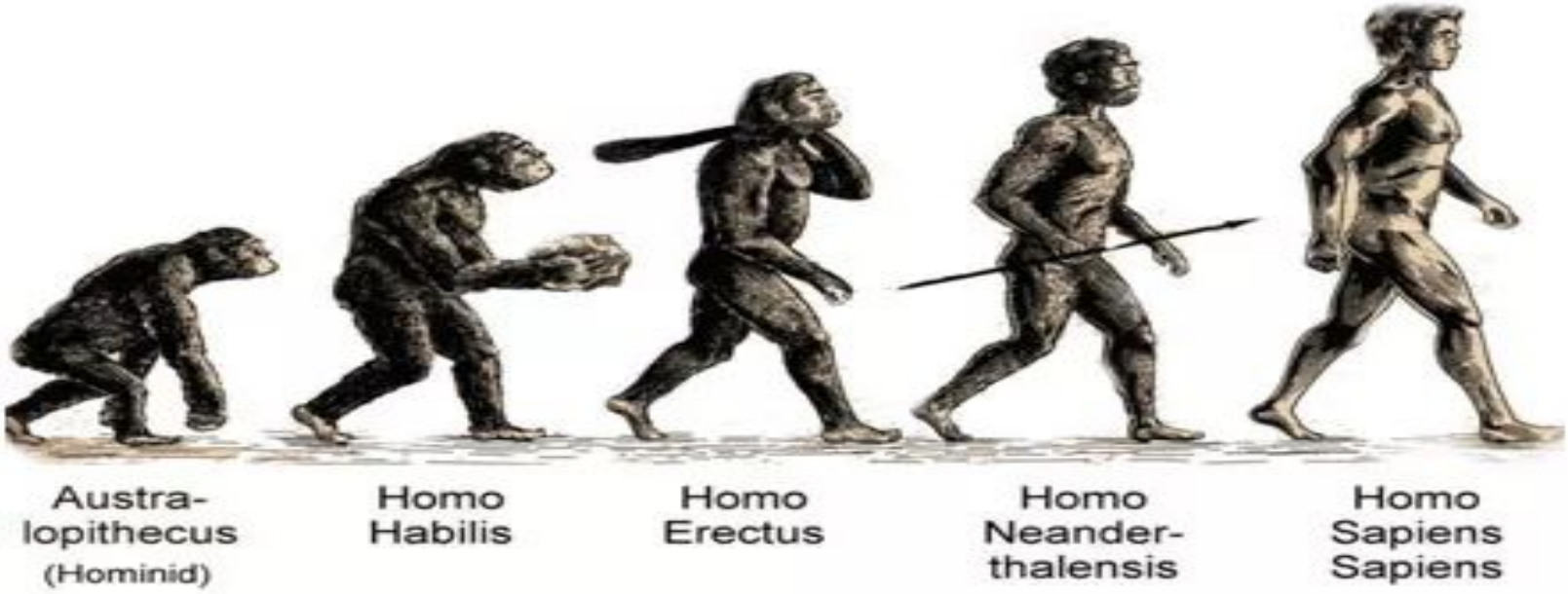
Fundamentals of Artificial Intelligence and Intelligent Agent

BCA SEM-6 (Gujarat University)

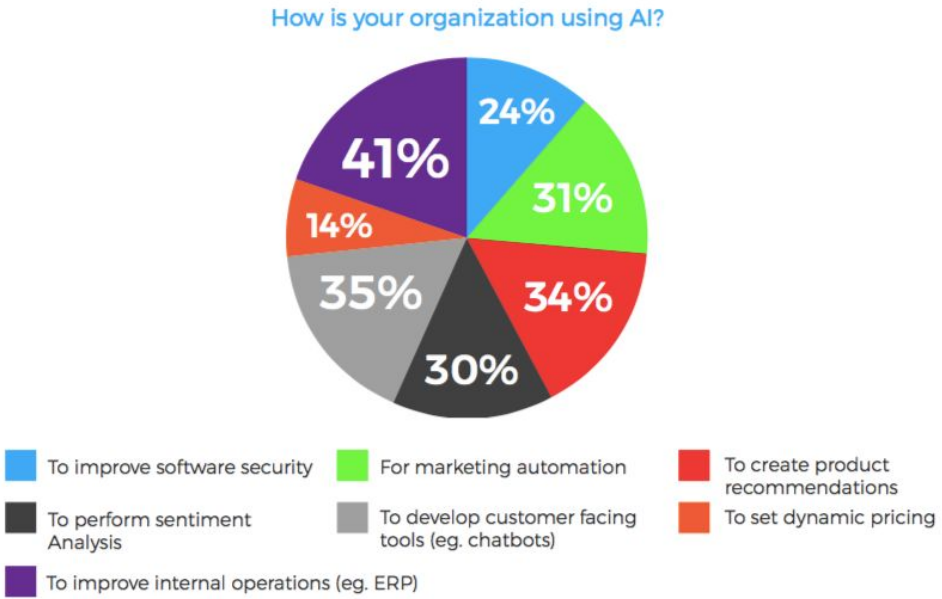
Evolution of Mankind - Homo Sapiens (The Wise Man)



Homo Sapiens

- **The Wise Man** - Because our intelligence is so important to us.
- For 1000 of years we have tried to understand **How We Think and Act** (How our brain can **Perceive, Understand , Predict, and Manipulate** a world far larger and more complicated than itself).
- The field of artificial intelligence is concerned **with not just understanding but also building intelligent entities.**

Artificial Intelligence Surveys



- Surveys regularly rank AI as one of the **Most Interesting and Fastest Growing** fields and is already generating over a

A year in revenue.

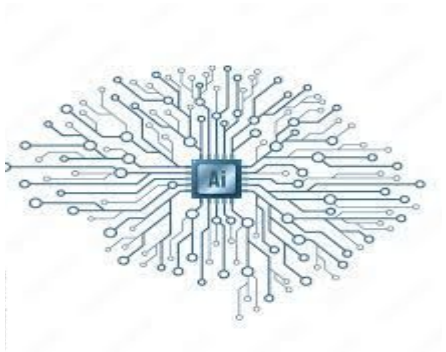
Artificial Intelligence Expert

- **Kai-Fu Lee** is a **Taiwanese** computer scientist, businessman, and writer. He is currently based in **Beijing**, **China**.
- He Predicts that its impact will be **“More than Anything in the History of Mankind”.**

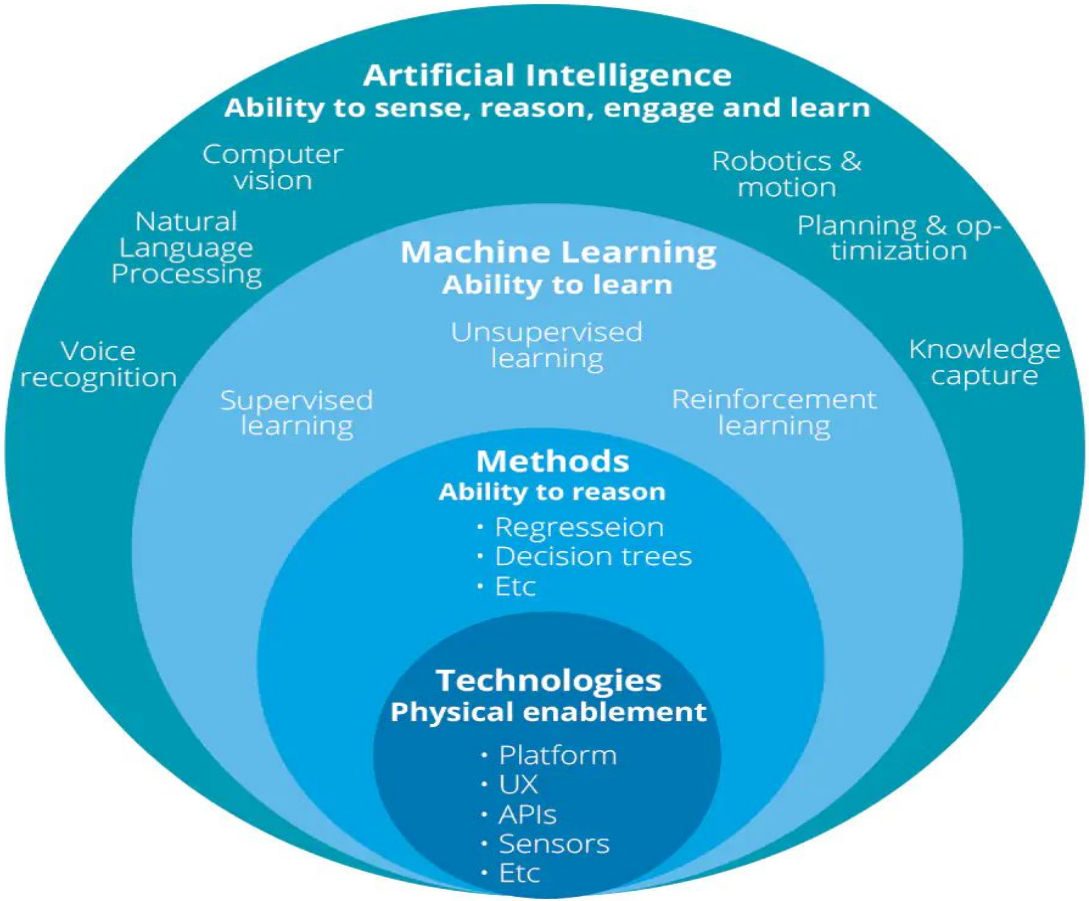
What is AI ?

The ***Oxford English Dictionary*** of **Oxford University Press** defines artificial intelligence as:

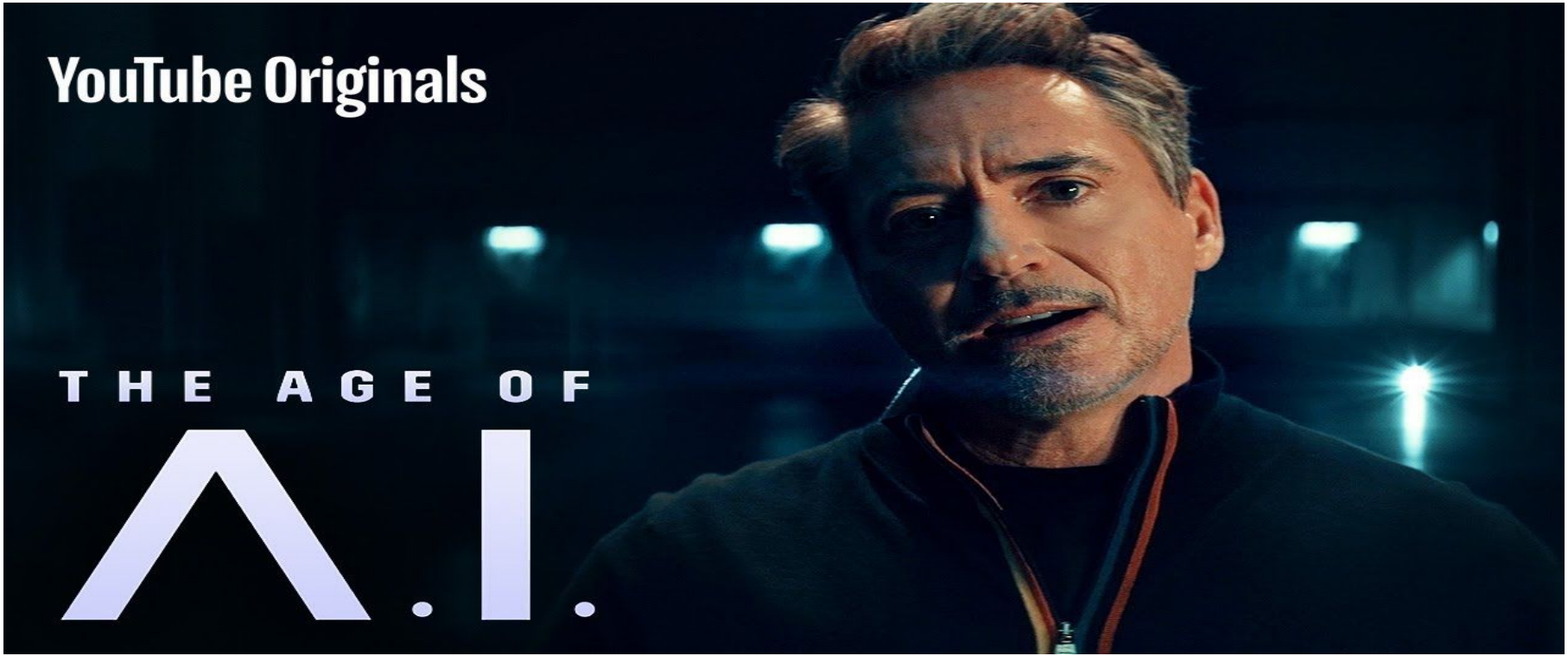
The theory and development of computer systems able to perform tasks that normally require **Human Intelligence**, such as **Visual Perception**, **Speech Recognition**, **Decision-Making**, and **Translation between languages.**



AI System = Machine learning + other types of Data Analytics methods to achieve artificial intelligence capabilities.



Robert Downey Jr.

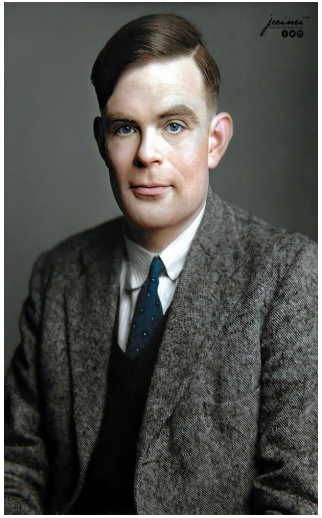


What is AI ?

- Historically, researchers have pursued several different versions of AI.
- Some have defined intelligence in terms of **Fidelity** to human performance, while others prefer an abstract, formal definition of intelligence called **Rationality**.
- The Subject matter itself also varies: some consider intelligence to be a property of **Internal Thought Process and Reasoning**, while other focus on **Intelligent Behaviour an External characterization.**
- From these two dimensions - **Human vs Rational** and **Thought vs Behavior** there are four possible combinations.

4 Dimensions of Artificial Intelligence

1. Acting Humanly - The Turing Test Approach



- The Turing Test, Proposed by **Alan Turing(1950)** was designed as a **Thought Experiment** that would sidestep the philosophical vagueness of the question.

"Can a Machine Think ? "

- The first proposal for success in building a program and acts humanly was the **Turing Test.** To be **Considered Intelligent a program must be able to act sufficiently like a HUMAN to fool an INTERROGATOR.** A human interrogates the program and another human via a terminal simultaneously.

