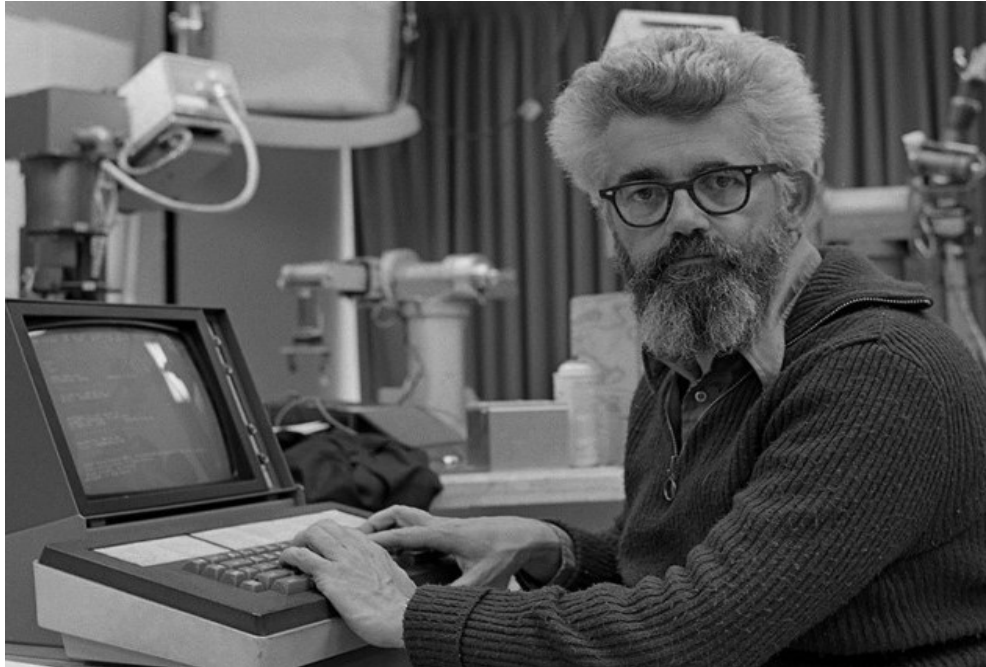


Introduction to Artificial Intelligence

“The science and engineering of making intelligent machines, especially intelligent computer programs”. -John McCarthy



A Computer Scientist coined the term "artificial intelligence" (AI)



Definition

System

- Act
- Think

Artificial defines "*man-made,*" and **intelligence** defines "*thinking power*", hence AI means "*a man-made thinking power.*"

So, defining AI as:

- **"It is a branch of computer science by which we can create intelligent machines which can behave like a human, think like humans, and able to make decisions."**
- Artificial Intelligence (AI) deals with helping machines finding solutions to complex problems in a more human-like fashion.
- This generally involves borrowing characteristics from human intelligence, and applying them as algorithms in a computer friendly way.

Why AI?

- Create software or devices which can solve real-world problems very easily and with accuracy such as health issues, marketing, traffic issues, etc.
- Create personal virtual Assistant
- Build Robots which can work in an environment where survival of humans can be at risk.
- AI opens a path for other new technologies, new devices, and new Opportunities.

