligence
Machine Learning
Neural Network
Natural Language Process
Intelligent Agents
Deep Learning
Speech and Voice Understanding and Generation
Machine Translation of Languages

Applications

- Predict an output

Expert Systems



Applications

- Predict an output
- Identify objects

Computer Vision

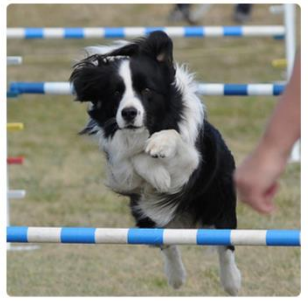
"man in black shirt is playing guitar."

"construction worker in orange safety vest is working on road."

"two young girls are playing with lego toy."

"boy is doing backflip on wakeboard."

"girl in pink dress is jumping in air."



"black and white dog jumps over bar."

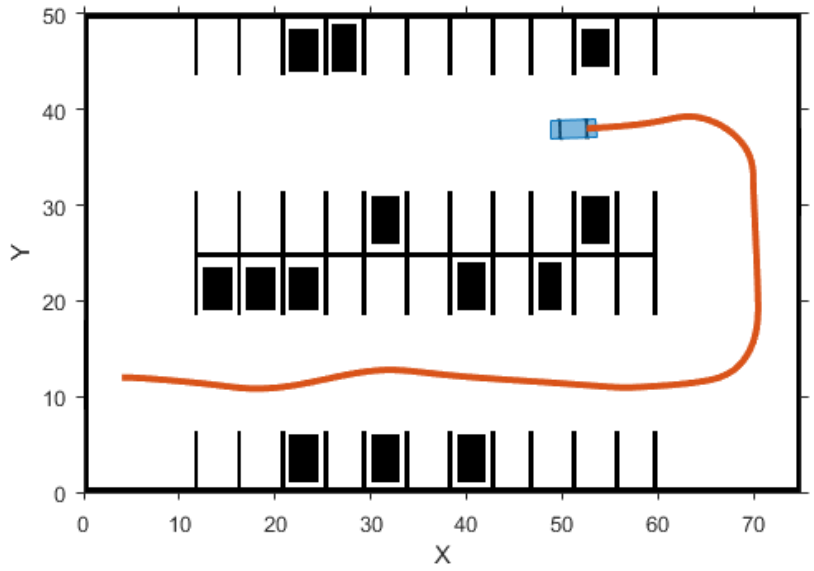
"young girl in pink shirt is swinging on swing."

"man in blue wetsuit is surfing on wave."

Karpathy & Fei-Fei, 2015; Donahue et al., 2015; Xu et al, 2015; many more

Applications

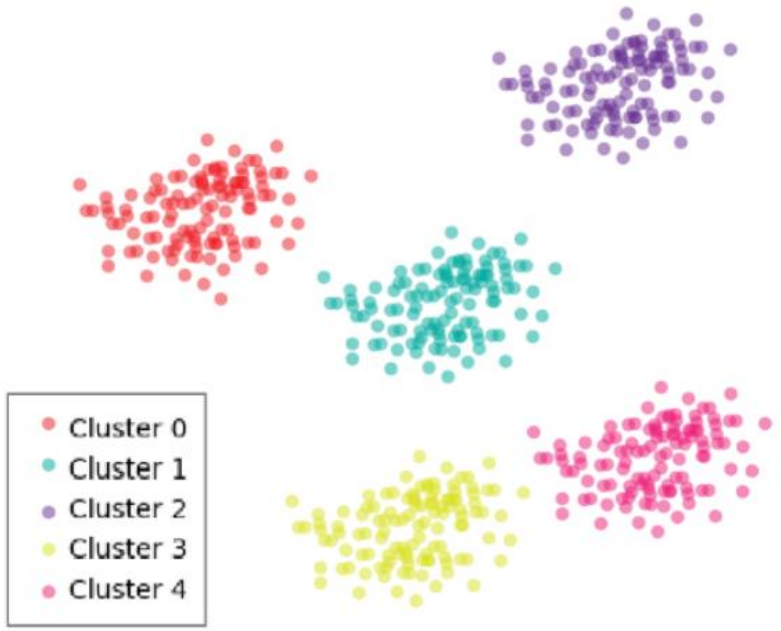
- Predict an output
- Identify objects
- Move physically or in a simulation