1. Acting Humanly - The Turing Test Approach

- The Turing test is based on a Party Game "Imitation game," with some modifications. This game involves **Three Players** in which One player is Computer, Another Player is Human Responder, and the Third player is a Human Interrogator, **who is isolated from other two players and his job is to FIND that which player is machine among two of them.**
- Consider, Player A is a computer, Player B is human, and Player C is an interrogator. Interrogator is aware that one of them is machine, but he needs to identify this on the basis of questions and their responses.
- The **Conversation** between all players **is via Keyboard and Screen** so the result would not depend on the machine's ability to convert words as speech.

1. Acting Humanly - The Turing Test Approach

The **Test Result does not depend on each Correct Answer**, but only **How closely its responses like a human answer.** The computer is **Permitted to do Everything Possible** to force a wrong identification by the interrogator.

The questions and answers can be like:

Interrogator: Are you a computer?

PlayerA (Computer): No

Interrogator: Multiply two large numbers such as **(256896489*456725896)**

Player A: **Long pause** and give the wrong answer.

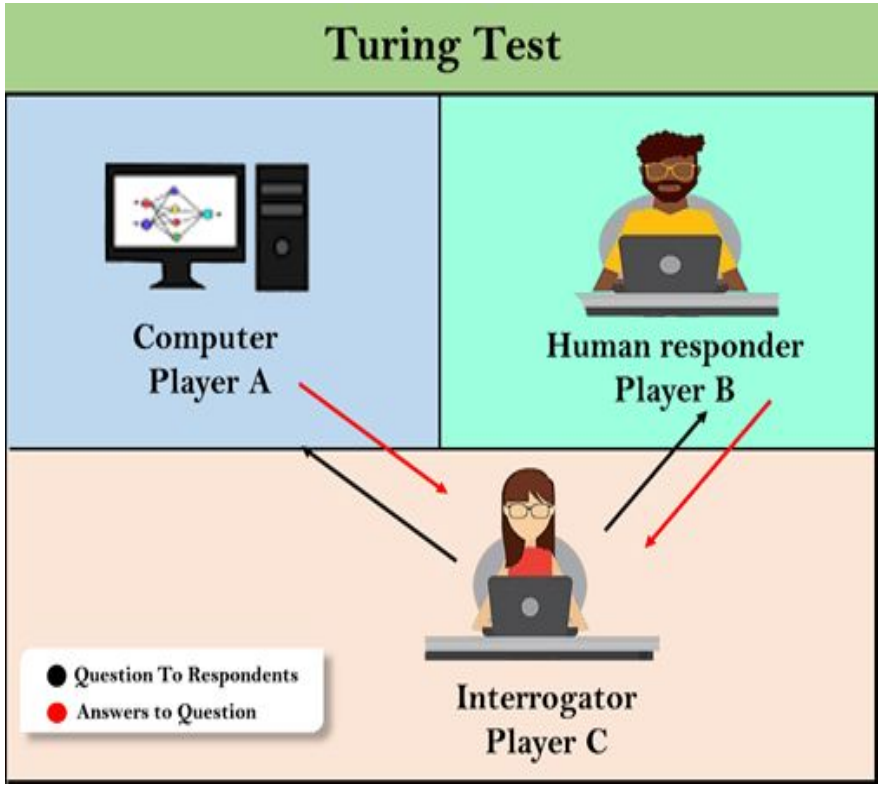
1. Acting Humanly - The Turing Test Approach

In this game, **if an interrogator would not be able to identify** which is a **MACHINE** and which is **HUMAN**, then the **Computer Passes the Test Successfully**, and the machine is said to be **INTELLIGENT** and can think like a **HUMAN**.

"In 1991, the New York businessman **Hugh Loebner** announces the prize competition, offering a $100,000 prize for the first computer to pass the Turing test. **However, no AI program to till date, come close to passing an undiluted Turing test".**

1. Acting Humanly - The Turing Test Approach

- The computer would need the following capabilities :
  - **Natural Language Processing** to communicate successfully in a human language;
  - **Knowledge Representation** to store what it knows or hears;
  - **Automated Reasoning** to answer questions and to draw new conclusions;
  - **Machine Learning** to Adapt to new circumstances and to detect and extrapolate patterns.
- To Pass the total turing test, which requires interaction with objects and people in the real world. To pass the total turing test, a robot will need
  - **Computer vision and Speech Recognition** to perceive the world;
  - **Robotics** to manipulate objects and move about.



2. Thinking Humanly - The Cognitive Modeling Approach

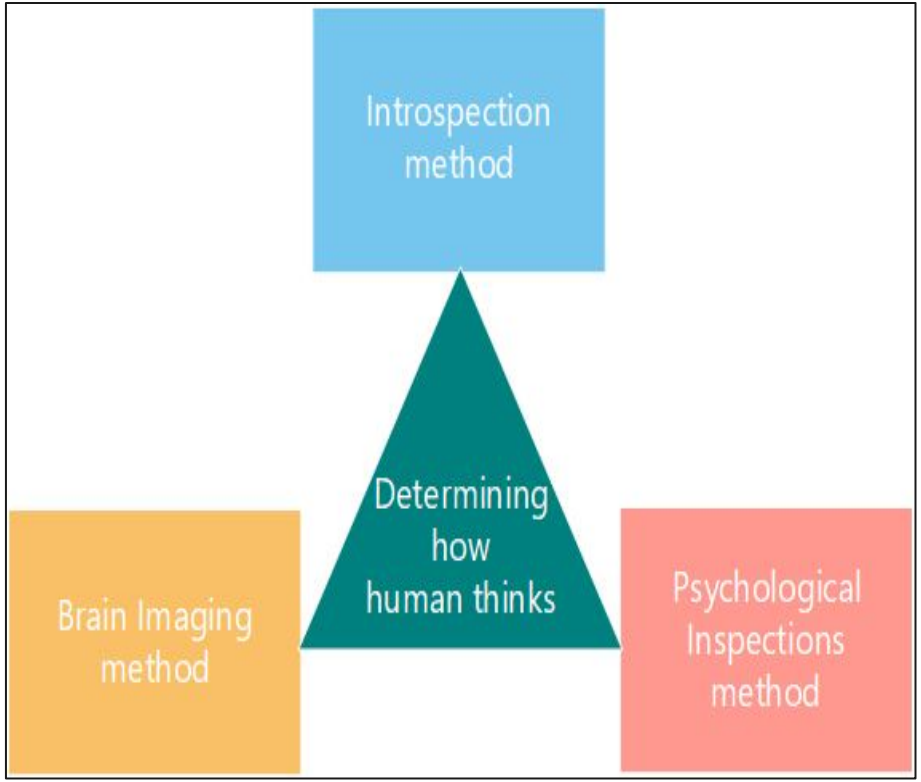
- Thinking humanly is to **Make a System or Program to Think like a Human**. But to achieve that, we need to know **How does a Human Thinks.**
- Suppose if we ask a person to explain **How his brain connects Different Things during the Thinking Process,** he/she will **Probably Close Both Eyes** and **Will Start to check how he/she thinks but he/she cannot Explain or Interpret the process.**
- **For Example** – If we want to **Model the thinking of Roger Federer** and make the model system to compete with someone or against him to play in a tennis game, **It may NOT be possible to replicate the exact thinking as Roger Federer**, however, a **Good build of Intelligence systems (Robot) can play and win the game against him.**

2. Thinking Humanly - The Cognitive Modeling Approach

To understand the exact process of how we think, we need to **Go inside the Human Mind to see How this Giant Machine Works.**

We can interpret how the human mind thinks in theory, in **THREE** ways as follows:

1. **Introspection Method** – Catch our thoughts and see how it flows.
2. **Psychological Inspections Method** – Observe a person on the action.
3. **Brain Imaging Method (MRI (Magnetic resonance imaging) or fMRI (Functional Magnetic resonance imaging) scanning)** – Observe a person's brain in action.



2. Thinking Humanly - The Cognitive Modeling Approach

Using the above methods, if we are able to catch the **Human Brain's Actions and give it as a Theory,** then we can **Convert that Theory into a Computer Program.** If the **Input/Output of the computer program matches with Human Behavior**, then it may be possible that a **Part of the Program may be behaving like a Human Brain.**

This could be explained with the **Famous Problem-Solving Example:**

- Allen Newell and Herbert Simon developed the **General Problem Solver (GPS)** program to **Model Human Thinking** and Check Whether it can **Solve Problems like a Person by following the same Reasoning Steps as a Human.**
- The **Intent of the program is Not just to solve the problem** correctly **But to go through the Same Series of Steps as that of a Human Brain to solve it.**

Allen Newell

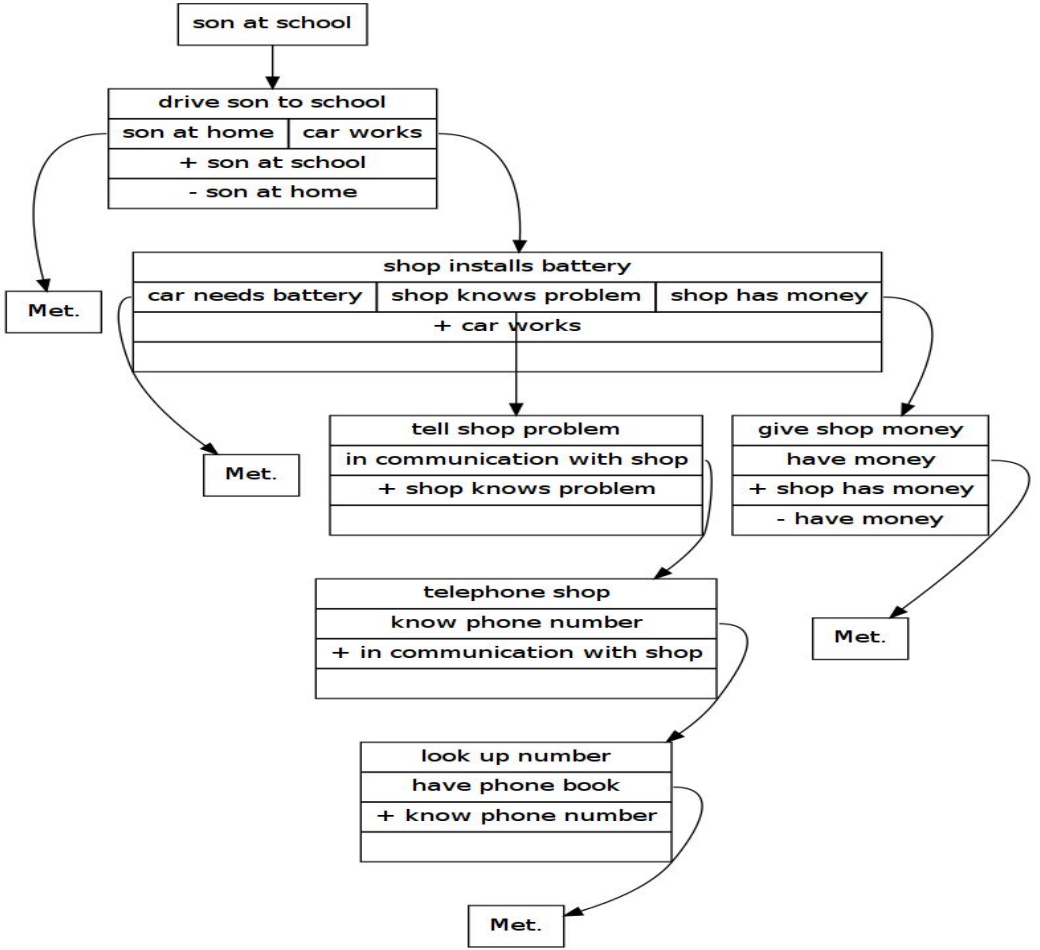
Herbert Simon

2. Thinking Humanly

Means-ends analysis

Simon and Newell **Studied** How Humans Solved problems, and realized that we often perform means-ends analysis. Here is one of their examples:

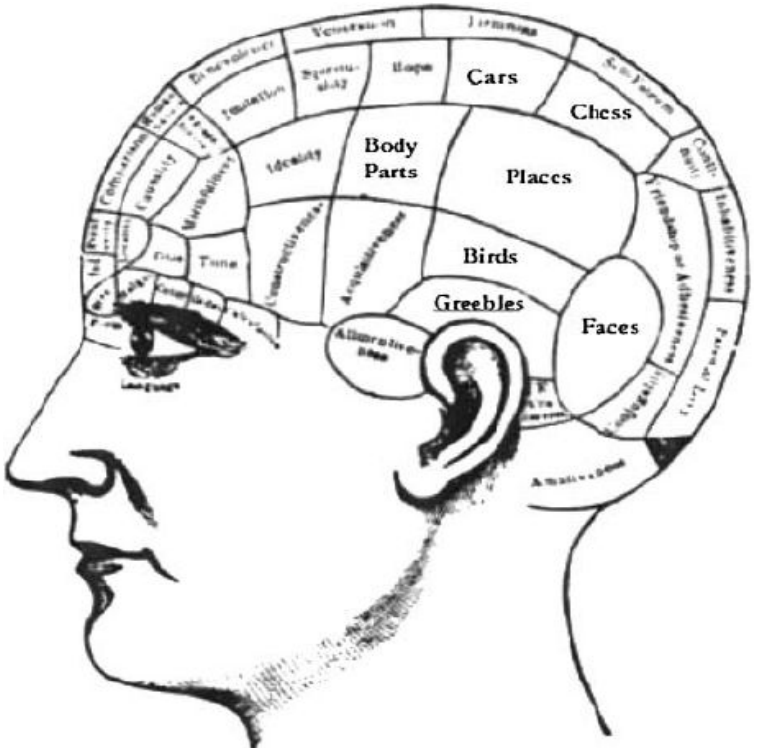
I want to Take My Son to Nursery School. What's the difference between what I have and what I want? **One of distance.** What changes distance? **My automobile.** My automobile won't work. What is needed to make it work? **A new battery.** What has new batteries? **An auto repair shop.** I want the repair shop to put in a new battery; but the shop doesn't know I need one. What is the difficulty? **One of communication.** What allows communication? **A telephone…** and so on.



