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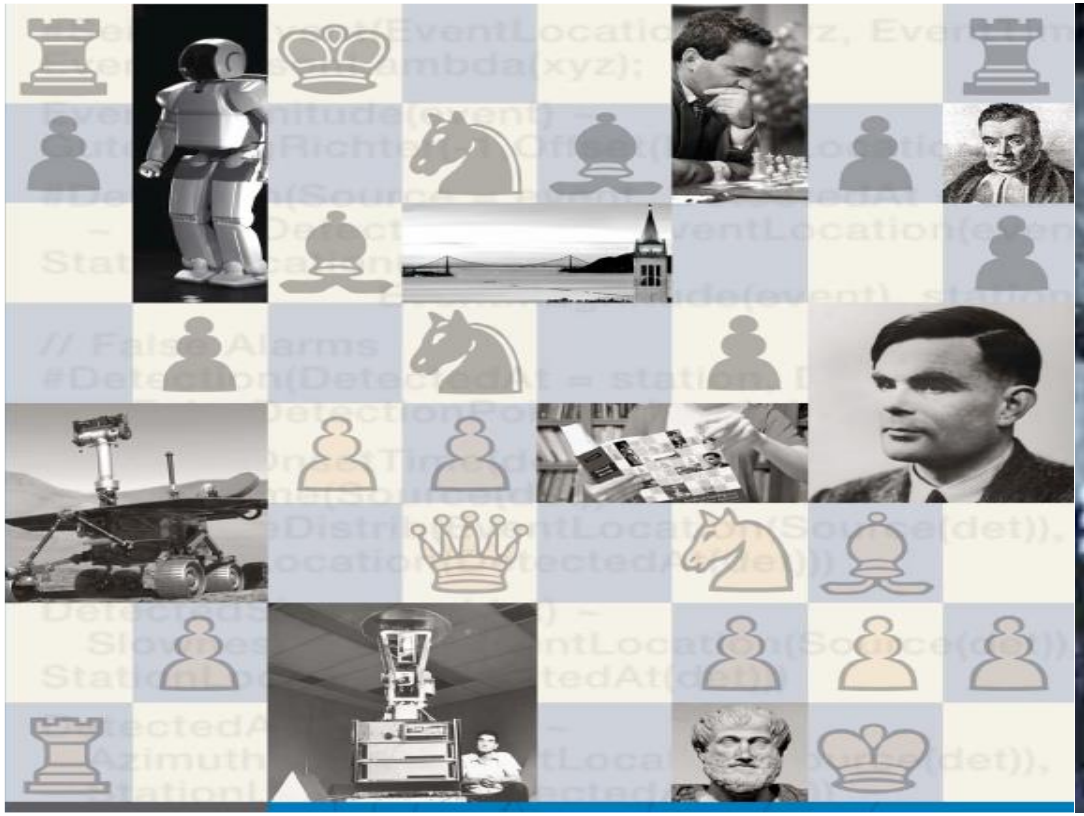


ARTIFICIAL INTELLIGENCE

L3 - Computer Systems (2025/2026)

About the Subject

- Coefficient : 3 Credit : 5
- Evaluation :
  - Test/10 pts,
  - Mini-Project/8 pts,
  - Lab attendance/2 pts (Attendance is not mandatory)

- Links:
  - Blog: https://ia-dz.blogspot.com
  - E-mail: mistudents14@gmail.com
  - Course: moodle.univ-dbkm.dz

References

- Artificial intelligence: a modern approach. Stuart Russel and Peter Norvig (1151 p)
  - 2010. 3rd PEARSON ed. https://github.com/AzatAI/cs_books/blob/master/Artificial Intelligence A Modern Approach.pdf
  - 2022. 4th US ed. https://aima.cs.berkeley.edu/

- Intelligence artificielle pour les développeurs. Concepts et implémentations en C# Virginie Mathivet (512 p)
  - 2014. 3rd ENI ed. http://livre21.com/LIVREF/F1/F001110.pdf