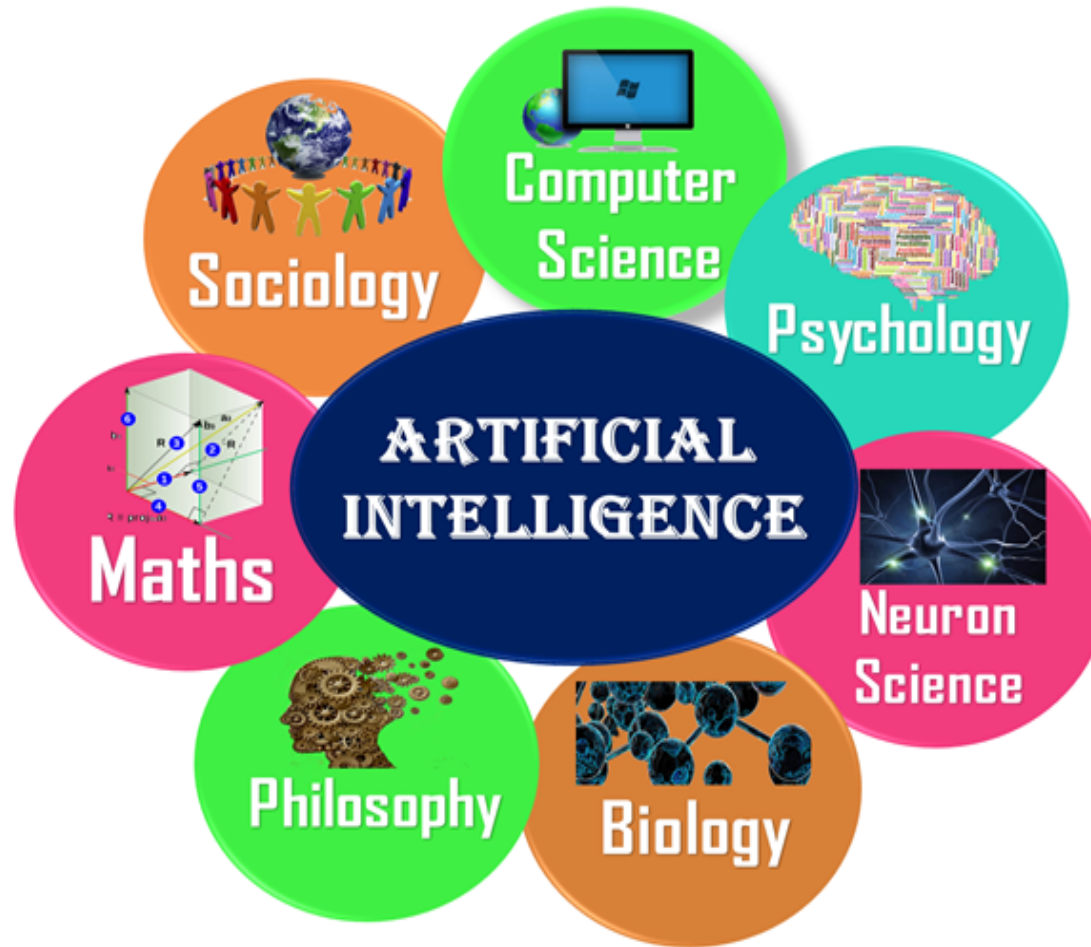




Activity 1

- Use any of these Voice assistants: Amazon Alexa, Google Assistant, Apple Siri, and Microsoft Cortana

Discipline



- Intelligence is an intangible part of our brain which is a combination of **reasoning, learning, problem-solving perception, language understanding, etc.**
- All these fields require to achieve the above factors



Advantages

- High Accuracy with less errors
- High-Speed
- High reliability
- Useful for risky areas
- Digital Assistant
- Useful as a public utility

Disadvantages

- High Cost
- Can't think out of the box
- No feelings and emotions
- Increase dependency on machines
- No Original Creativity



Activity 2

What Erica Says?

<https://www.youtube.com/watch?v=TyJ-xLj9SEE>

Application of AI



AI Terms

An **agent** can be viewed as

- perceiving its **environment** through **sensors**
- acting upon that environment through **actuators**.