2. Thinking Humanly - The Cognitive Modeling Approach

Cognitive Science is the **Study of the Human Mind and Brain,** focusing on **How the mind represents and manipulates knowledge** and **How mental representations and processes are realized in the brain.**

An example would be the problem of **Remembering a Phone Number and Recalling it Later.**



3. Thinking Rationally - The Law of Thought Approach

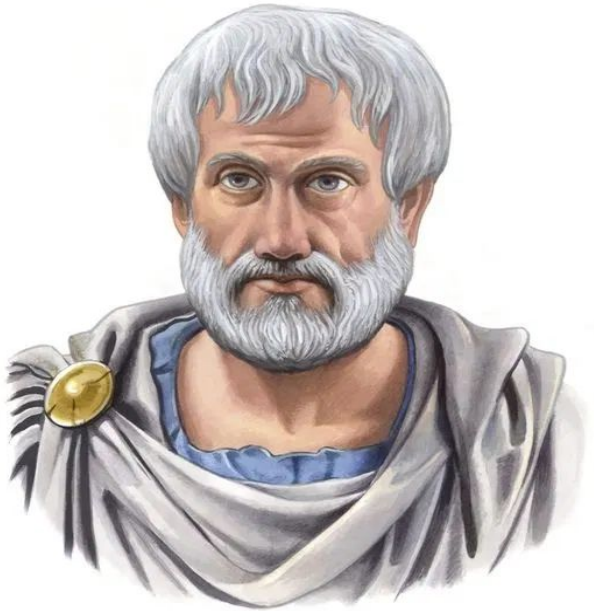
The Greek philosopher **Aristotle was the one who first codifies "right-thinking" reasoning processes.**

Aristotle's syllogisms provided patterns for argument structures that always provide correct premises.

A famous example, ***"Socrates is a man; all men are mortal; therefore, Socrates is mortal."***

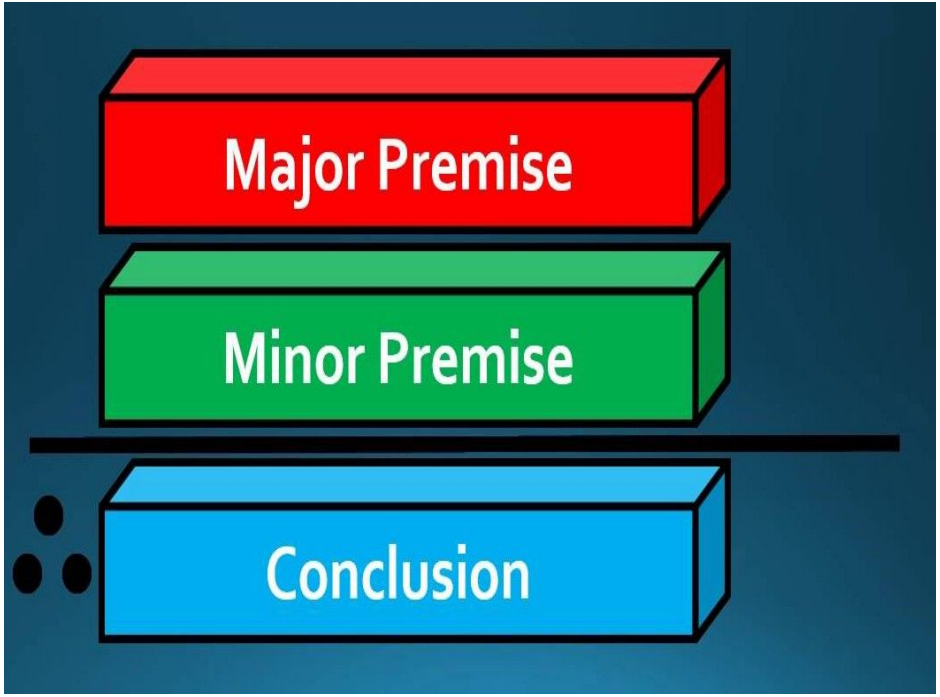
Another example – ***All TVs use energy; Energy always generates heat; therefore, all TVs generate heat."***

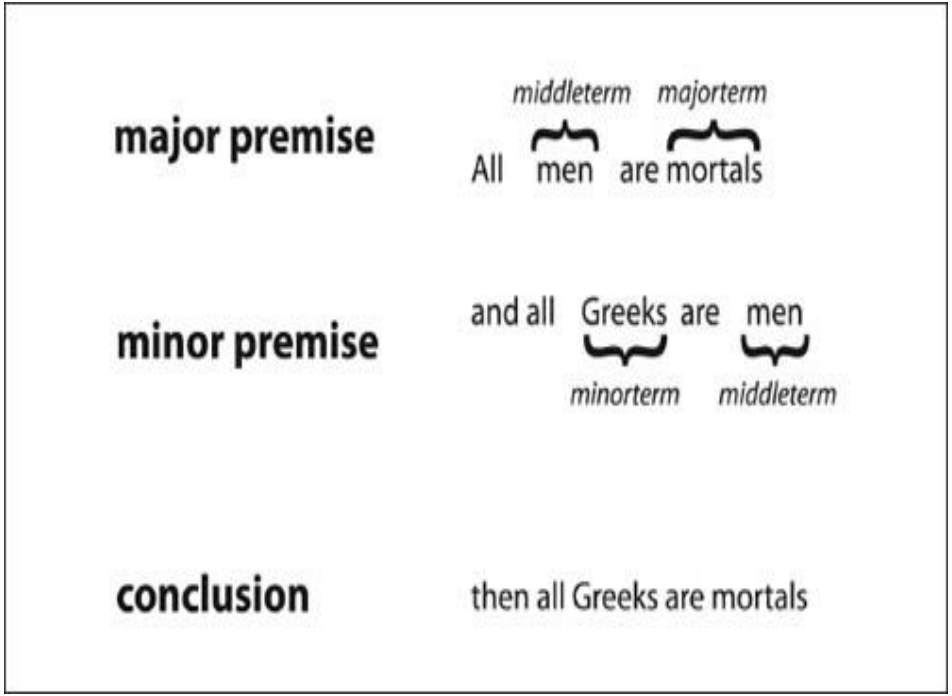
These arguments initiated the field called LOGIC. **Notations for statements for all kinds of objects were developed** and interrelated between them to show logic.



3. Thinking Rationally - The Law of Thought Approach

Syllogism - A form of arguing in which two statements are used to prove that a third statement is true.



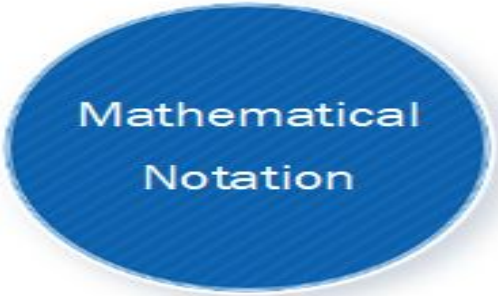


3. Thinking Rationally - The Law of Thought Approach

Socrates is a man;

All men are mortal;

therefore, Socrates is mortal.



Ps is the statement “Socrates is a man.”

Qs is the statement “Socrates is mortal.”

$\forall x[Px \rightarrow Qx]$

Ps

———————

$\therefore Qs$

Fact Statement: Socrates is a man.

man(socrates).

Rule (Headed horn clause) Statement: All men are mortal.

mortal(X):- man(X)

Goal or Query Statement: Is Socrates mortal?

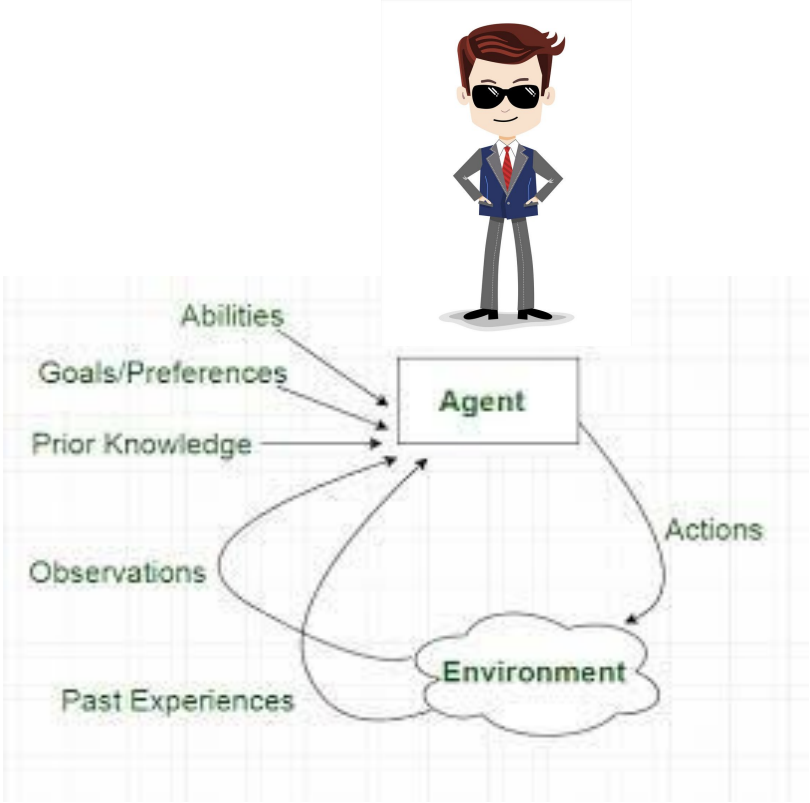
?- mortal(Socrates)

4. Acting Rationally - The Rational Agent Approach

A traditional **Computer program blindly executes the code that we write.** Neither it acts on its own nor it adapts to change itself based on the outcome.

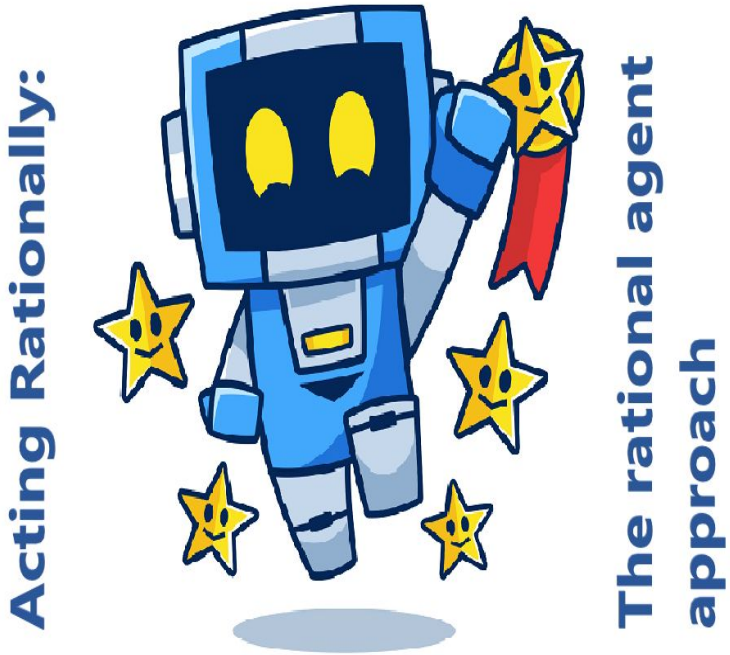
The so-called agent program that we refer to here is expected to do more than the traditional computer program. It is expected to create and pursue the goal, change state, and operate autonomously.

A rational agent is an agent that acts to achieve its best performance for a given task.

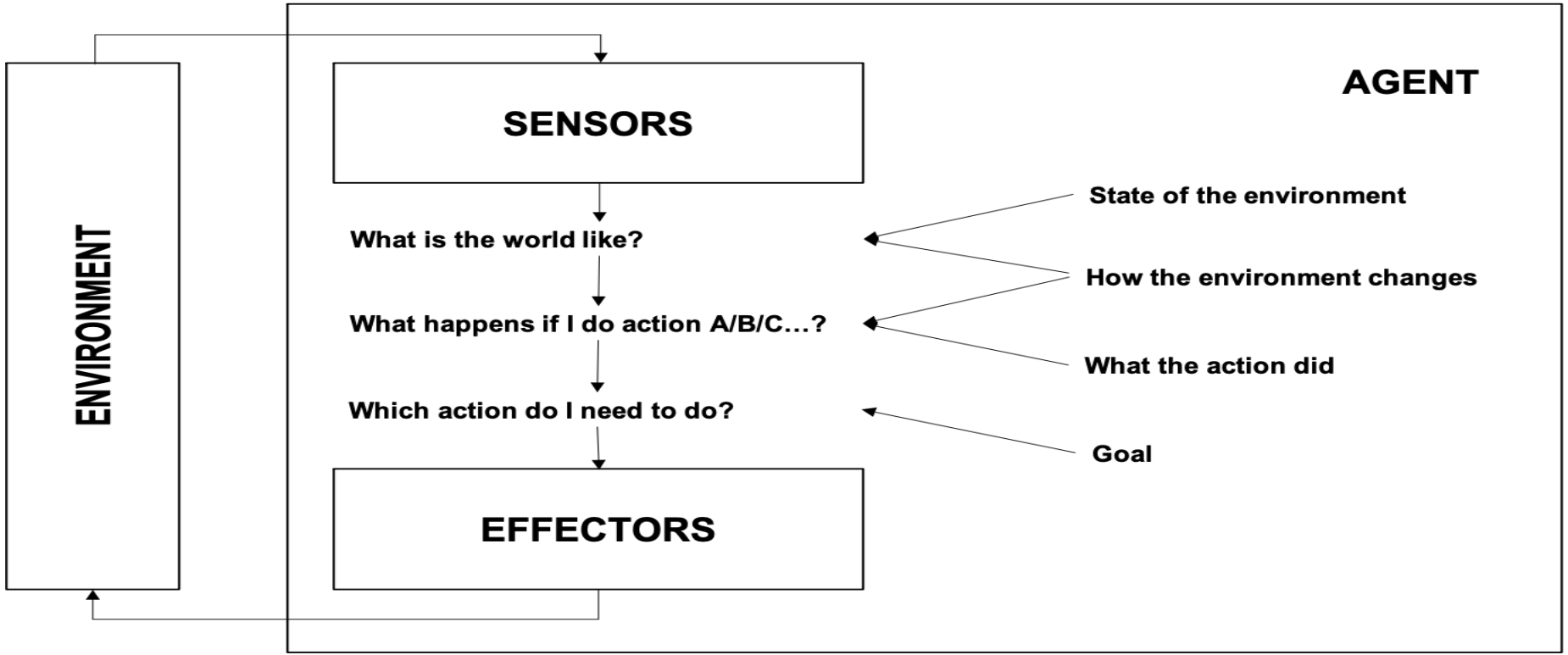


4. Acting Rationally - The Rational Agent Approach

- The **“Logical Approach”** to AI emphasizes correct inferences and achieving a correct inference is a part of the rational agent.
- **Being able to give a logical reason is one way of acting rationally.**
- But all correct inferences cannot be called rationality, **because there are situations that don’t always have a correct thing to do.**
- **It is also possible to act rationally without involving inferences.** Our reflex actions are considered as best examples of acting rationally without inferences.