- Top AI course creators

DeepLearning.AI

towards data science

coursera

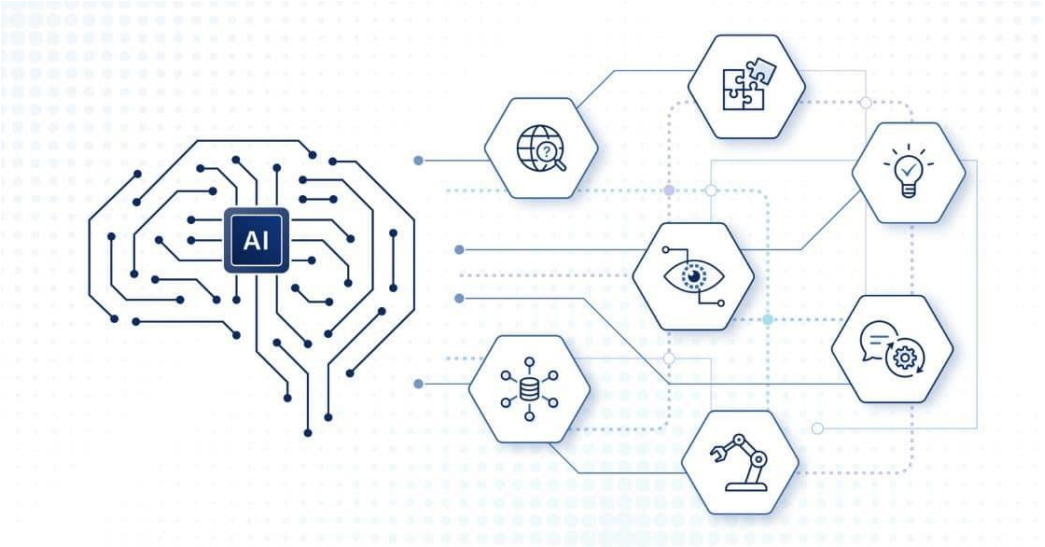
Andrew Ng

Andrej Karpathy

Jay Alammar

PLAN

- Chapter 1 : Introduction
  - Definition. History
  - AI applications
- Chapter 2 : Knowledge Representation
  - Propositional logic, First-order logic, Semantic nets
  - Expert systems
- Chapter 3 : Probabilistic reasoning
  - Bayes rule
  - Bayesian networks
- Chapter 4 : Machine learning
  - Types of machine learning
  - KNN, ANN
  - Regression
  - Decision trees
  - K-means



Lab plan:
- Python basics
- Prolog
- Machine learning

CHAPTER I

INTRODUCTION

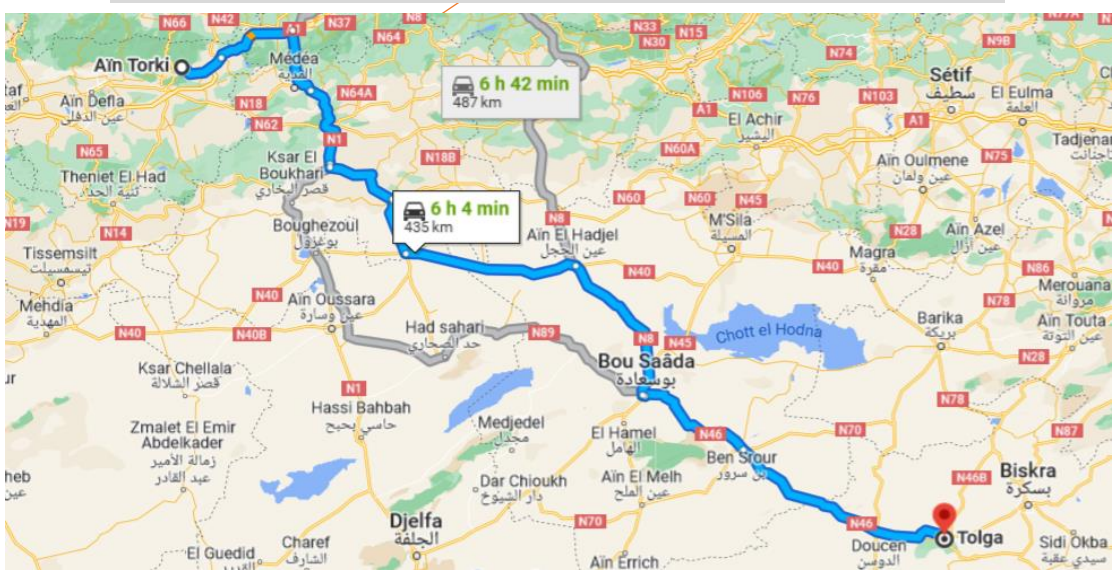
- Definition
- History
- Types of AI
- AI Applications

DEFINITION

Designing systems capable of reproducing human behavior (Reasoning and Action activities)