Applications

- Predict an output
- Identify objects
- Move physically or in a simulation
- Data analysis

Customer behavior analysis



From SPD Group

Applications

- Predict an output
- Identify objects
- Move physically or in a simulation
- Data analysis
- Enhance images or signals

From Gigapixel AI

Applications

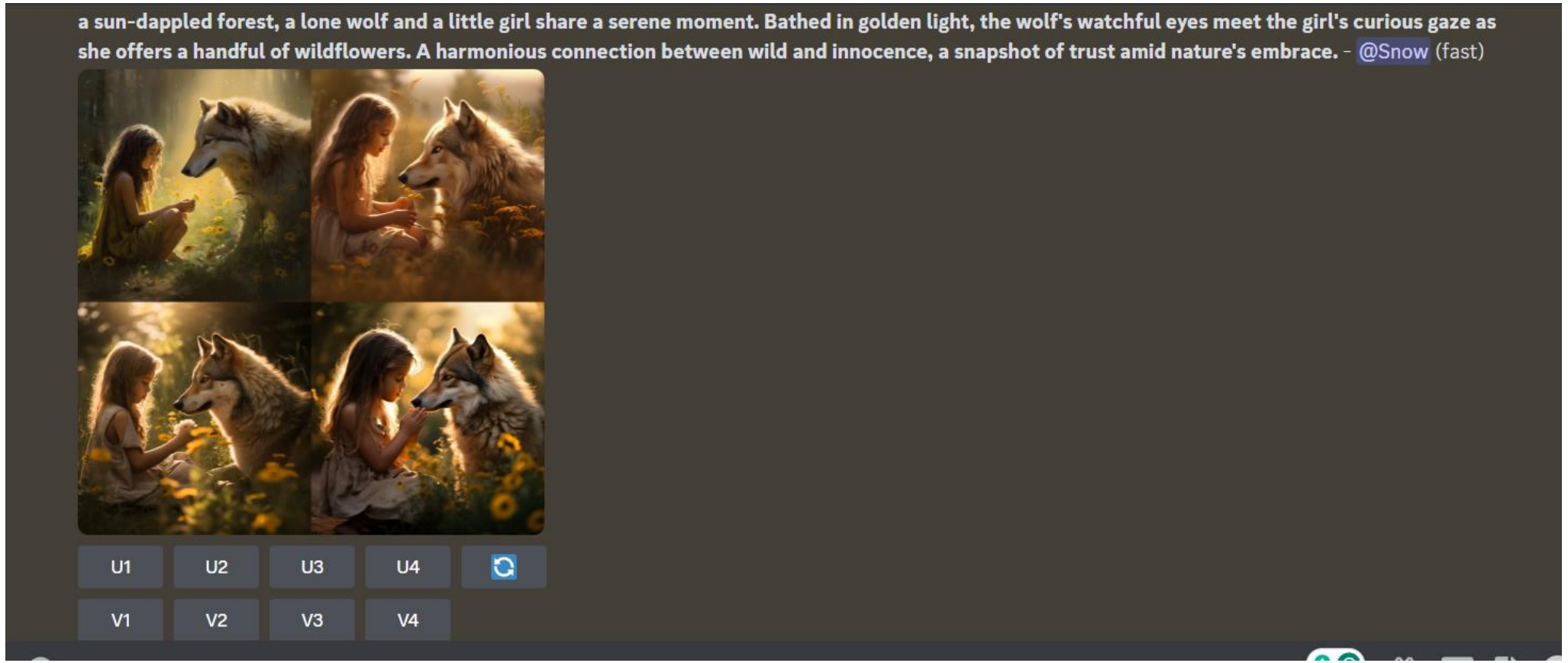
- Predict an output
- Identify objects
- Move physically or in a simulation
- Data analysis
- Enhance images or signals
- Generate images

https://stablediffusionweb.com/#demo

From MidJourney

Let’s Play!