4. Acting Rationally - The Rational Agent Approach



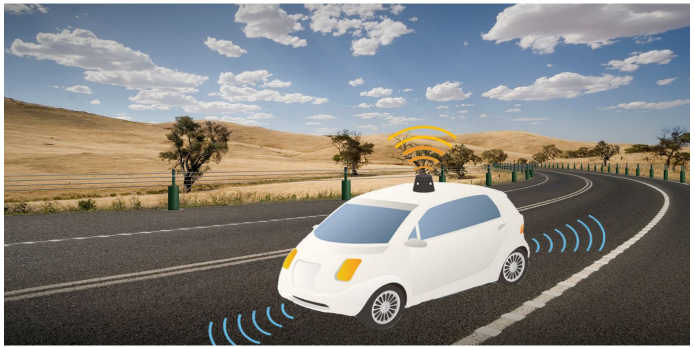
4. Acting Rationally

The Rational Agent Approach

Agent	Performance measure	Environment	Actuators	Sensors
1. Vacuum Cleaner	• Cleanliness • Efficiency • Battery life • Security	• Room • Table • Wood floor • Carpet • Various obstacles	• Wheels • Brushes • Vacuum Extractor	• Camera • Dirt detection sensor • Cliff sensor • Bump Sensor • Infrared Wall Sensor

4. Acting Rationally

The Rational Agent Approach



Agent	Performance measure	Environment	Actuators	Sensors
2. Self Driving Car	• Safety • Time • Legal Drive • Comfort	• Roads • Other vehicles • Road Signs • Pedestrian	• Steering • Accelerator • Brake • Signal • Horn	• Camera • GPS • Speedometer • Odometer • Accelerometer

State of Art

- Stanford University's **One Hundred Year Study on AI (also known as AI100)** convenes panels of experts to **provide reports on the state of the art in AI.**
- Their **2016** report concludes that **"Substantial increases in the future uses of AI applications, including more self driving cars, health care diagnostics and targeted treatment, and physical assistance for elder care can be expected".**

Artificial Intelligence Index Report 2022

https://aiindex.stanford.edu/wp-content/uploads/2022/03/2022-AI-Index-Report_Master.pdf

State of Art

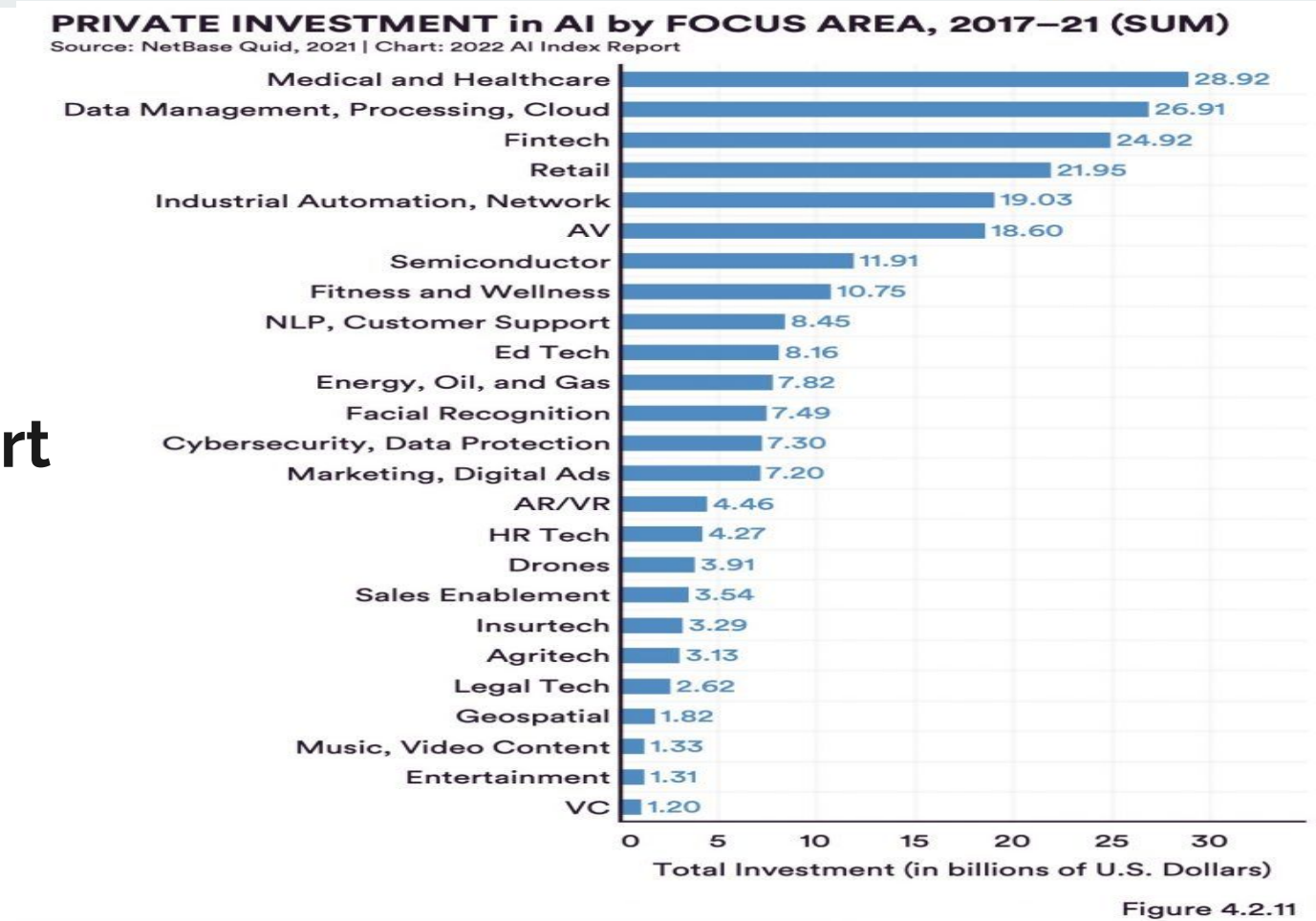


Figure 4.2.11

Applications of AI

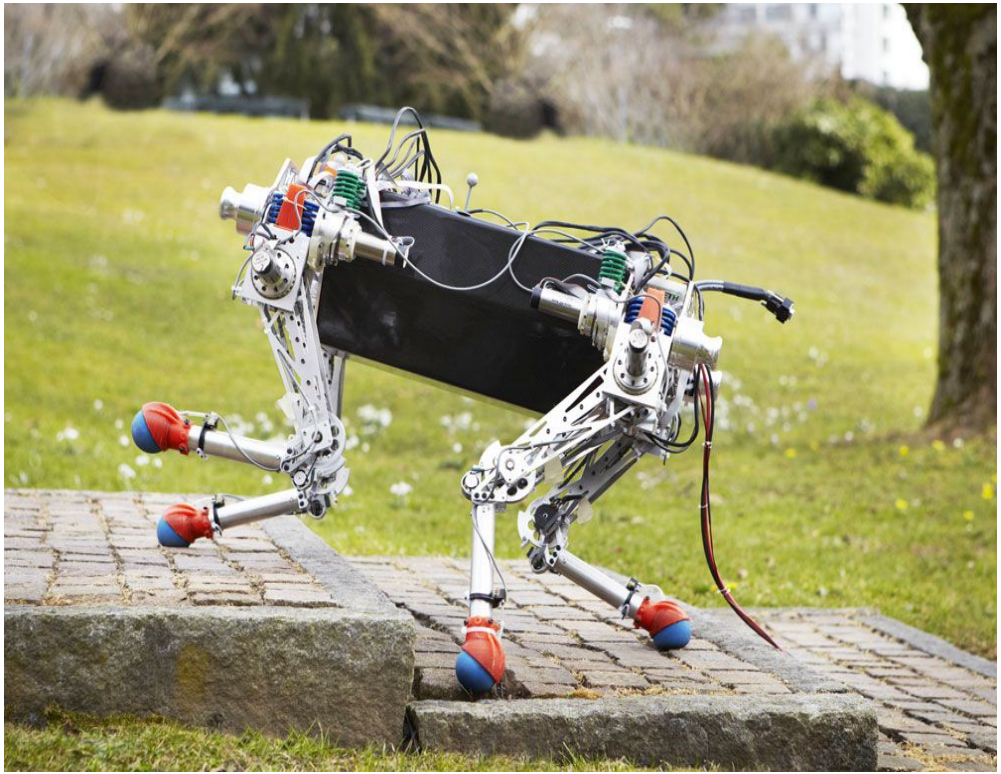
Robotics Vehicles

Self-Driving Cars - Self Driving Car for waste collection fully electric

Quadcopters - It performs remarkable aerobatic maneuvers, explore building and also to explore Target in the Enemy locations.

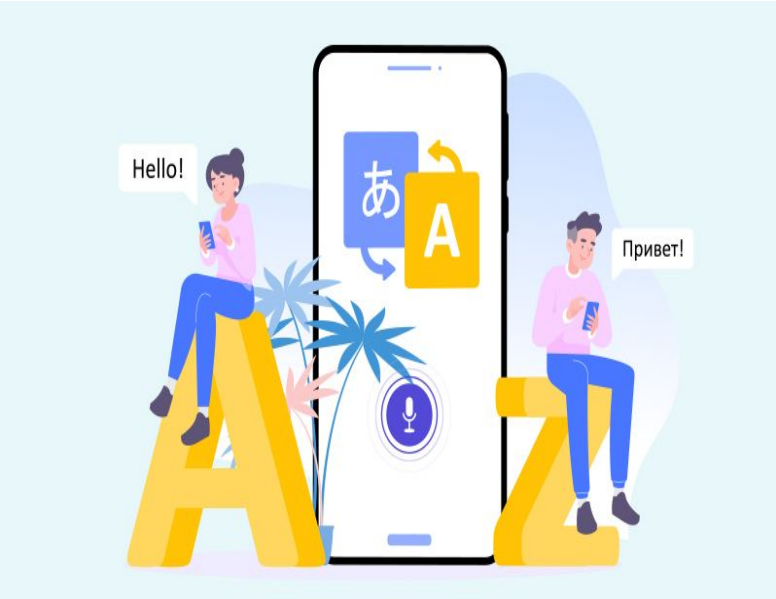
Applications of AI

Autonomous Planning and Scheduling - A 100 Million miles from Earth, NASA's Remote Agent Program became the first on board autonomous planning program to control the scheduling of operations.



Legged Locomotion - Legged robots can traverse on challenging terrain, to use perception to plan for footstep locations and to navigate in the environment, as well as to execute manipulation tasks

Applications of AI



Machine Translation - The process of using artificial intelligence to automatically translate text from one language to another without human involvement.

Playing Games - Game Playing is an important domain of artificial intelligence. Games don't require much knowledge; the only knowledge we need to provide is the rules, legal moves and the conditions of winning or losing the game. **[SQUARE OFF CHESS BOARD]**

Applications of AI

Climate Change - Autonomous and connected electric vehicles, Smart agriculture and food systems, Smart disaster response

(a)

(b)

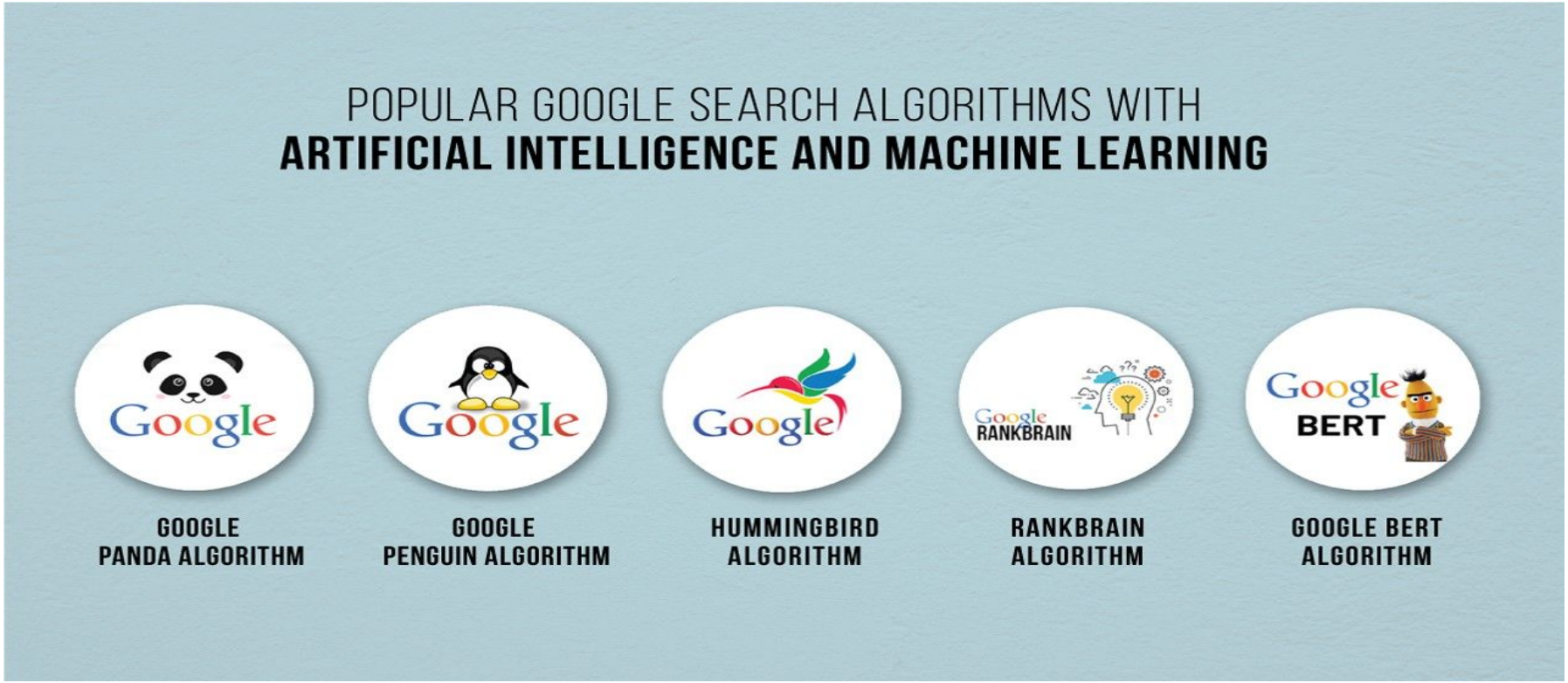
(c)

(d)

Medicine - Artificially intelligent computer systems are used extensively in medical sciences. Common applications include **diagnosing patients**, **end-to-end drug discovery** and development, improving communication between physician and patient, transcribing medical documents, such as prescriptions, and remotely treating patients.