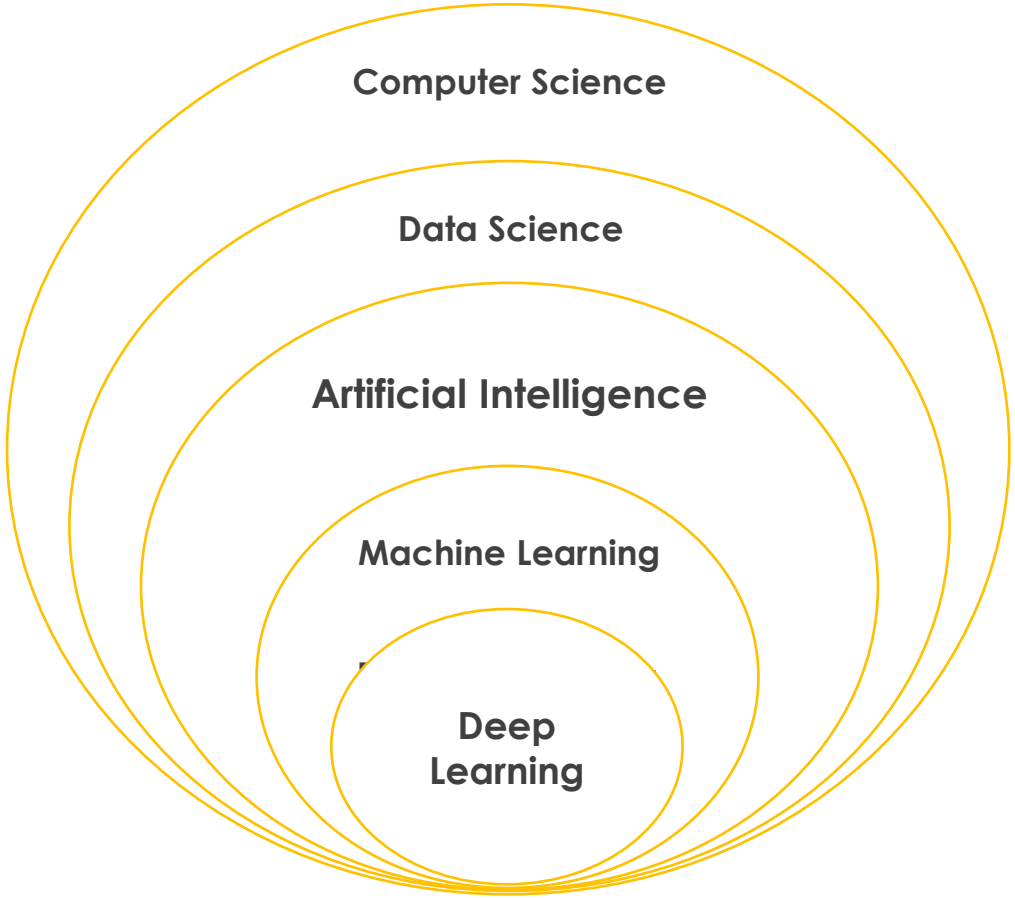
Rationality vs Imitation

Make decisions that optimize a defined goal



Mimicking human behavior using examples

POSITION of AI



New AI apps are mostly based on deep learning

TYPES of AI

- Narrow AI: Artificial Narrow Intelligence (ANI) [Current use]
  - Trained and focused to perform specific tasks
  - Apps : Chatbots, Data generators, Pattern recognition, …
- General AI: Artificial General Intelligence (AGI) [Still theoretical]
  - Machine would have an intelligence equaled to humans

    (Consciousness, Solve problems, learn and plan for the future,…)
- Super AI: Artificial Super Intelligence (ASI) [Future perspective]
  - To surpass the human brain ability..

History

1950

Alan Turing

Computing machinery and intelligence.

Can machines think ?

