# AGENT

## # What is Agent?

Artificial intelligence is defined as the study of rational agents. A rational agent could be anything that makes decisions, as a person, firm, machine, or software. It carries out an action with the best outcome after considering past and current percepts.

## #What kind of agents?

Four basic kinds of agent that embody the principles underlying almost all intelligent systems:

Simple reflex agents;

Model-based reflex agents;

Goal-based agents; and

Utility-based agents.

1. Simple Reflex agent:

The Simple reflex agents are the simplest agents. These agents take decisions on the basis of the current percepts and ignore the rest of the percept history.

These agents only succeed in the fully observable environment.

The Simple reflex agent does not consider any part of percepts history during their decision and action process.

The Simple reflex agent works on the Condition-action rule, which means it maps the current state to action. Such as a Room Cleaner agent, works only if there is dirt in the room.

Problems for the simple reflex agent design approach:

They have very limited intelligence

They do not have knowledge of non-perceptual parts of the current state

Mostly too big to generate and to store.

Not adaptive to changes in the environment

2. Model-based reflex agent

The Model-based agent can work in a partially observable environment, and track the situation.

A model-based agent has two important factors:

Model: It is knowledge about "how things happen in the world," so it is called a Model-based agent.

Internal State: It is a representation of the current state-based on percept history.

These agents have the model, "which is knowledge of the world" and based on the model they perform actions.

Updating the agent state requires information about:

How the world evolves

How the agent's action affects the world.

3. Goal-based agents

The knowledge of the current state environment is not always sufficient to decide for an agent what to do.

The agent needs to know its goal which describes desirable situations.

Goal-based agents expand the capabilities of the model-based agent by having the "goal" information.

They choose action so that they can achieve the goal.

These agents may have to consider a long sequence of possible actions before deciding whether the goal is achieved or not. Such considerations of different scenarios are called searching and planning, which makes an agent proactive.

4. Utility-based agents

These agents are similar to the goal-based agent but provide an extra component of utility measurement which makes them different by providing a measure of success at a given state.

Utility-based agents act based not only on goals but also on the best way to achieve the goal.

The Utility-based agent is useful when there are multiple possible alternatives, and an agent has to choose in order to perform the best action.

The utility function maps each state to a real number to check how efficiently each action achieves the goals.