Applications of AI

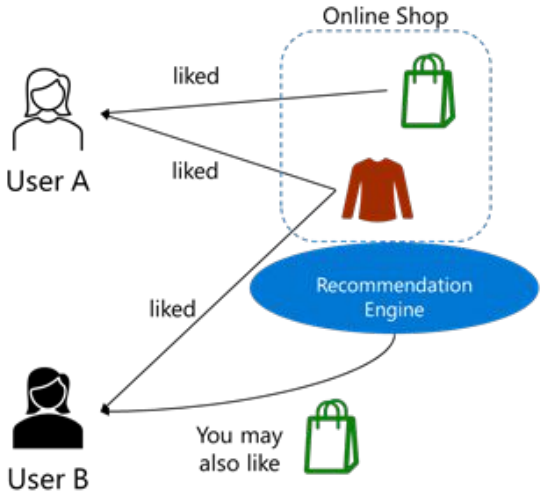
Advanced Web Search Engine



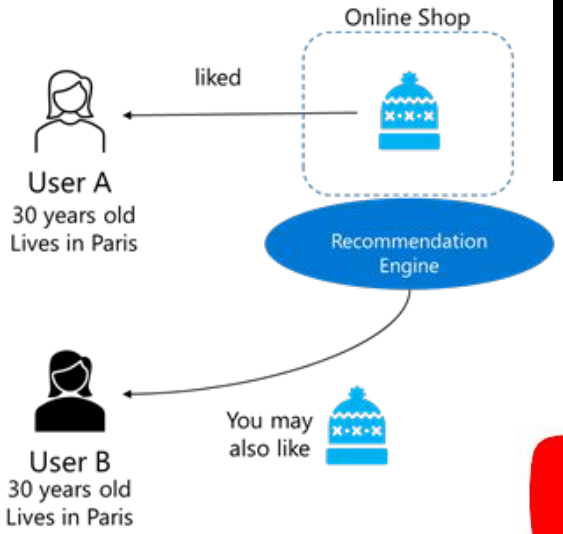
Applications of AI

Recommendation System

Collaborative Filtering



Content-based Filtering



NETFLIX

YouTube

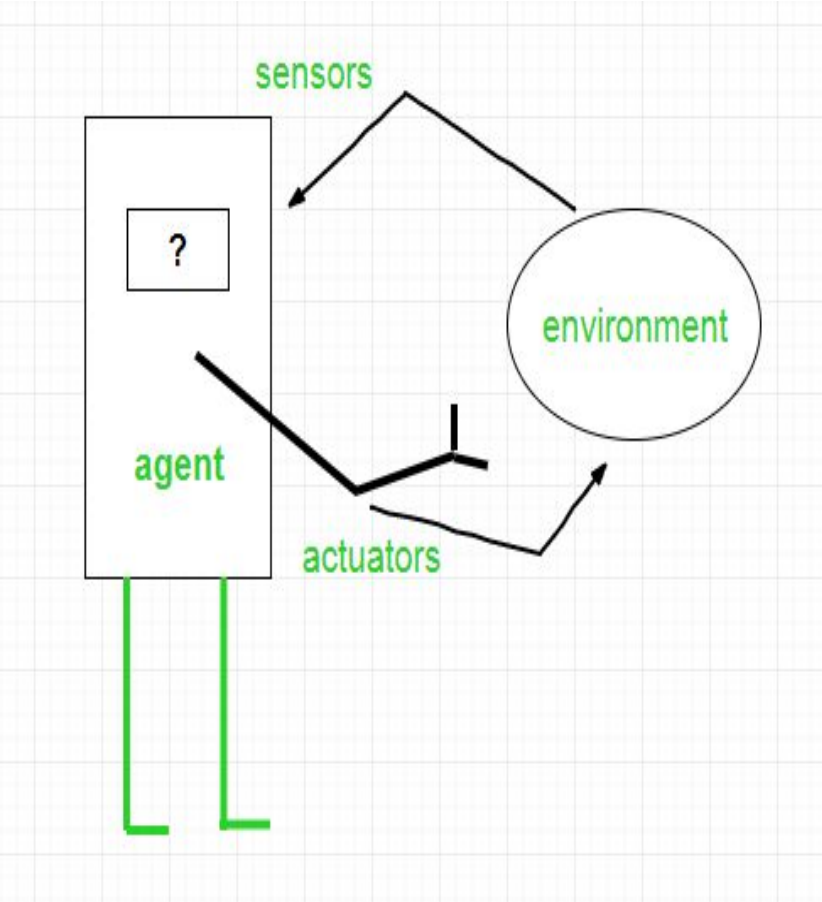
Applications of AI

Understanding Human Speech

Self Driving Car - TESLA

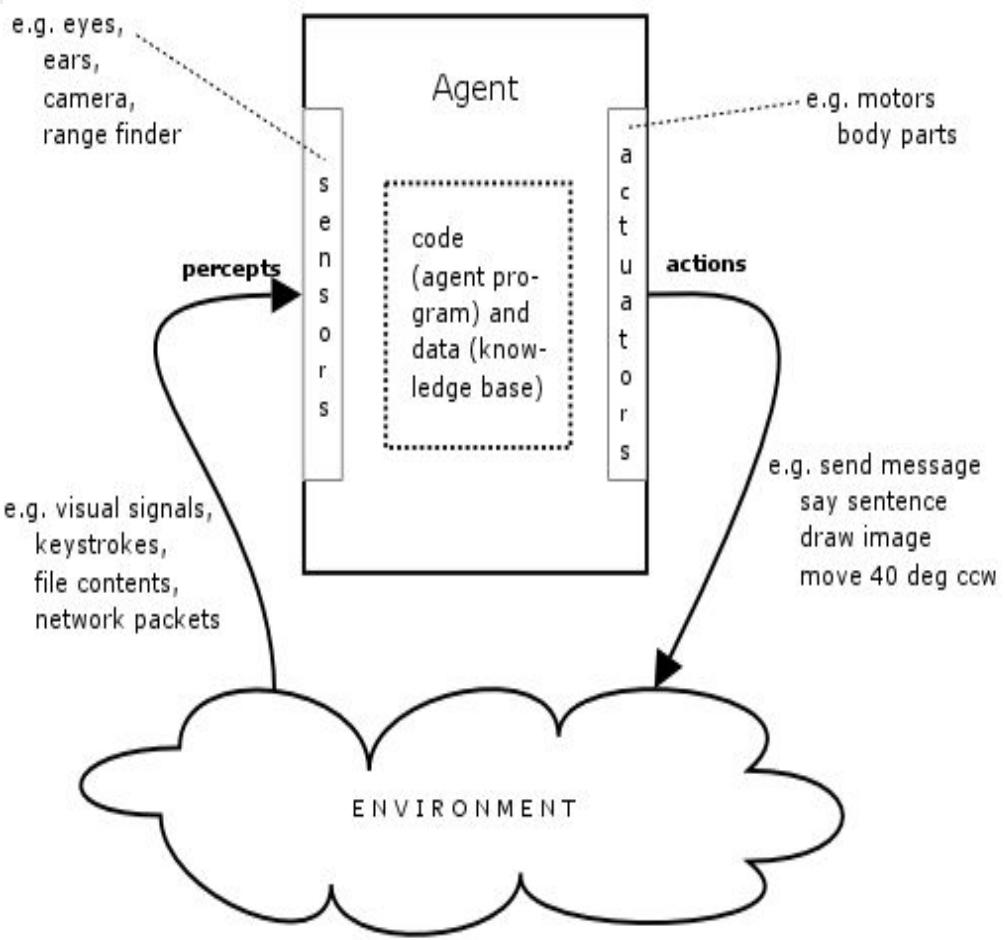
Agents and Environments

- An agent is anything that can be viewed as **Perceiving its environment through sensors** and **Acting upon that environment through actuators.**
- A **Human agent has Eyes, Ears and Other organs for Sensors** and **Hands, Legs, Vocal Tract, and so on for Actuators.**
- **A Robotic Agent might have Cameras and Infrared Range Finders for Sensors** and **Various Motors for Actuators.**
- A software agent **Receives file contents, network packets, and human input (keyboard, mouse, touchscreen, voice) as sensory inputs** and **Acts on the environment by writing files, sending network packets, and displaying information or generating sounds.**



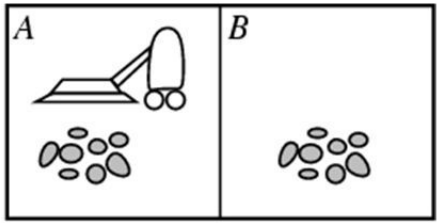
Agents and Environments

- We use the term **Percept to refer to the content an agent's sensors are perceiving.**
- An **Agent's percept sequence is the complete history of everything the agent has ever perceived.**
- In general, **An agent's choice of action at any given instant can depend on its built in knowledge and on the entire percept sequence observed to date, But not on anything it hasn't perceived.**
- Mathematically speaking, **we say that an agent's behavior is described by the agent function that maps any given percept sequence to an action.**



Agents and Environments

- **Percepts:**
  Location and status,
  e.g., [A,Dirty]
- **Actions:**
  Left, Right, Suck, NoOp



Percept sequence	Action
[A, Clean]	Right
[A, Dirty]	Suck
[B, Clean]	Left
[B, Dirty]	Suck
[A, Clean], [A, Clean]	Right
[A, Clean], [A, Dirty]	Suck
⋮	⋮
[A, Clean], [A, Clean], [A, Clean]	Right
[A, Clean], [A, Clean], [A, Dirty]	Suck
⋮	⋮

Figure - Partial Tabulation of a Simple Agent Function for the vacuum cleaner world shown, The agent Cleans the Current Square if it is DIRTY, otherwise it moves to the OTHER square.

ALVINN - Autonomous-Land-Vehicle-In-a-Neural-Network

The Concept of Rationality

An agent should act as a **Rational Agent**. **A rational agent is one that does the right thing that is the right actions will cause the agent to be most successful in the environment.**

Type	Percepts	Actions	Goals	Environment
ALVINN	Images, Signals, Position	Steer, Speed control, Sensor control	Drive from A to B	Roads, Vehicles, Hazards
Price Grabber	Web pages	Navigate web, Gather info.	Find best price	Internet
Chess program	Current board state	Next move	Win game	Opponent, Game board

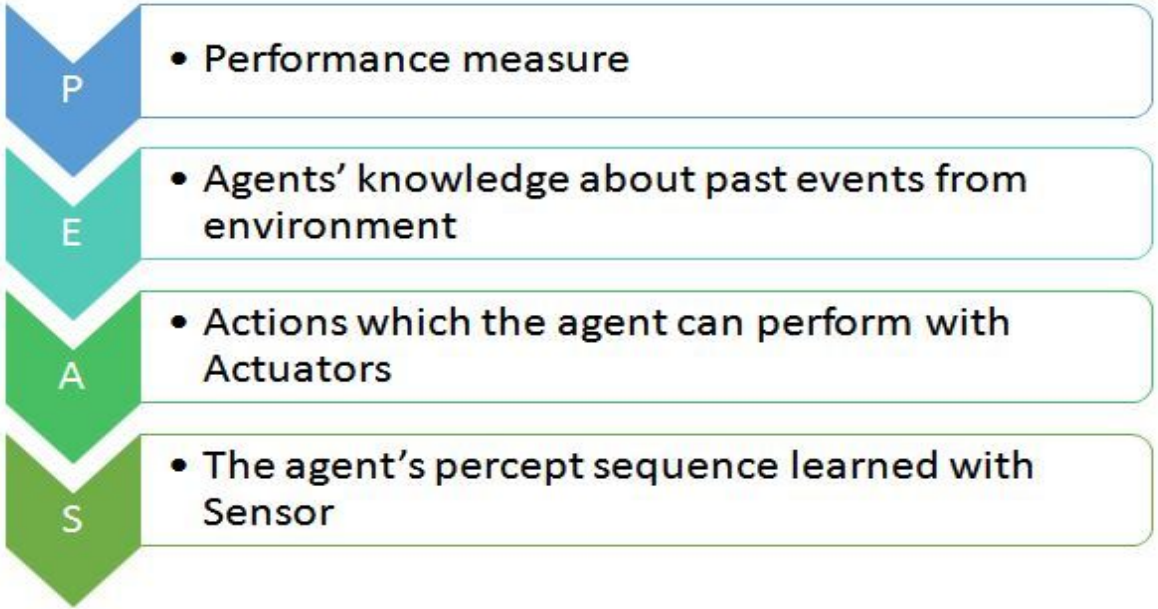
1. Performance Measures

A **performance measures embodies the criterion for success of an agent's behavior.** As a general rule, **it is better to design performance measures according to what one actually wants in the environment, rather than according to how one thinks the agent should behave.**

The Concept of Rationality

2. Rationality

What is rational at any given time depends on four things:



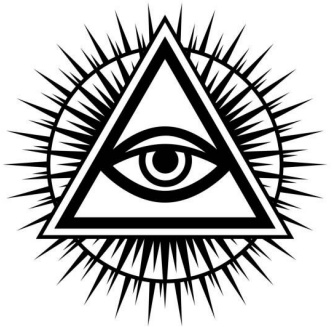
This leads to a definition of a rational agent (ideal rational agent)

"
For each possible percept sequence, **A**

Rational Agent should select an action that is expected to maximize its performance measure, Given the evidence provided by the percept sequence and whatever built-in knowledge the agent has, that is the task of rational agent is to improve the performance measure depends on percept sequence

"

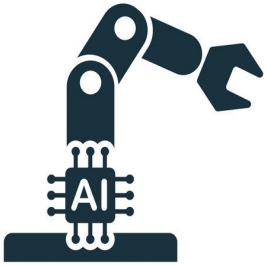
The Concept of Rationality



3. Omniscience, learning, and autonomy

An omniscient agent knows the actual outcome of its actions and can act accordingly; but ~~**OMNISCIENCE**~~ is **IMPOSSIBLE** in reality.

A rational agent not only to gather information, but also to **LEARN as much as possible from what it perceives.** The **agent's initial configuration could reflect some prior knowledge of the environment**, but as **the agent gains experience this may be modified and augmented.**



Successful agents split the task of computing the agent function into three different periods: **when the agent is being designed, some of the computation is done by its designers;** when it is deliberating on its next action, the agent does more computation; and as it learns from experience, it does even more computation to decide how to modify its behavior.

A rational agent should be autonomous.

AUTONOMOUS

The Nature of Environment

A **task environment specification** includes the performance measure, the external environment, the actuators, and the sensors.

In designing an agent, **the first step must always be to specify the task environment as fully as possible.**

Task environments are specified as a :

PAGE (Percept, Action, Goal, Environment) **OR**

PEAS (Performance, Environment, Actuators, Sensors)

description, both means the same.