Turing Test

1956

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Artificial Intelligence (AI)

Lisp language

1957

Frank Rosenblatt

Mark1 Perceptron

First neural net

1980

D. Rumelhart

Backpropagation algorithm

Neural nets widely used in AI apps

1997

Deep Blue

IBM's Deep Blue beats the world chess champion Garry Kasparov

2015

Deep neural networks

Convolutional neural networks

2017

Transformer-based models

Attention is all you need

2023

Generative AI

Large Language Models (LLMs)
T5, GPT, BARD

Multimodal AI
ChatGPT, SORA

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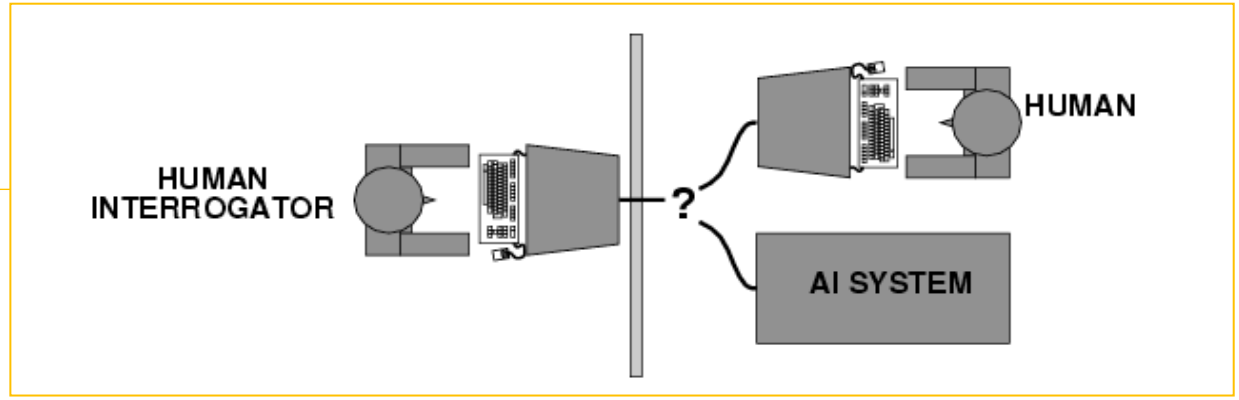

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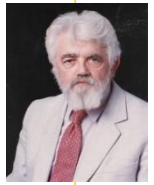

"Computer programs that solve problems typically solved by high-level mental processes with humans"

Marvin Lee Minsky, John McCarthy (1956)

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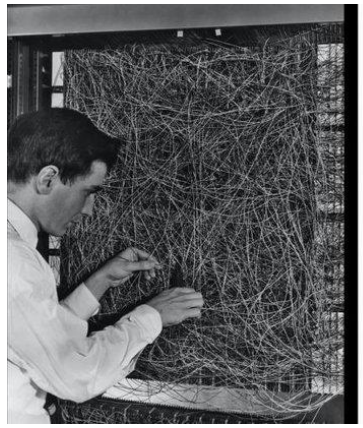

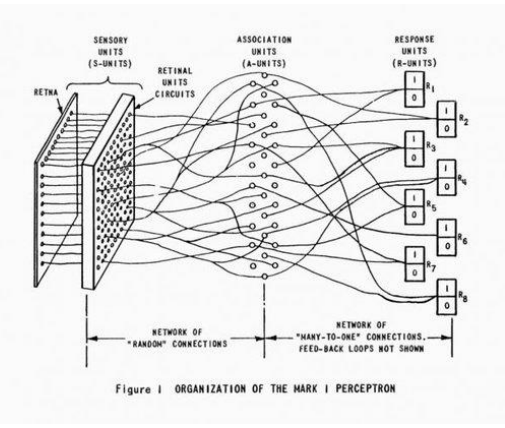

Figure 1 ORGANIZATION OF THE MARK I PERCEPTRON

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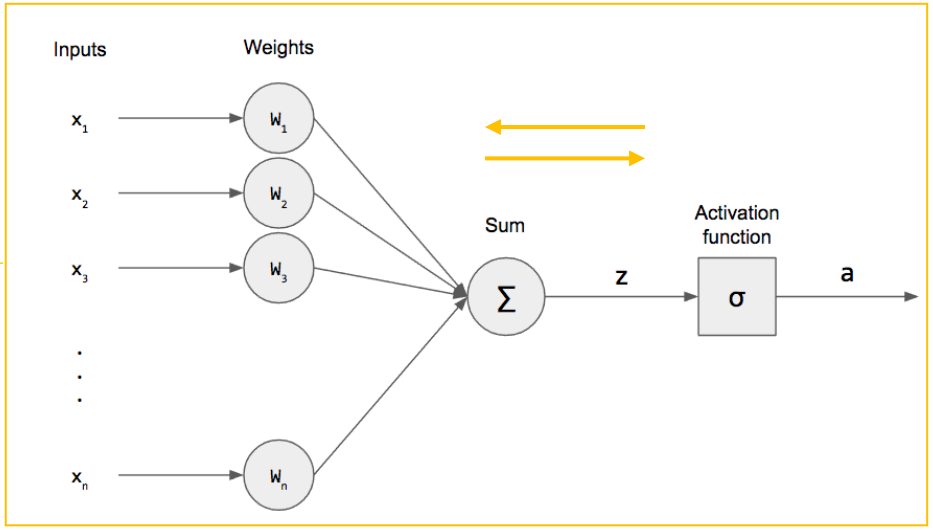