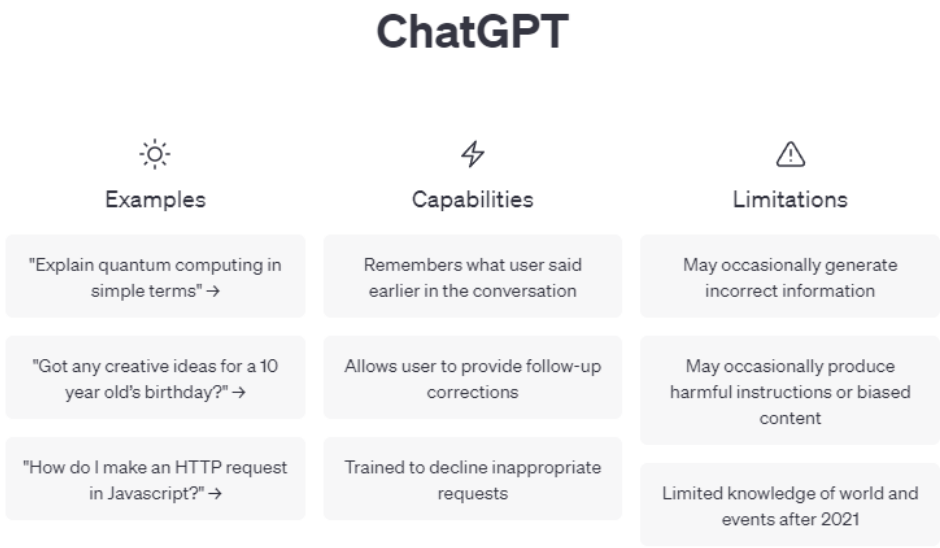
- Send describtion to **ws@usn.no**



Applications

- Predict an output
- Identify objects
- Move physically or in a simulation
- Data analysis
- Enhance images or signals
- Generate images
- Respond to speech or text

Natural Language Processing

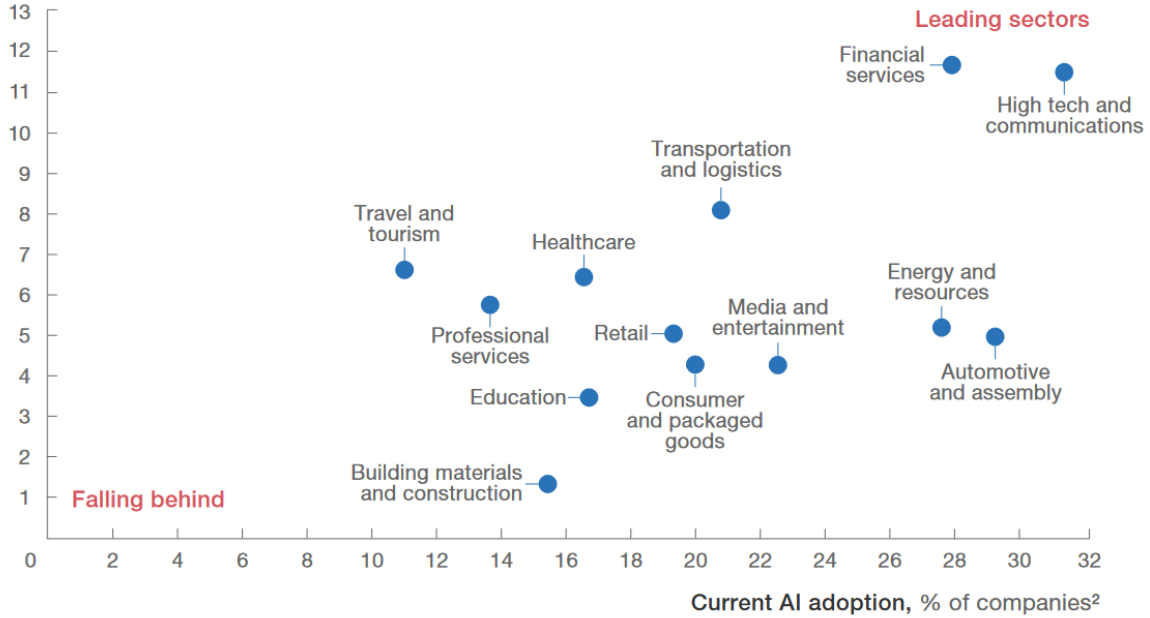


AI for Business

AI for Business

DATA FROM 2018

Future AI demand trajectory, % change in AI spending over next 3 years[1]