The Nature of Environment - Specifying the Task Environment

Taxi Driver Example

Performance Measure	Environment	Actuators	Sensors
safe, fast, legal, comfortable trip, maximize profits	roads, other traffic, pedestrians, customers	steering, accelerator, brake, signal, horn, display	camera, sonar, speedometer, GPS, odometer, engine sensors, keyboard, accelerator

The Nature of Environment - Properties of Task Environment

1. Fully observable vs Partially Observable:

- If an agent sensor can sense or access the complete state of an environment at each point of time then it is **a fully observable** environment, else it is **partially observable.**
- A fully observable environment is easy as there is no need to maintain the internal state to keep track history of the world.
- An agent with no sensors in all environments then such an environment is called as **unobservable.**

2. Single-agent vs Multi-agent

- **If only one agent is involved in an environment,** and operating by itself then such an environment is called single agent environment.
- However, **if multiple agents are operating in an environment, then such an environment is called a multi-agent environment.**
- **The agent design problems in the multi-agent environment are different from single agent environment.**

The Nature of Environment - Properties of Task Environment

3. Deterministic vs Stochastic:

- If an **agent's current state and selected action can completely determine the next state** of the environment, then such environment is called a deterministic environment.
- A stochastic environment is **RANDOM** in nature and cannot be determined completely by an agent.

4. Discrete vs Continuous:

- If in an environment **there are a finite number of percepts and actions** that can be performed within it, then such an environment is called a discrete environment else it is called continuous environment.
- A chess game comes under discrete environment as there is a finite number of moves that can be performed. **[Values belonging to the set are Distinct] [Integer Values].**
- A self-driving car is an example of a continuous environment. **[Values belonging from the Range][can have fraction Values].**

Presentation Prepared By :
Nehal Sheth (SLICA)

The Nature of Environment

Fully Observable- See the Whole Board or Game

Partially Observable-

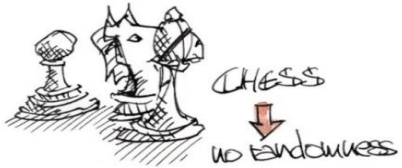
See Only His Cards

Single Player Agent

Multi Player Agent

VS.

- AGENT'S ACTIONS UNIQUELY DETERMINE THE OUTCOME
- SOME RANDOMNESS INVOLVED



Discrete data can only take on certain individual values.

Continuous data can take on any value in a certain range.

Example 1

Number of pages in a book is a **discrete variable**.

Example 2

Length of a film is a **continuous variable**.

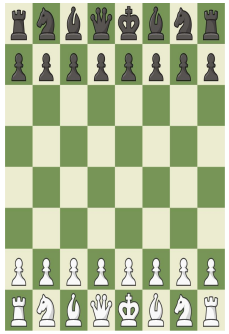
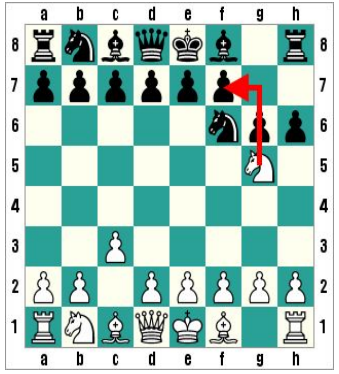
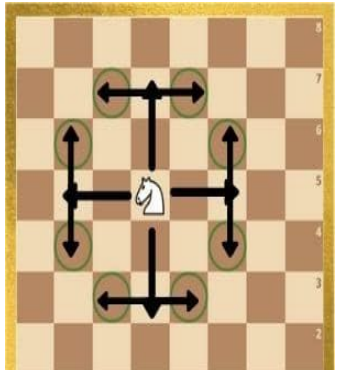
Example 3

Shoe size is a **Discrete variable**. E.g. $5, 5\frac{1}{2}, 6, 6\frac{1}{2}$ etc. Not in between.

Example 4

Temperature is a **continuous variable**.

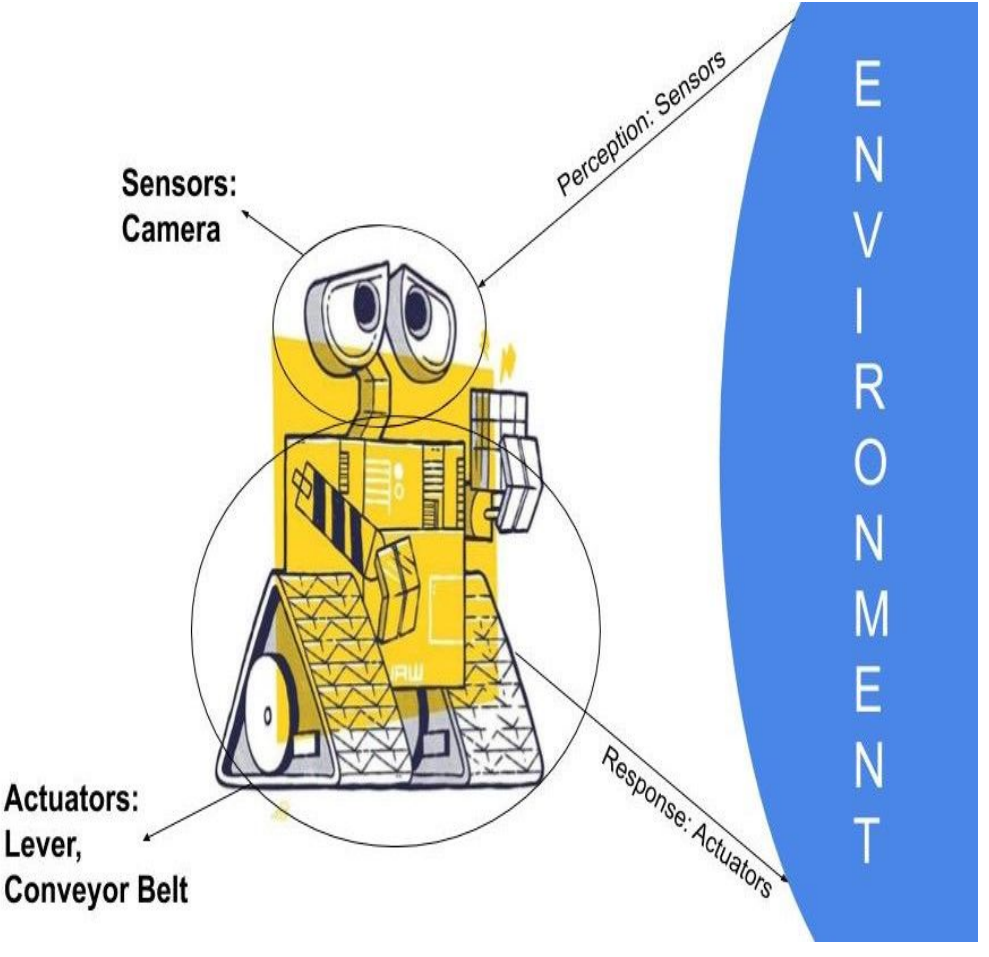
The Nature of Environment - Properties of Task Environment

Task Environment	Observable	Agents	Deterministic	Discrete
Chess with a Clock	Fully	Multi	Deterministic	Discrete
				

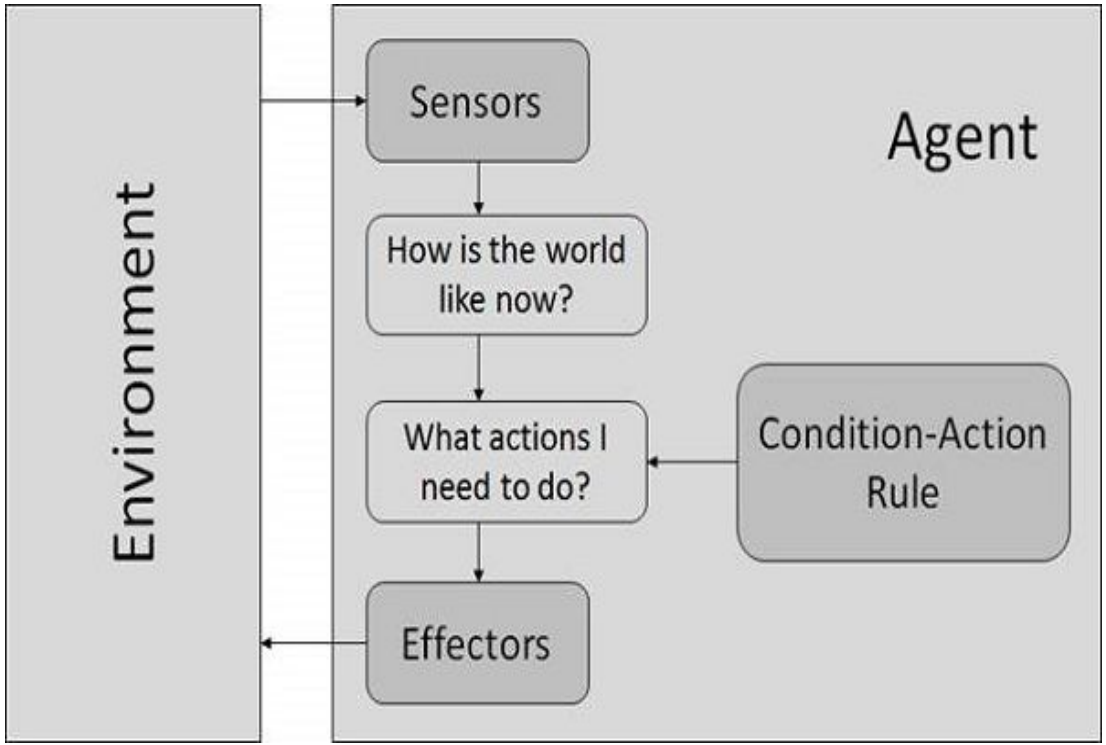
The Structure of Agents

Agent's structure can be viewed as −

- **Agent** = Architecture + Agent Program
- **Architecture** = the machinery that an agent executes on.
- **Agent Program** = an implementation of an agent function.



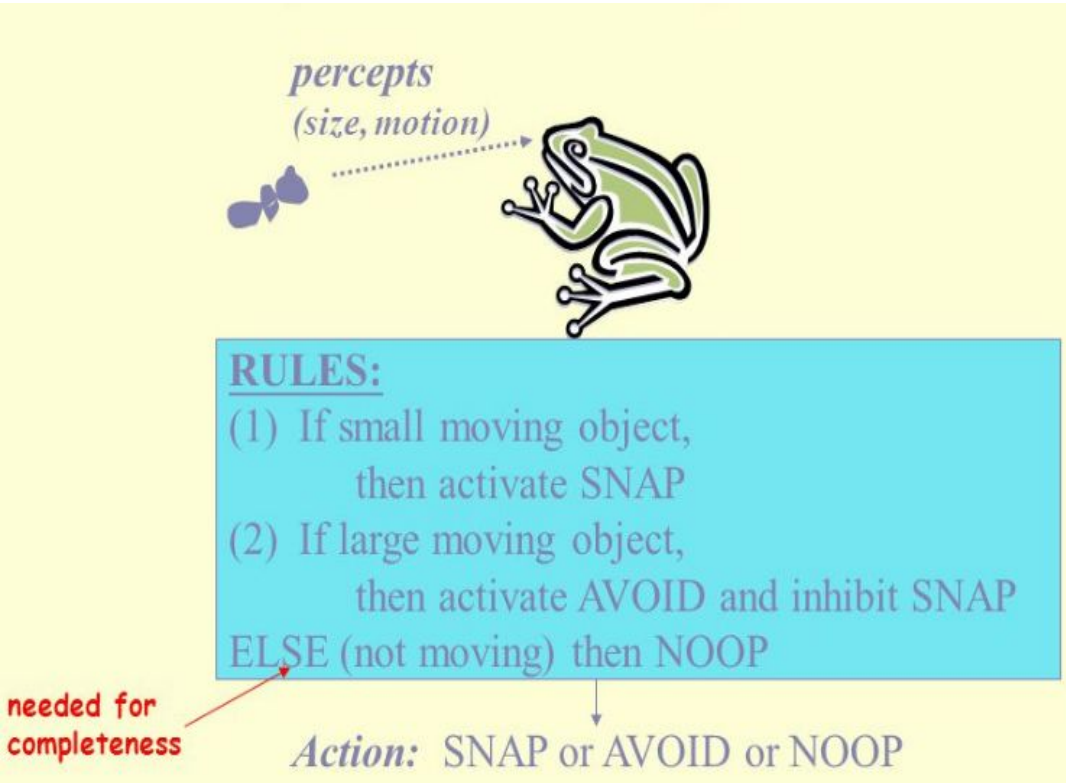
The Structure of Agents - Simple Reflex Agents

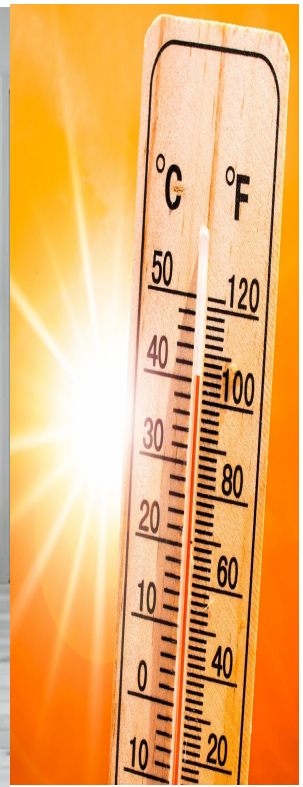


- They choose actions **only based on the current percept.**
- **They are rational only if a correct decision is made only on the basis of current precept.**
- Their environment is **completely observable.**
- **Based on If Then Rules**

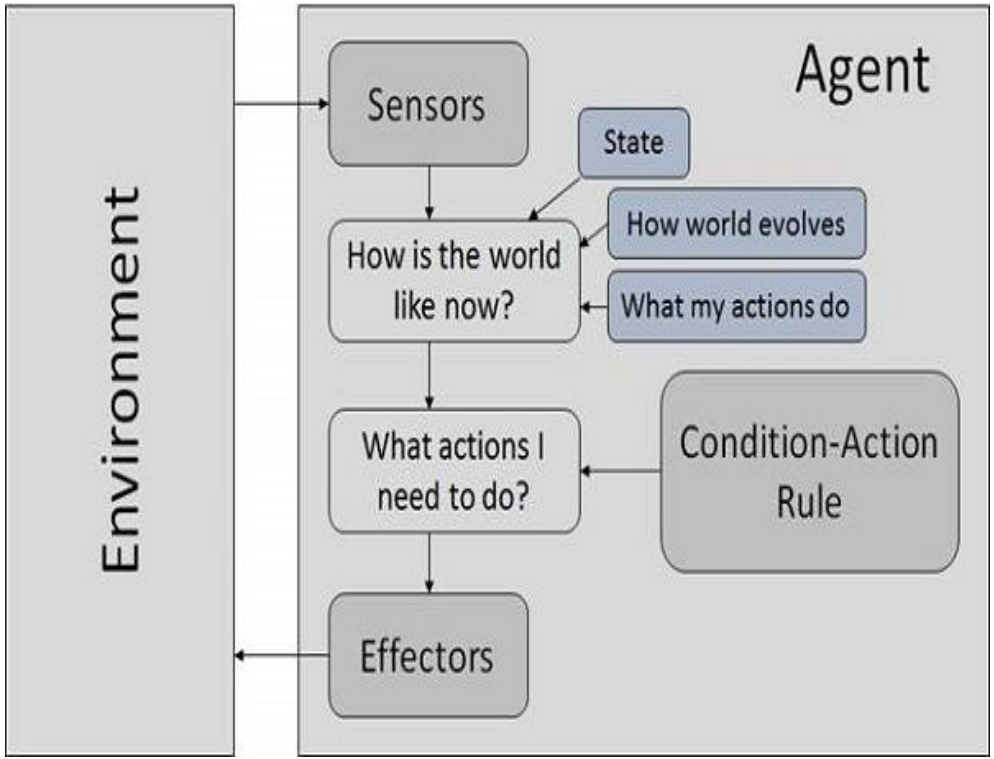
Condition-Action Rule – **It is a rule that maps a state (condition) to an action**

The Structure of Agents - Simple Reflex Agents in Nature





The Structure of Agents - Model Based Reflex Agents



They use a model of the world to choose their actions.