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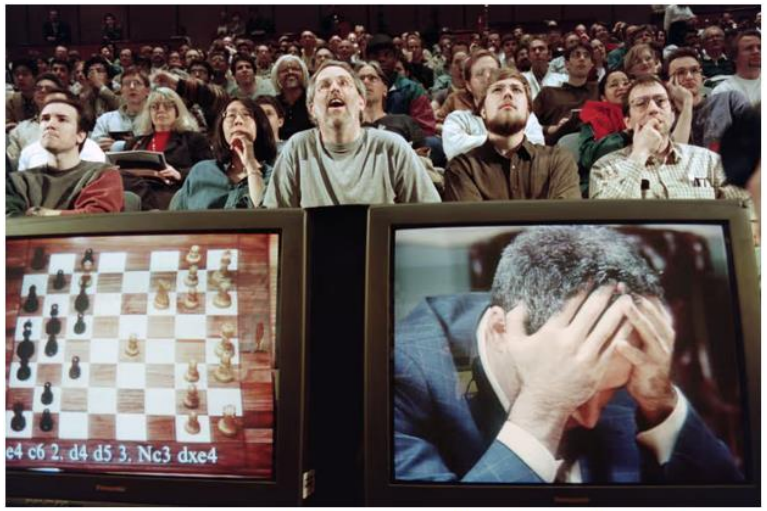

The last game of Garry Kasparov's 1997 rematch against Deep Blue, which he lost. Photograph: Stan Honda/AFP/Getty Images

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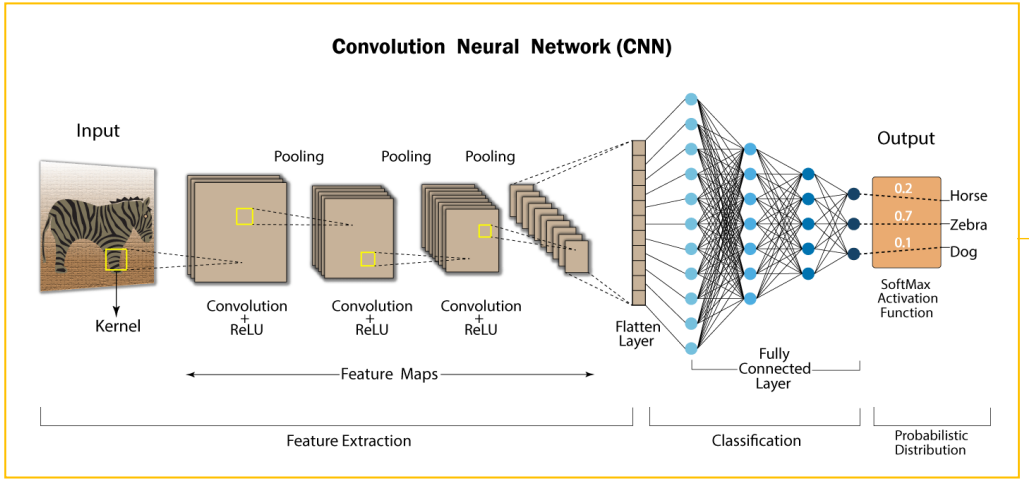