[1]Estimated average, weighted by company size; demand trajectory based on midpoint of range selected by survey respondent.
[2]Adopting 1 or more AI technologies at scale or in business core; weighted by company size.
Source: McKinsey Global Institute AI adoption and use survey; McKinsey Global Institute analysis

DATA FROM 2022

Most commonly adopted AI use cases within each business function, % of respondents[1]

AI Applications in Accounting

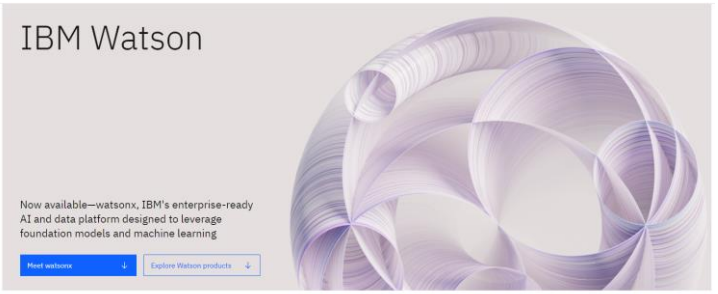
- AI in big accounting firms and in small accounting firms
  - Solve complex billing problems (especially in healthcare)
    - Claim processing and reimbursement
  - Real estate contracts, risk analysis …
  - AI provides cheaper and better data-driven support
  - Generates needed insights from data analysis
  - Frees time of accountants for more complex tasks
  - Machine learning is often used for prediction
- AI will improve and automate accounting tasks but at the same time will take away some accounting jobs.

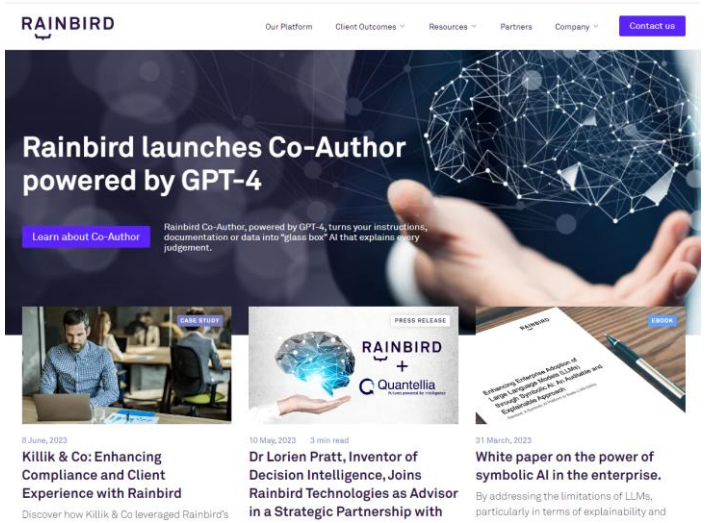
AI Applications in Financial Services

- Diverse use of AI, in banking and insurance.
- Examples of AI use in general financial services:
  - Extreme personalization (e.g., chatbots, personal assistants, etc.)
  - Sharing economic activities (e.g., person-to-person loans)
  - Shifting customer behavior both online and in branches
  - Facilitating trust in digital identity, revolutionizing payments
  - Offering financial services 24/7 and globally
- Banking can also use AI for …
  - Face recognition (safer online banking), help customer with smart investment decisions, prevent money laundering, …
- Insurance – mostly in issuing policies and handling claims

AI Applications in Financial Services

- Application of AI uses in Banking
  - Employee surveillance (AI machines, e.g., IBM Watson).
  - Tax preparation/filing.
  - Automated customer service; Offer solutions and explains judgement.
    - See Rainbird Co. ar rainbirf.ai as a company that provides such services.
  - Automated online support for paying bills and account inquiries using Amazon Alexa (e.g., Capital One).
  - Fraud detection and anti–money-laundering activities; also improving customer experience (Bank Danamon).
  - Victual banking assistant, Olivia at HSBC, learn from experience and helps customers better.





