What is an AI Agent?

AI (Artificial Intelligence) Agent is a program that can independently perform tasks on behalf of another user/system.

These tasks can include: -

1) Collecting real-time data

2) Perform prompt actions

3) Understand, process and respond with data in human language.

Types of AI Agent

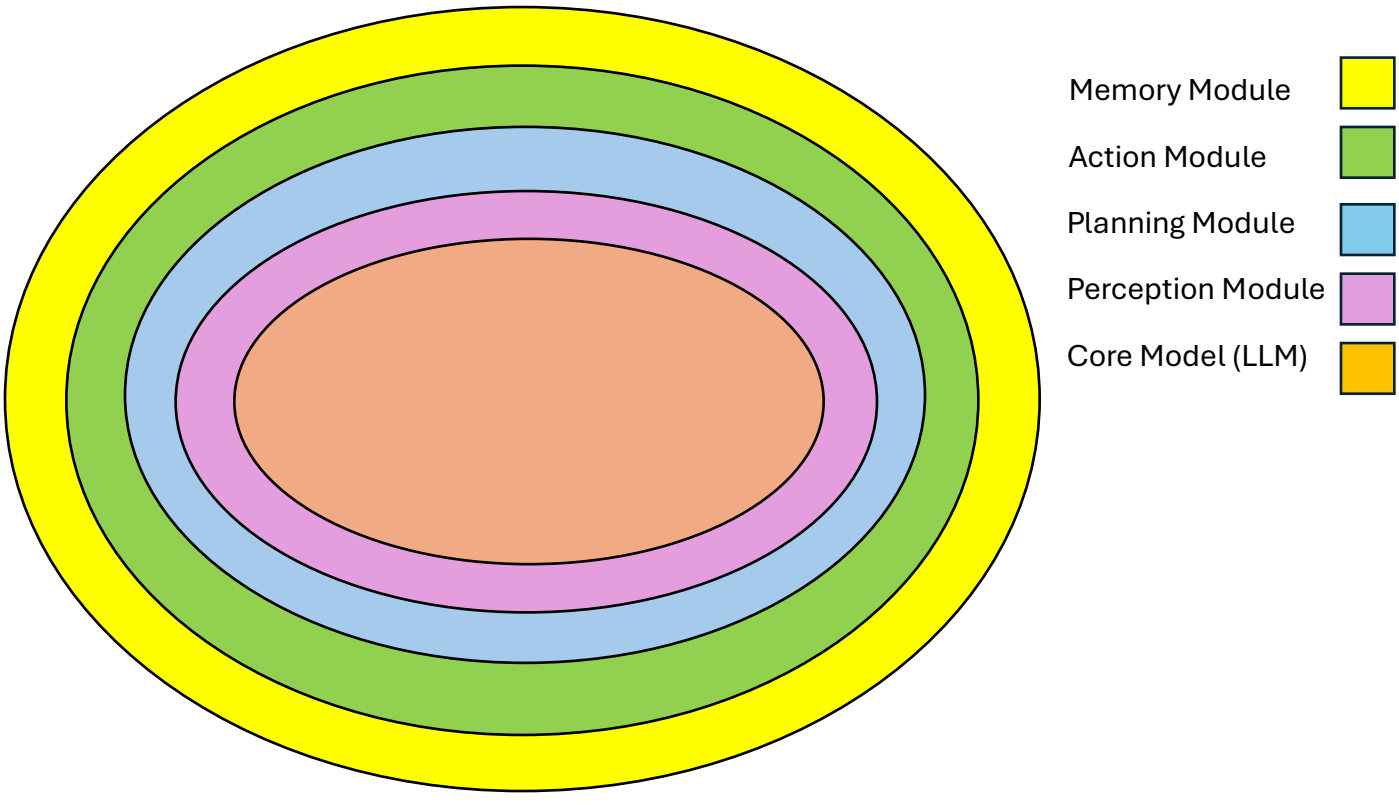
AI agents can be classified into the following based on: -

1) Architecture

2) Functionality

3) Learning abilities

Architecture of an AI Agent is: -



1) **Memory Module** – It allows the AI agent to retain and retrieve information across interactions that are both short-term and long-term.
2) **Action Module** – It allows the AI agent to perform the action/decisions by interacting with other systems via APIs.
3) **Planning Module** – It generates a sequence of actions or sub-tasks to achieve a specific goal.
4) **Perception Module** – It allows the AI agent to perceive inputs from the environment via API data/databases/sensors/user prompts.
5) **Core Module** – This module is the heart of the AI Agent. This module usually constitutes the LLM. It enables the AI agent with reasoning and understanding.

Based on architecture AI agents can be classified as below: -

Sl No.	Type of Agent	What is it?	Examples
1	Reactive	• AI Agent that responds directly to current perceptions (reactively) without memory/planning.	Older models of Roomba vacuum cleaner.
2	Deliberative	• AI Agent that builds and maintains internal representation of the environment to plan their actions.	IBM Watson assisting in healthcare with medical image analysis and risk assessment.
3	Hybrid	• AI Agent that combines the speed of reactive systems with the planning capabilities of deliberative system.	Self-driving cars that use - 1) rules for safe navigation (deliberative feature) and 2) learning for adaptive driving. (reactive feature)
4	Emergent	• AI Agent that displays emergent behavior and develops unexpected capabilities beyond its initial programming.	Open AIs hide-and-seek experiment.

Based on functionality, AI agents can be classified as below: -

Sl No.	AI Agent	Functionality	Examples
1	Simple reflex	• AI agent which functions based on pre-defined rules. • AI agent that acts on a simple If (x) do { Y } rule.	• Basic thermostat that operates based on direct responses to environmental conditions.
2	Model-Based	• AI agent which functions based on a saved internal model built/derived from previous perceptions.	• Genie 3 is a world model which learns to simulate an environment by modelling its rules.
3	Goal-Based	• AI agent which functions based on goals. These agents can plan a sequence of actions to reach their goal.	• Amazon's warehouse robotics whose goal is usually to sort and ship packages.
4	Utility-Based	• AI agent which contains a utility function that the agent uses to identify the best outcome to select its next move/decision.	• Holly AI which provides market scanning and strategy optimization for day traders.
5	Multi-Agent	• AI agent composed of multiple AI agents that work together to collaborate/compete.	• Autonomous drones to monitor a large crop field.
6	Hierarchical	• AI agent composed of multiple AI agents where the agent organizes each agent in layers for task decomposition. • There is a supervisor-subordinate between agents.	• Amazon's bedrock AI agent allows developers to build applications that use foundational models from Amazon and other companies.

AI agents are usually trained to identify patterns and make decisions based on the data. Based on the learning capability, AI agent can be classified as below: -

Sl No.	AI agent	What is it?	Examples
1	Supervised	• AI agent which identifies patterns and makes decisions based on labelled data.	• Spam filter supported within email services which is trained using data that is labelled as spam/non-spam.
2	Un-Supervised	• AI agent which identifies patterns and makes decisions based on unlabeled data.	• Netflix using matrix factorization technique for movie recommendation which is trained based on unsupervised learning.
3	Reinforcement	• AI agent which identifies patterns and makes decisions by interacting with the environment and receiving feedback in form of rewards/penalties.	• AlphaGo created by Google that uses reinforcement learning in the Game of Go.

Note: - Labelled data refers to data which is tagged/annotated that provides context and meaning unlike raw data which is usually unstructured.