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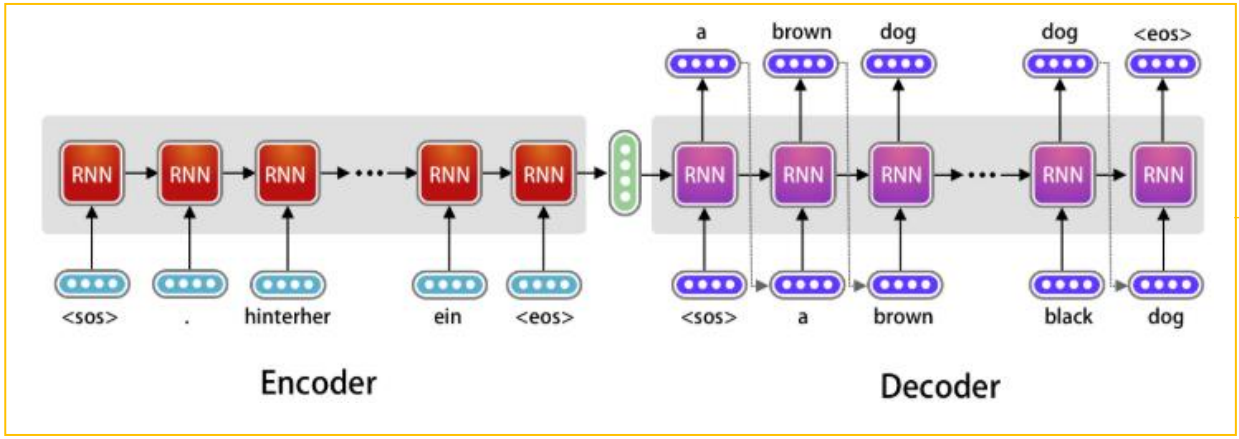

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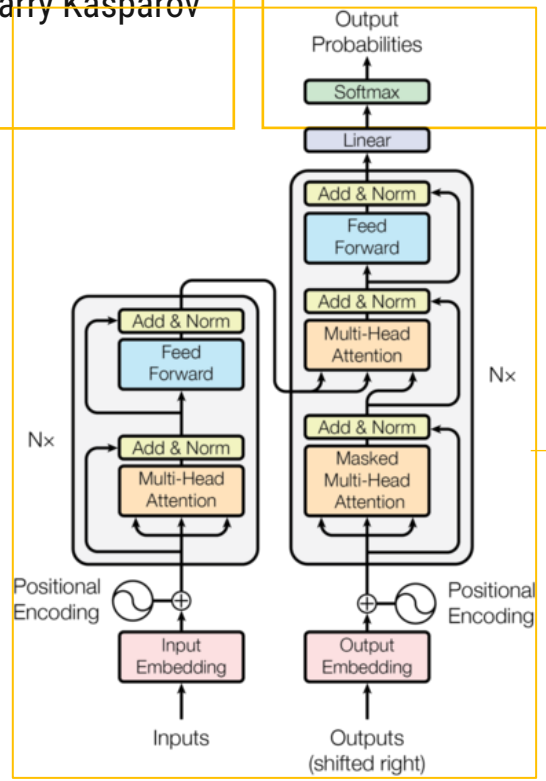

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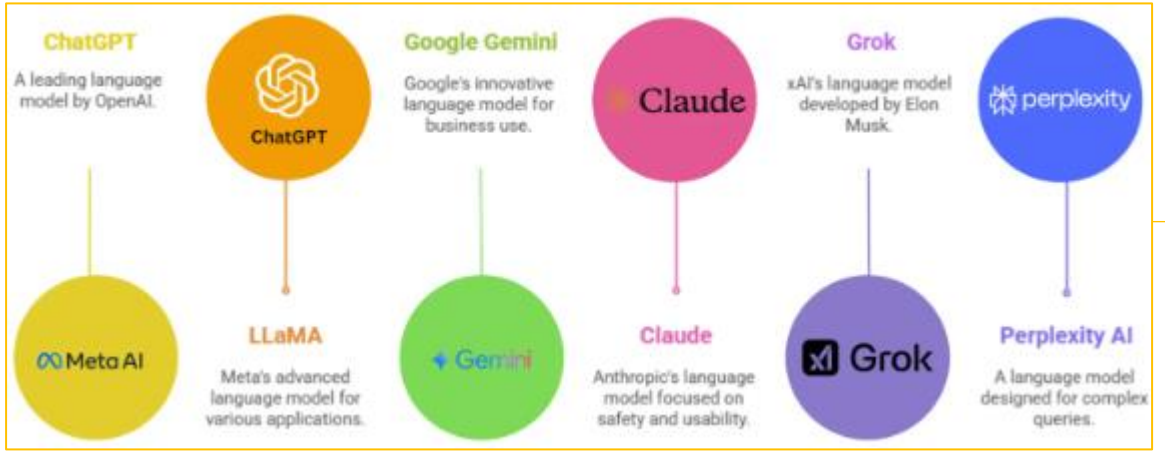