AI in Marketing, Advertising, & CRM

- One of the richest area for AI applications:
  1. Product and personal recommendations
  2. Smart search engines
  3. Fraud and data breaches detection
  4. Social semantics
  5. Web site design
  6. Producer pricing
  7. Predictive customer service
  8. … many more in the book …

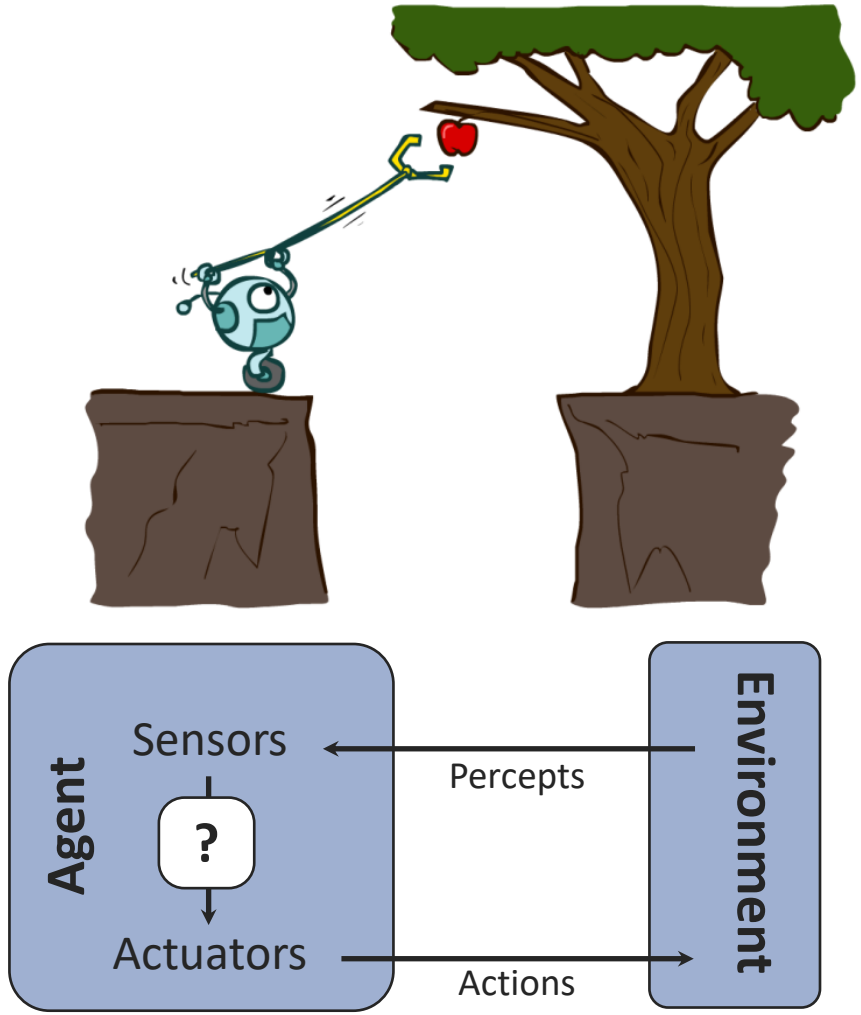
AI in Production-Operation Management

- AI in manufacturing
  - Automation for compliance and cost reduction
  - React quicker and more effectively (agility)
- Implementation model
  - Streamlining processes, smart outsourcing, work automation, improving customer experience
- Intelligent factories
- Logistic and transportation
  - Example: DHL supply-chain

Intelligent Agents

Designing Agents

- An **agent** is an entity that *perceives* and *acts*.
- A **rational agent** selects actions that maximize its (expected) **utility**.
- An **intelligent agent** refers to a system or entity that possesses the ability to gather and process information, make decisions, and take actions in order to achieve specific goals or objectives.