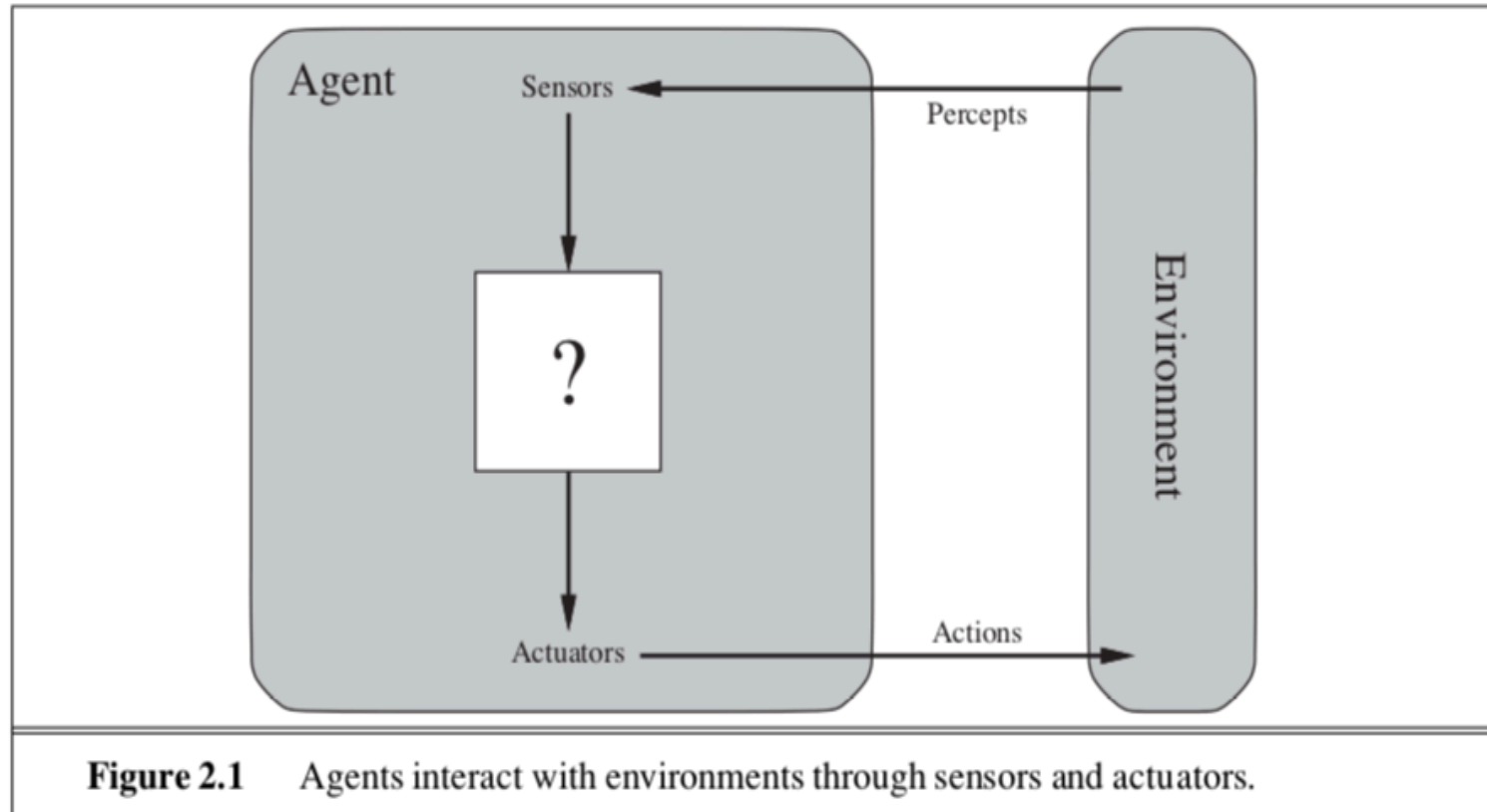
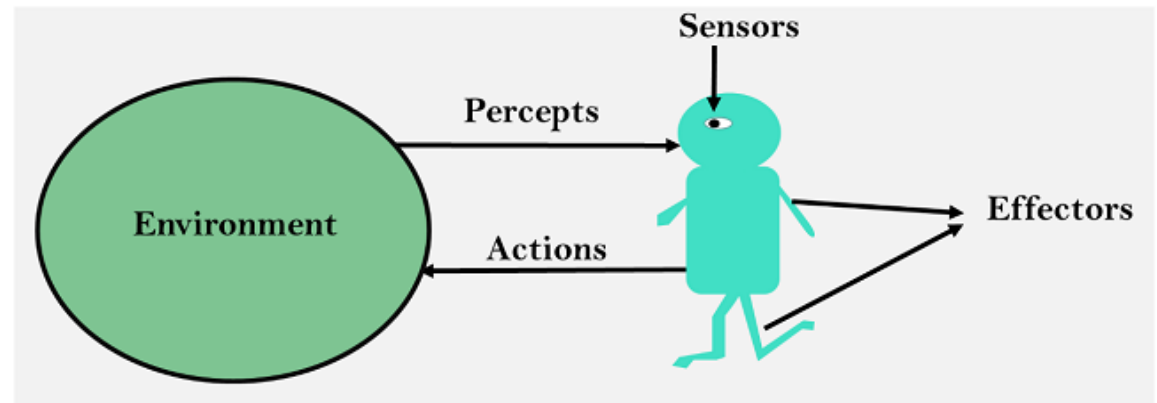


Figure 2.1 Agents interact with environments through sensors and actuators.

4 rules for an AI agent

- **Rule 1:** An AI agent must have the ability to perceive the environment.
- **Rule 2:** The observation must be used to make decisions.
- **Rule 3:** Decision should result in an action.
- **Rule 4:** The action taken by an AI agent must be a rational action.