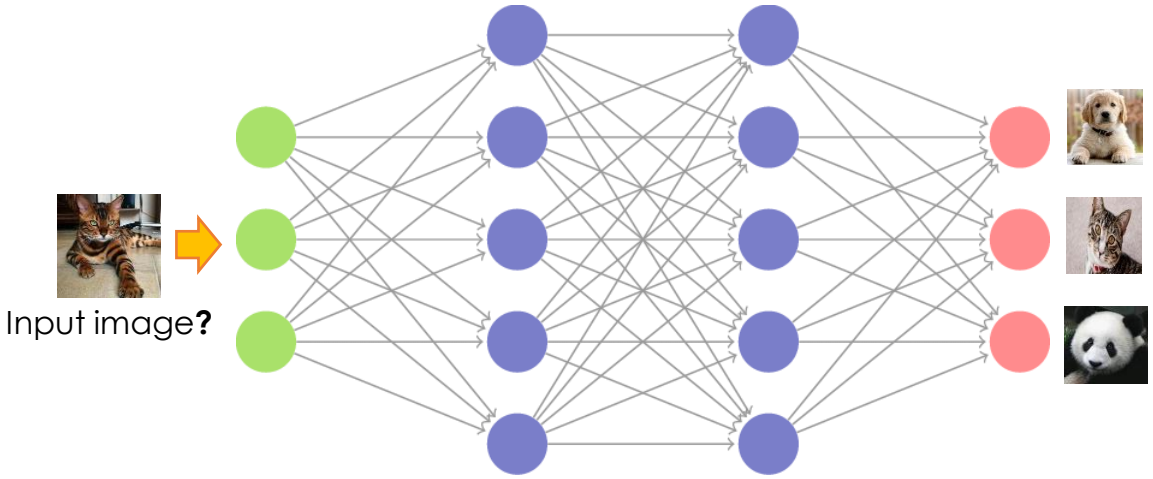
TRADITIONAL AI vs MODERN AI

Rule 1: Dogs are animals

Rule 2: Animals are mortal

Data: Boby is a dog

Is Boby mortal?



APPLICATIONS

- NLP : Natural Language Processing

  - Text analysis, Text generation, Speech recognition, Speech synthesis, …

- Computer vision :

  - Image and video processing, Pattern recognition, Radiology imaging, Self-driving cars,…

- Customer service and recommendation engines

  - Virtual **agents** replace the human agent along the customer journey

  - Use past consumption behavior data to discover data trends

➢ Techniques : Reasoning, Machine learning, Deep learning, Generative AI,..

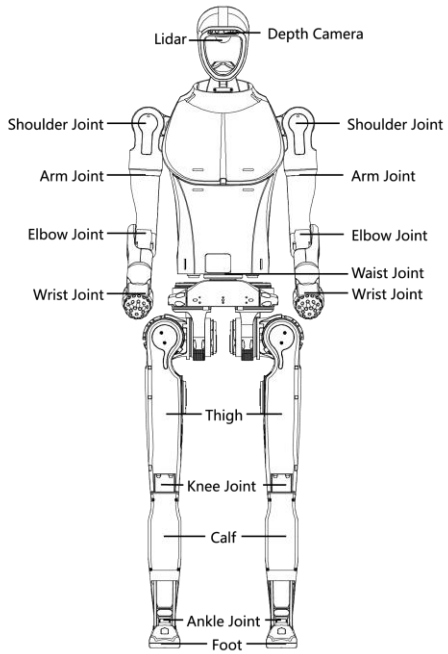
Agent

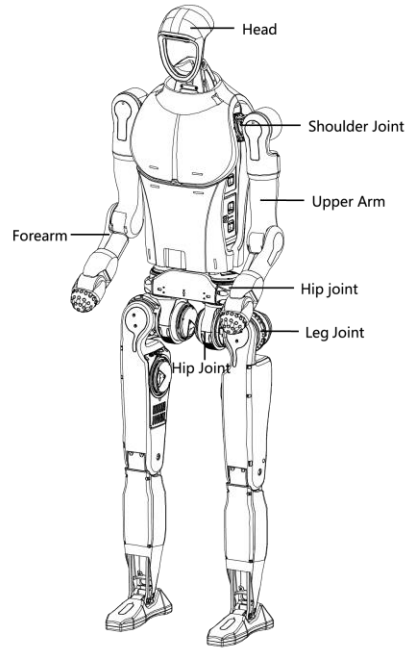
An intelligent agent (IA) is an autonomous computer program that **perceives** (using sensors) its environment and **acts** (using actuators) on it in order to reach a specific goal. It is based on AI technologies, and takes various forms, from computer software to autonomous connected object.