An intelligent agent interaction with its environment

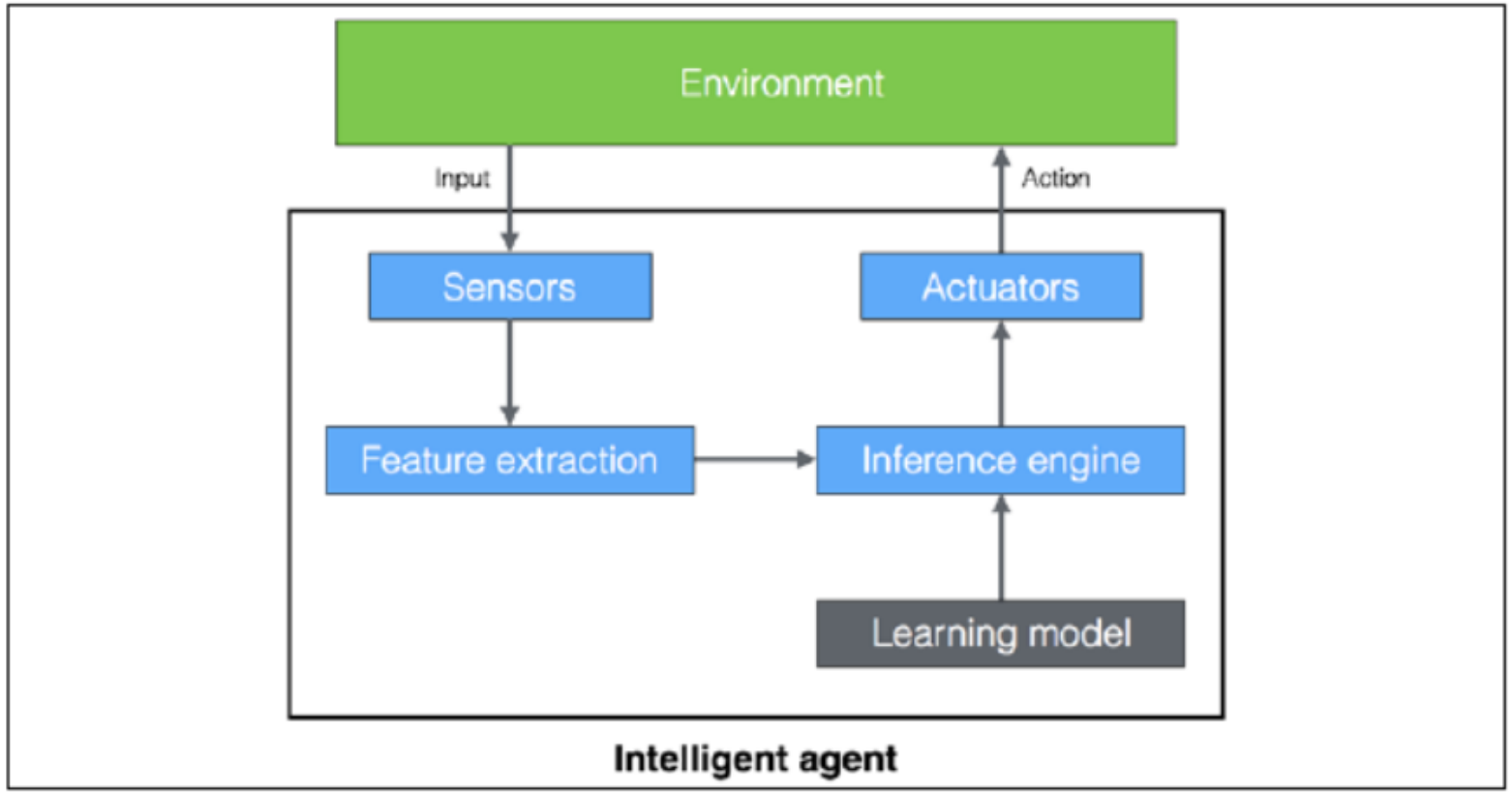
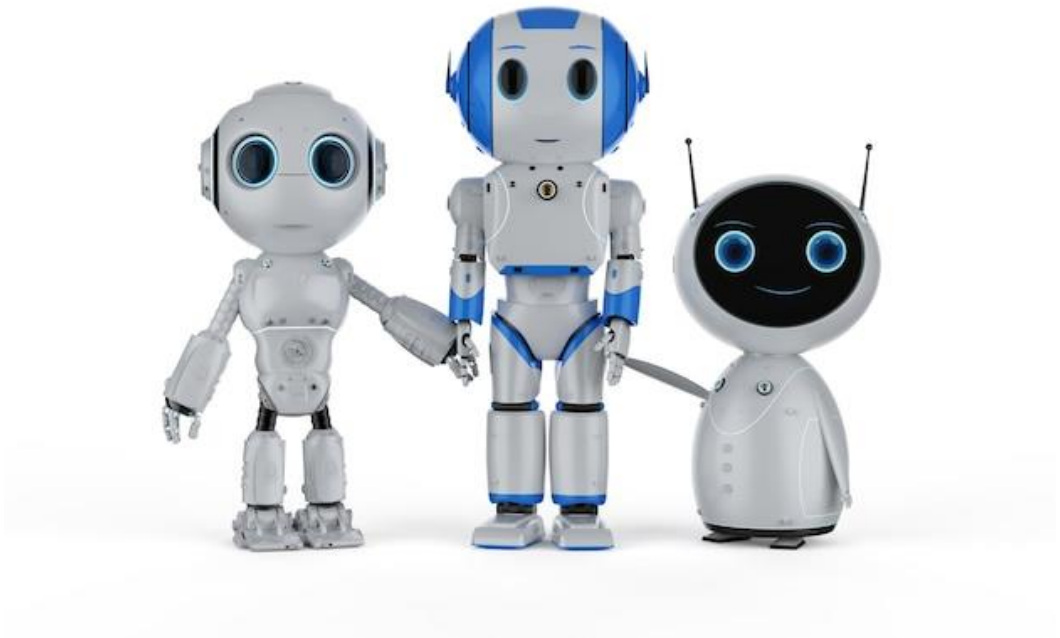