Agent Example

Human-agent

Agent: Human

Sensors: Eyes, Ears

Actuator: Hands, Legs, Mouth

Robotic Agent

Agent: Robot

Sensors: Cameras, infrared range finder, NLP

Actuators: Various motors

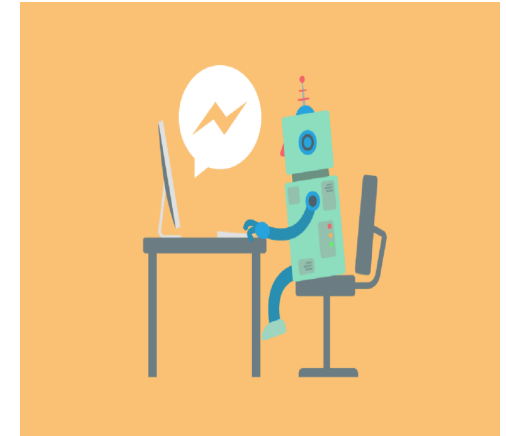
Software Agent

Agent: Software

Sensors: Keystrokes, file contents

Actuators: display output on the screen.

The world around us is full of agents such as thermostat, cellphone, camera, and even we are also agents.



Intelligent Agents

- An intelligent agent is an autonomous entity which act upon an environment using sensors and actuators for achieving goals.
- An intelligent agent may learn from the environment to achieve their goals.
- A thermostat is an example of an intelligent agent.

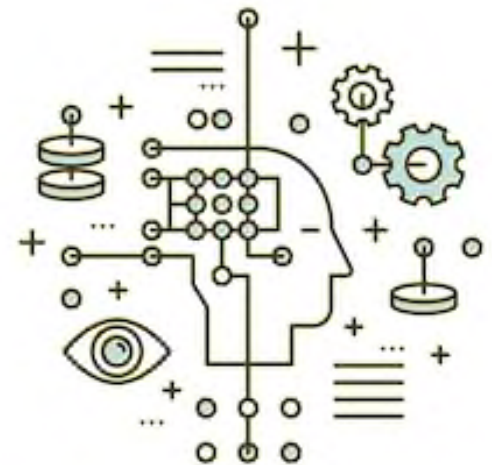


Rational Agent

- A rational agent is an agent which has clear preference, models uncertainty, and acts in a way to maximize its performance measure with all possible actions.
- A rational agent is said to perform the right things.
- AI is about creating rational agents to use for game theory and decision theory for various real-world scenarios.

Example: Vacuum Cleaner Agent

- P: amount of dirt cleaned up, time taken, electricity consumed etc..



Structure / Architecture of Agent

- Agent program runs on some sort of computing device with physical sensors & actuators called as architecture
- Architecture makes the percepts from the sensors available to the programs, runs the program & feed the program's action choice to effectors as they are generated.

Agent = Architecture + Program



PEAS Representation

- PEAS is a type of model on which an AI agent works upon.

It is made up of four words:

P: Performance measure

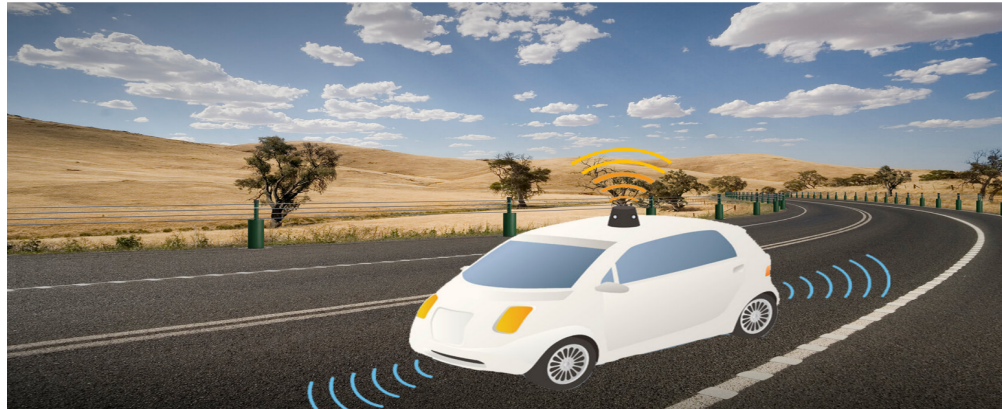
E: Environment

A: Actuators

S: Sensors

- Here performance measure is the objective for the success of an agent's behavior.

PEAS for self-driving cars



- **Performance:** Safety, time, legal drive, comfort
- **Environment:** Roads, other vehicles, road signs, pedestrian
- **Actuators:** Steering, accelerator, brake, signal, horn
- **Sensors:** Camera, GPS, speedometer, odometer, accelerometer, sonar.

MIT AI

https://www.youtube.com/watch?v=TjZBTDzGeGg&list=PLU14u3cNGP63gFHB6xb-kVBiQHye_4hSi