The **Unitree H1** is a versatile, human-sized **humanoid robot** developed by Unitree Robotics. It is primarily designed for research and development in robotics and artificial intelligence

HUMAN AGENT vs AI AGENT

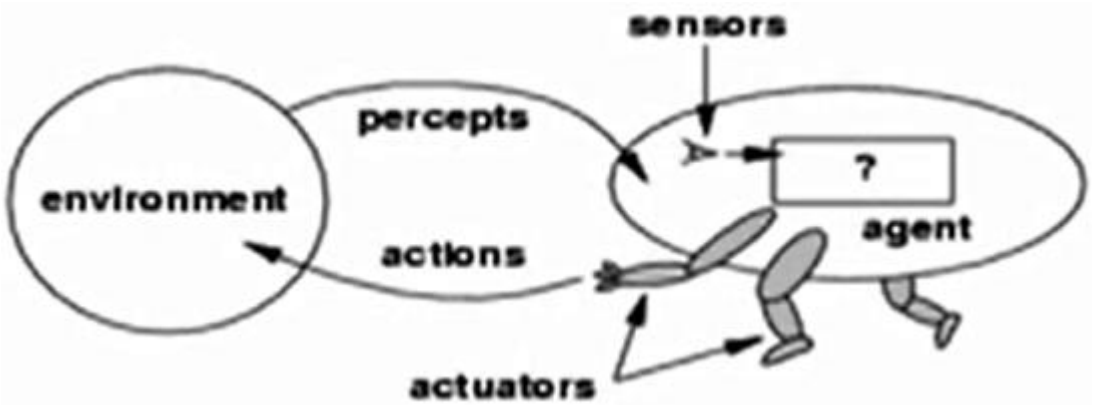
- **Human agent :**
  - Eyes, Ears and other sensors
  - Hands, legs and other actuators
- **Robot :**
  - Cameras, infra-red sensor and other sensors
  - Wheels, legs, articulated arms and other actuators
- **Software agent :**
  - Keyboard, hard disk access reader and other sensors
  - Screen, hard disk access writer and other actuators





Agent Creation

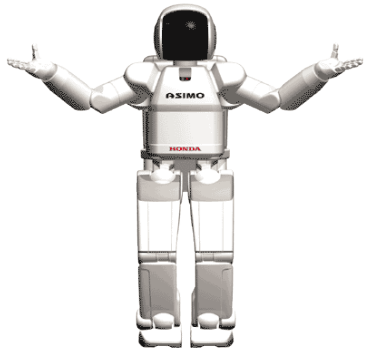
- Create an agent with the fundamental capabilities:
  - Perception
  - Knowledge representation (modeling)
  - Machine learning
  - Reasoning
  - Decision making



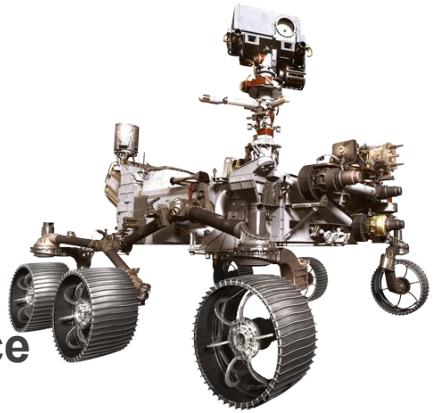
PROTOTYPES

Kiva system

ANYmal



ASIMO



Perseverance

Ingenuity

1. **Re-order the following domains (Narrow → Broad)**
   A. Artificial intelligence
   B. Computer science
   C. Deep learning
   D. Data science
   E. Machine learning

2. Which of the following are common types of AI?
   A. Narrow AI
   B. General AI
   C. Emotional AI

QUIZ

3. Which of these applications use AI?
   A. Amazon's recommendations
   B. Excel spreadsheet calculations
   C. Digital assistants (e.g. Siri, Alexa)

4. Which of these fall under imitation learning?
   A. A robot watching a human pour coffee and trying to copy it
   B. A chess bot that perform thousands of calculations in order to detect the best position to take
   C. A chess bot that mimics grandmaster strategies from past games

5. In supervised learning, what do you need?
A. A labeled dataset
B. A predefined output for each input
C. Training data only, no predefined outputs