Figure 8: An intelligent agent interaction with its environment

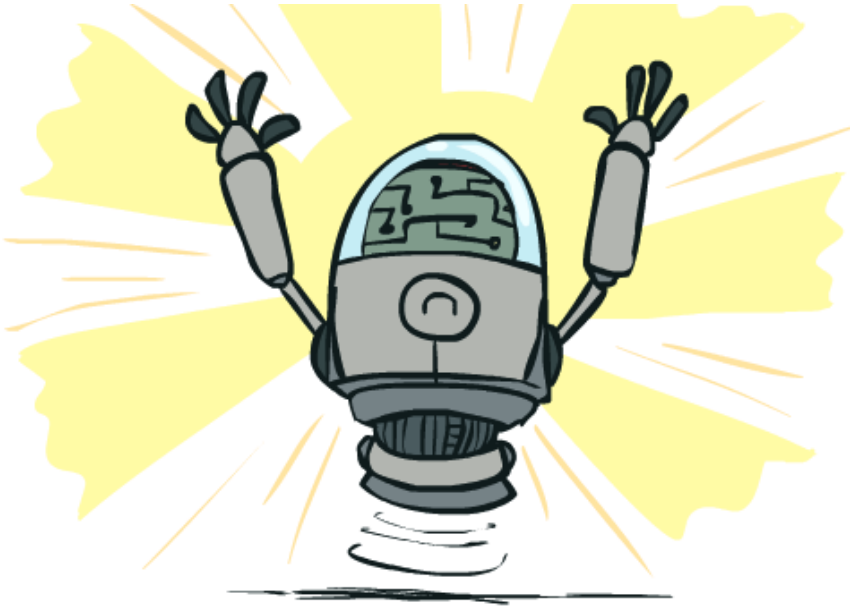
Group Up!



At most 8 person in one group; Create your group from Canvas

Reflection

ASSIGNMENT PROCESS



Python

Install Python: https://www.python.org/

Install Scikit-learn: pip install -U scikit-learn from cmd
Install pandas: pip install pandas from cmd
Install matplotlib: pip install matplotlib from cmd

THANKS