They maintain an internal state based on the past History Experience.

Model – knowledge about "how the things happen in the world".

Internal State – It is a representation of unobserved aspects of current state depending on percept history.

Environment Type - Partially Observable.

Updating the state requires the information about –

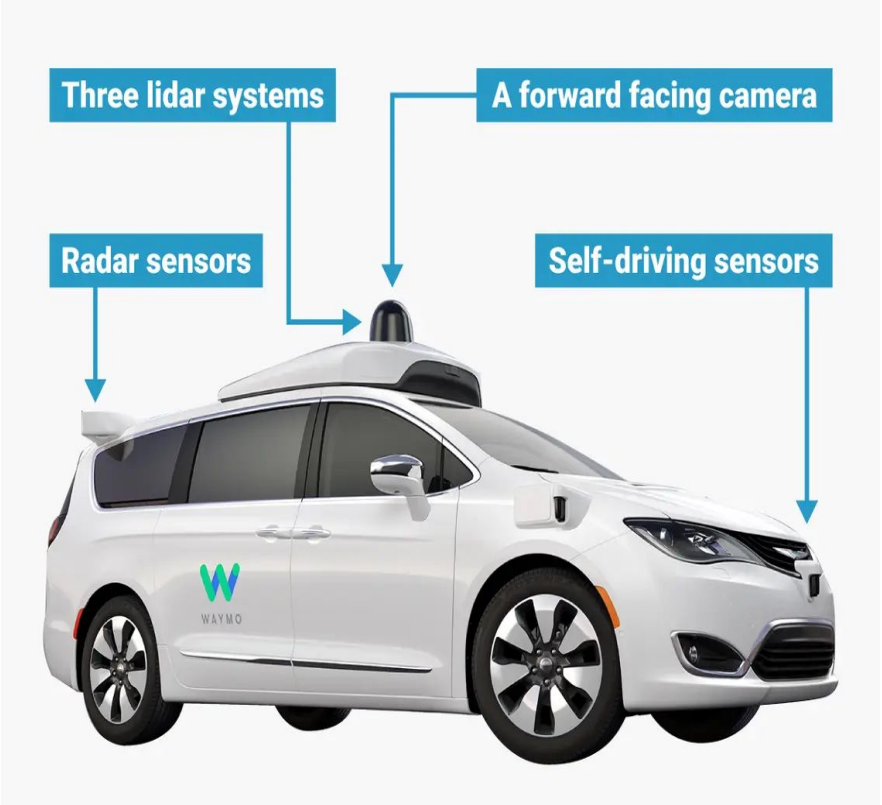
- How the world evolves.
- How the agent's actions affect the world.

The Structure of Agents - Model Based Reflex Agents

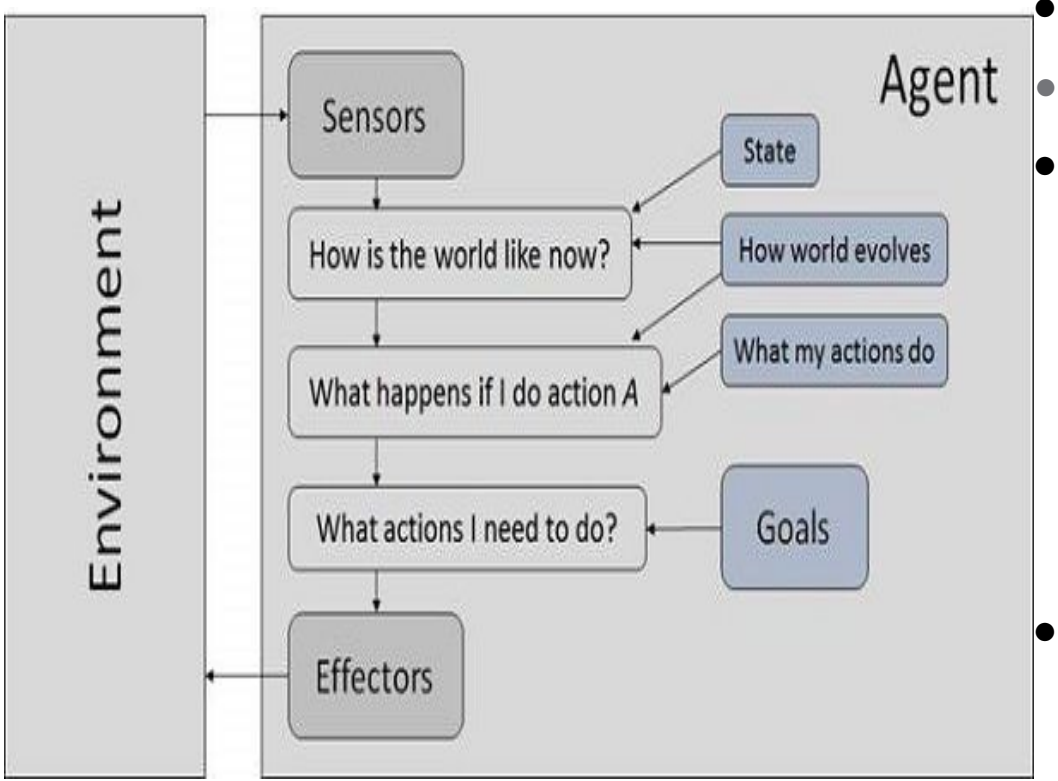
Self-driving cars are a great example of a model-based reflex agent.

The car is equipped with sensors that detect obstacles, such as car brake lights in front of them or pedestrians walking on the sidewalk.

As it drives, these sensors feed percepts into the car's memory and internal model of its environment.



The Structure of Agents - Goal Based Agents



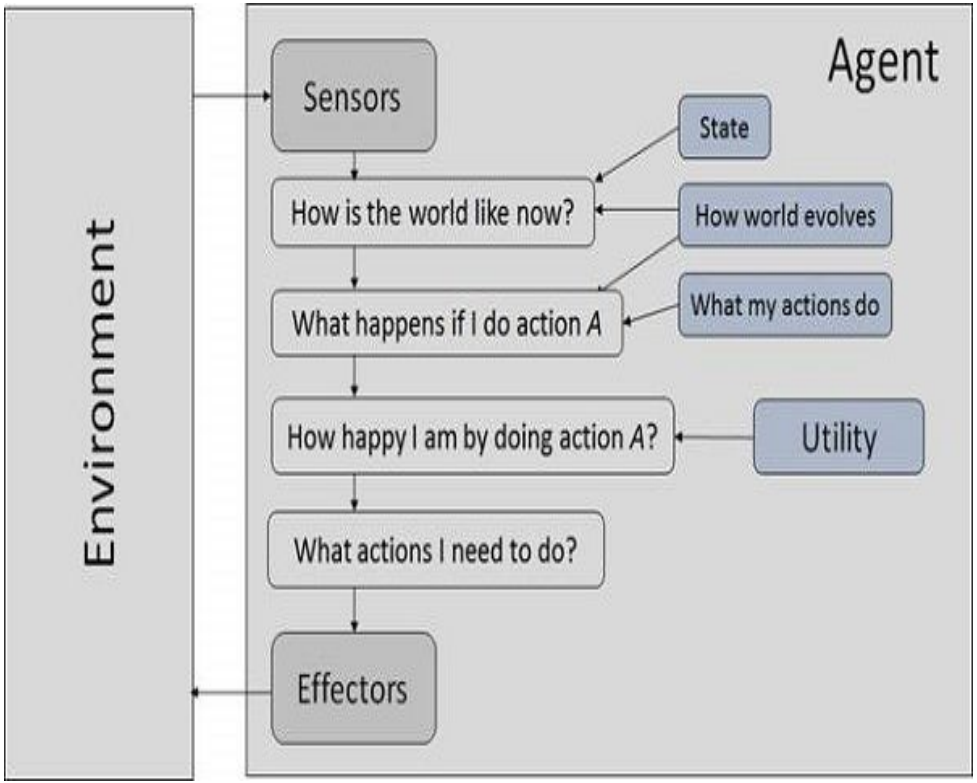
- It is Expansion of Model Based Agents.
- It has Searching and Planning.
- They choose their actions in order to achieve goals. **Goal-based approach is More Flexible than Reflex Agent** since the knowledge supporting a decision is explicitly modeled, thereby **Allowing for Modifications.**
- **Goal – It is the description of desirable situations.**

The Structure of Agents - Goal Based Agents

- Finding the **Best Route** Not the **Longest Route.**
- **Finding Map** Route between A to B.
- **What type of Vehicle to choose ?**
- **Petrol Refill Stations in between at what distances ?**

G Plus Vehicle Of Ali Baba to Deliver Products.

The Structure of Agents - Utility Based Agents



They choose actions based on a Preference (Utility) for each state.

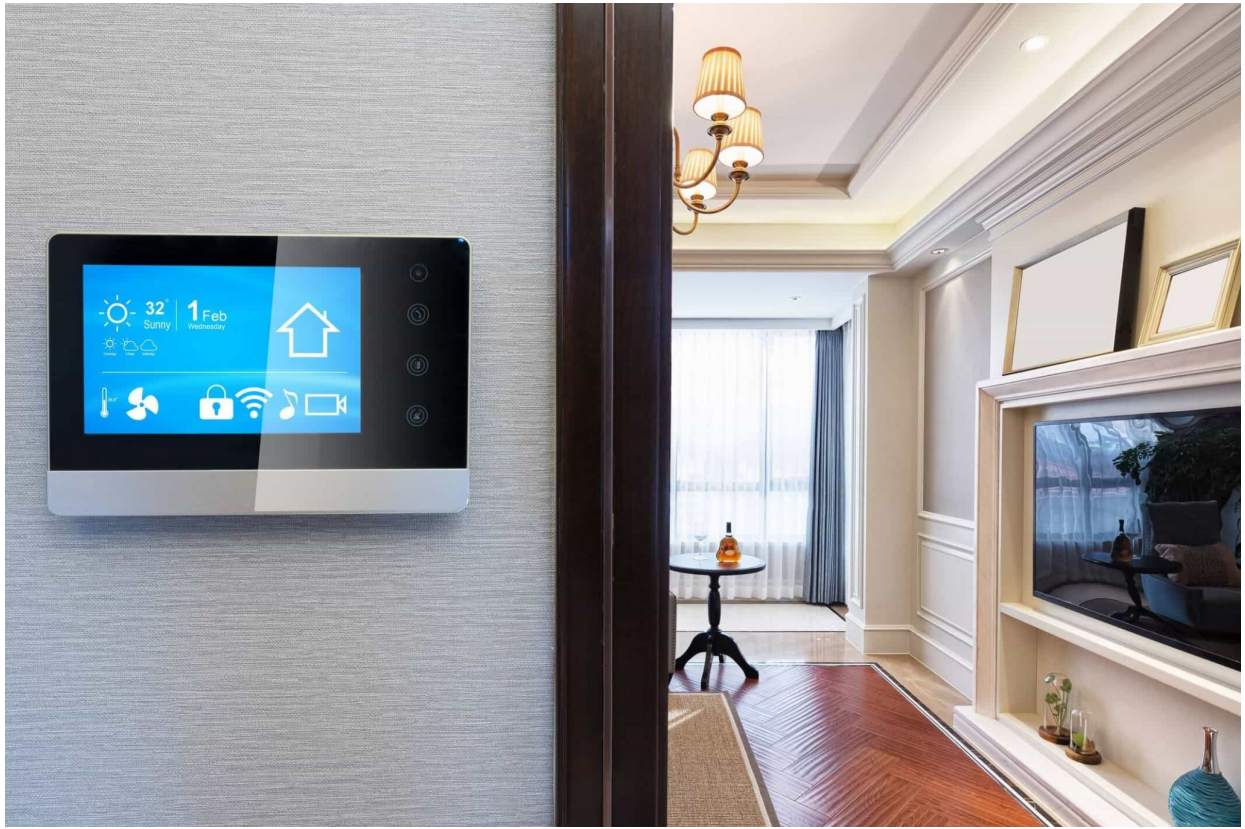
Goals are InAdequate when –

- There are Conflicting goals, out of which Only Few can be achieved.
- Goals have some Uncertainty of being achieved and you need to Weigh likelihood of success against the importance of a goal.

The Structure of Agents - Utility Based Agents

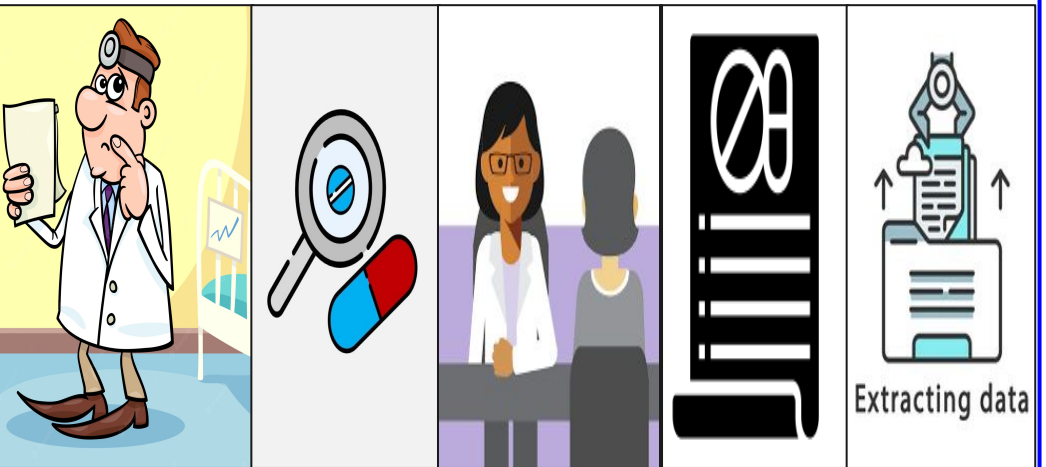
A **utility-based agent** is an agent that **acts based not only on what the goal is, but the best way to reach that goal.**

Ex : It could be a **Home Thermostat** that knows to start **heating** or **cooling** your house based on reaching a certain temperature.



Case Study - Health Care Market with AI

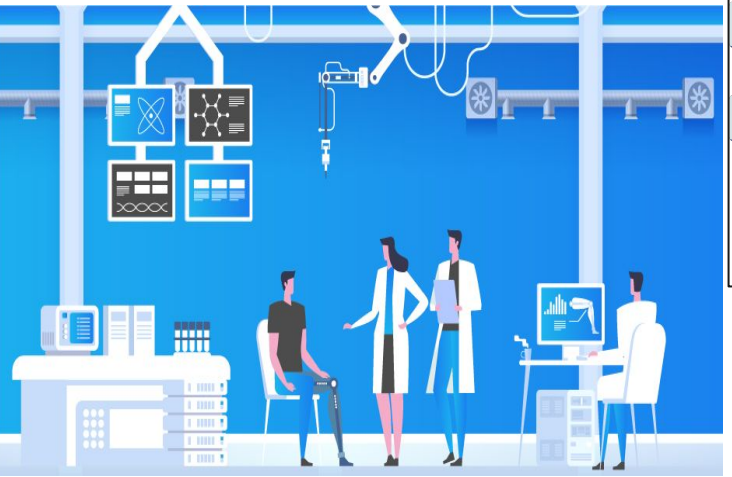
Nowadays, **Artificial Intelligence (AI)** is used extensively in **Medical Sciences** and is transforming the **Healthcare Industry**. The adoption of this technology in healthcare is primarily applied to **Patient Diagnoses**, **Drug Discovery and Development**, **Clinician-Patient Interaction**, **Transcribing Medical Documents and Prescriptions** and **Improving Data Discovery and Extraction** that helps in Personalized Treatments.

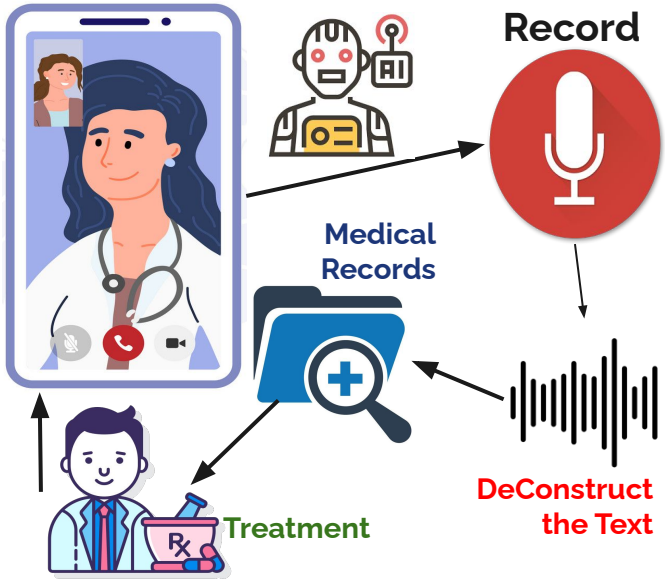


Although an ever-increasing amount of medical data is being stored in **Electronic Health Records (EHRs)**, patient health data generated by healthcare industries is in **Large Volumes**, often **Inflexible, Difficult to use, and Expensive to Configure**. Besides being captured inefficiently these data are also **Incomplete**, **Redundant**, **Inconsistent in Representation**, and have heterogeneity and noise. Also, the amount of online health records **DOUBLES** every five years and **Clinicians cannot process all this data manually.**

Case Study - Health Care Market with AI

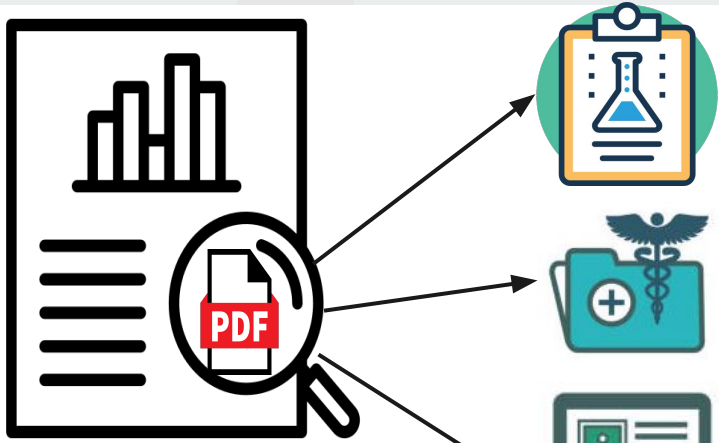
AI helps manage such vast datasets and assists clinicians in treating their patients by Automating Tasks and Analyzing Them in a meaningful way. It readily makes information available Whenever and Wherever it is needed and Categorizes data in a Patient-Specific Manner. It holds promise to deliver improved quality of healthcare by Increasing Productivity, Accelerating Digital Health, Improving Personalized Care, and supporting Clinical Decision-Making at a Lower Cost.



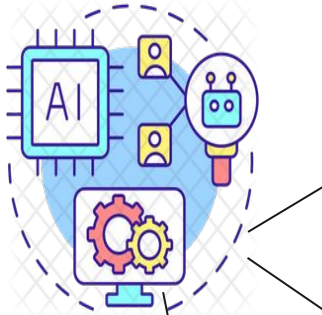


AI plays a critical role in developing digital scribes that Support Voice Recognition and Record a Conversation between a Doctor and a Patient, Deconstruct the TEXT and use it to Capture Relevant Information in the Patient's Electronic Medical Record. AI helps Identify Response Patterns to any Treatment and perform outcome predictions.

Case Study - Health Care Market with AI



The AI tool also Analyzes PDF reports and segregates them into relevant categories Based on the NATURE of the reports such as Pathology Reports, Imaging, or Procedure. It is also able to extract document data and combine multi page reports so that they can be recognized intact. With an **AI Algorithm**, These records are presented to the Participating Clinicians using a Dashboard.

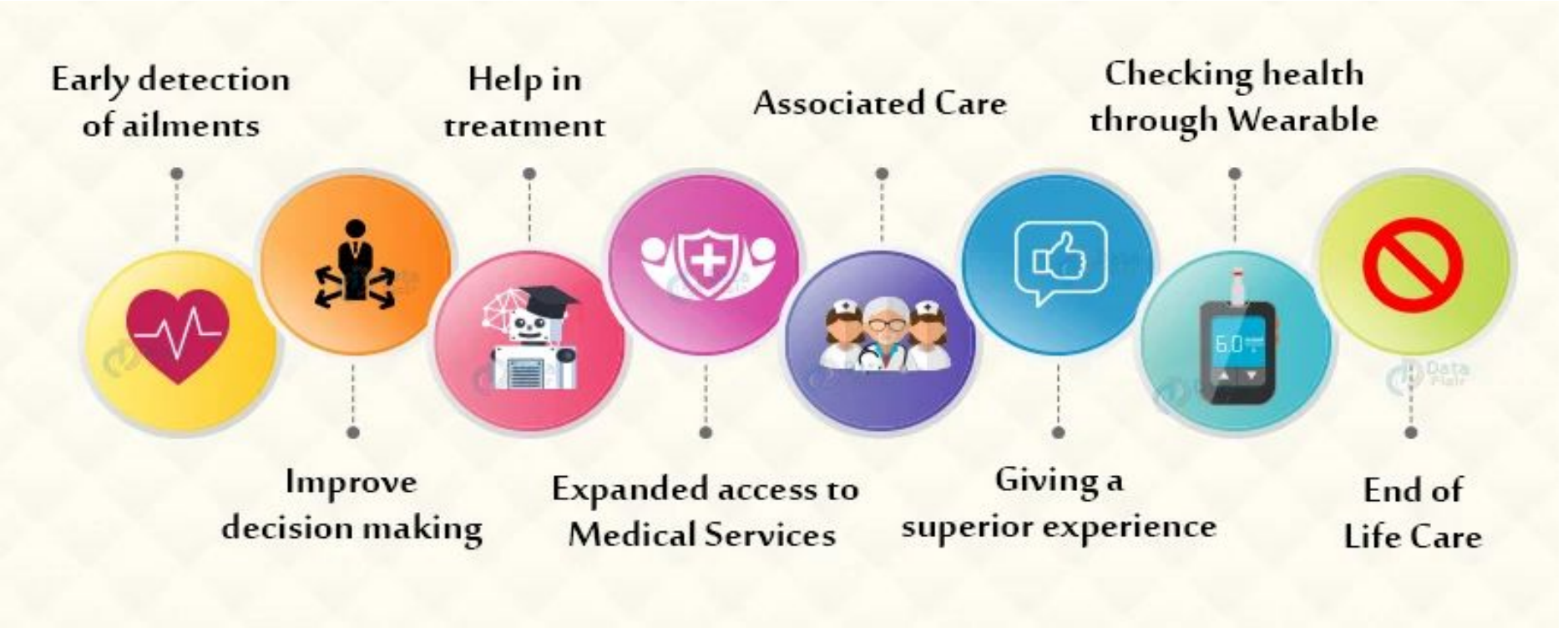


Previous Medical Records

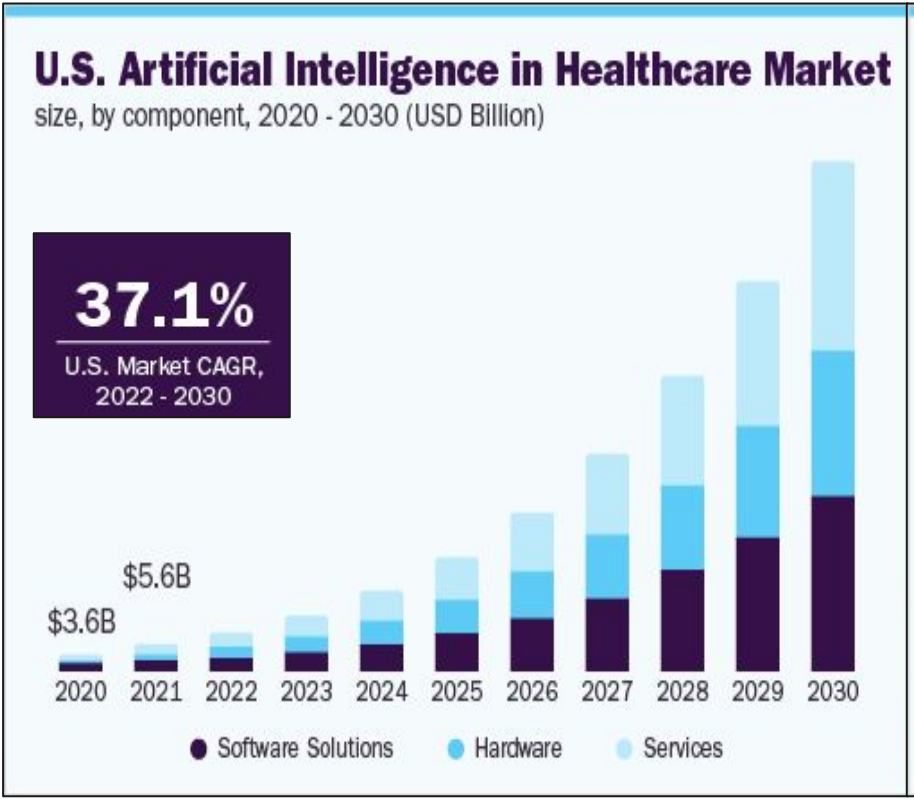
AI-based clinical decision support tools are being used to Improve Care Delivery. These tools can analyze large volumes of data to provide Diagnostic Assistance, and Treatment Guidance, and Evaluate Disease Prognosis and Progression. AI evaluates an Individual Patient's Record and Predicts a risk for a Disease based on their Previous Medical Records and Family History. AI also utilizes large amounts of data and creates a set of rules that Connect Specific Observations to Concluded Diagnoses of Disease. AI can Evaluate a Patient's Information Based on collective data and can bring outstanding issues to a Clinician's Attention and Save Time.

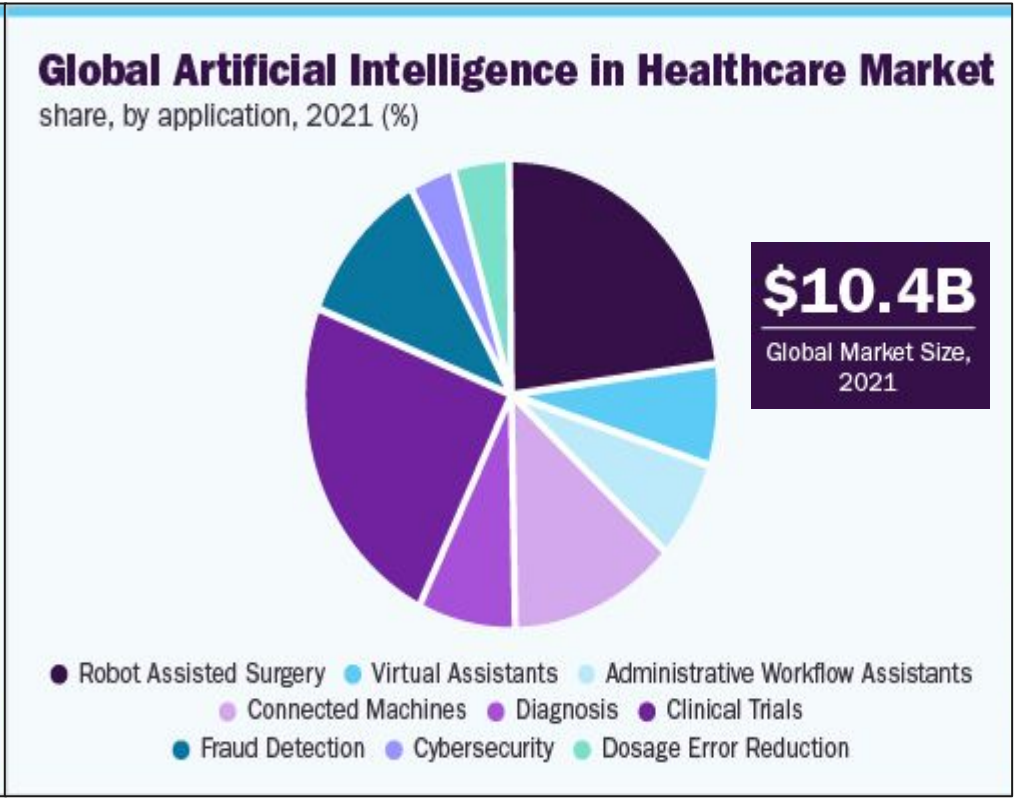
Case Study - Health Care Market with AI

Role of AI in Healthcare



Case Study - Health Care Market with AI Statistics





Thank You !!