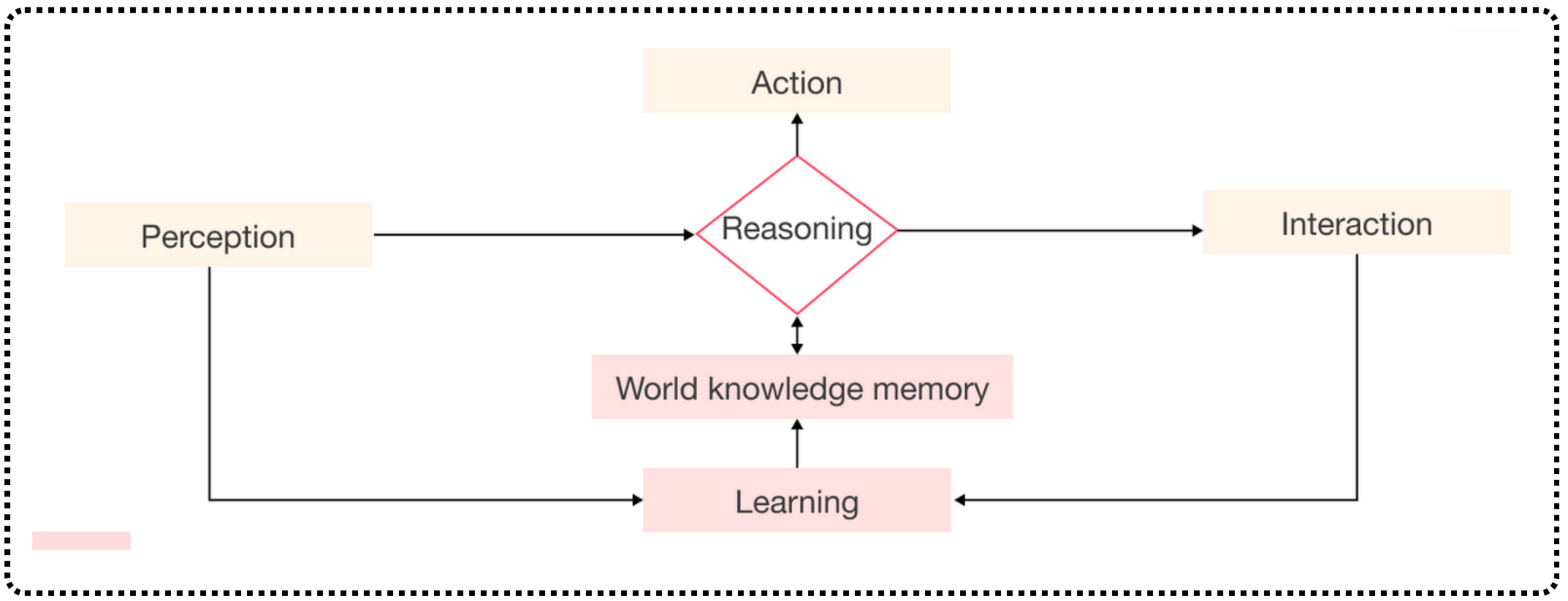
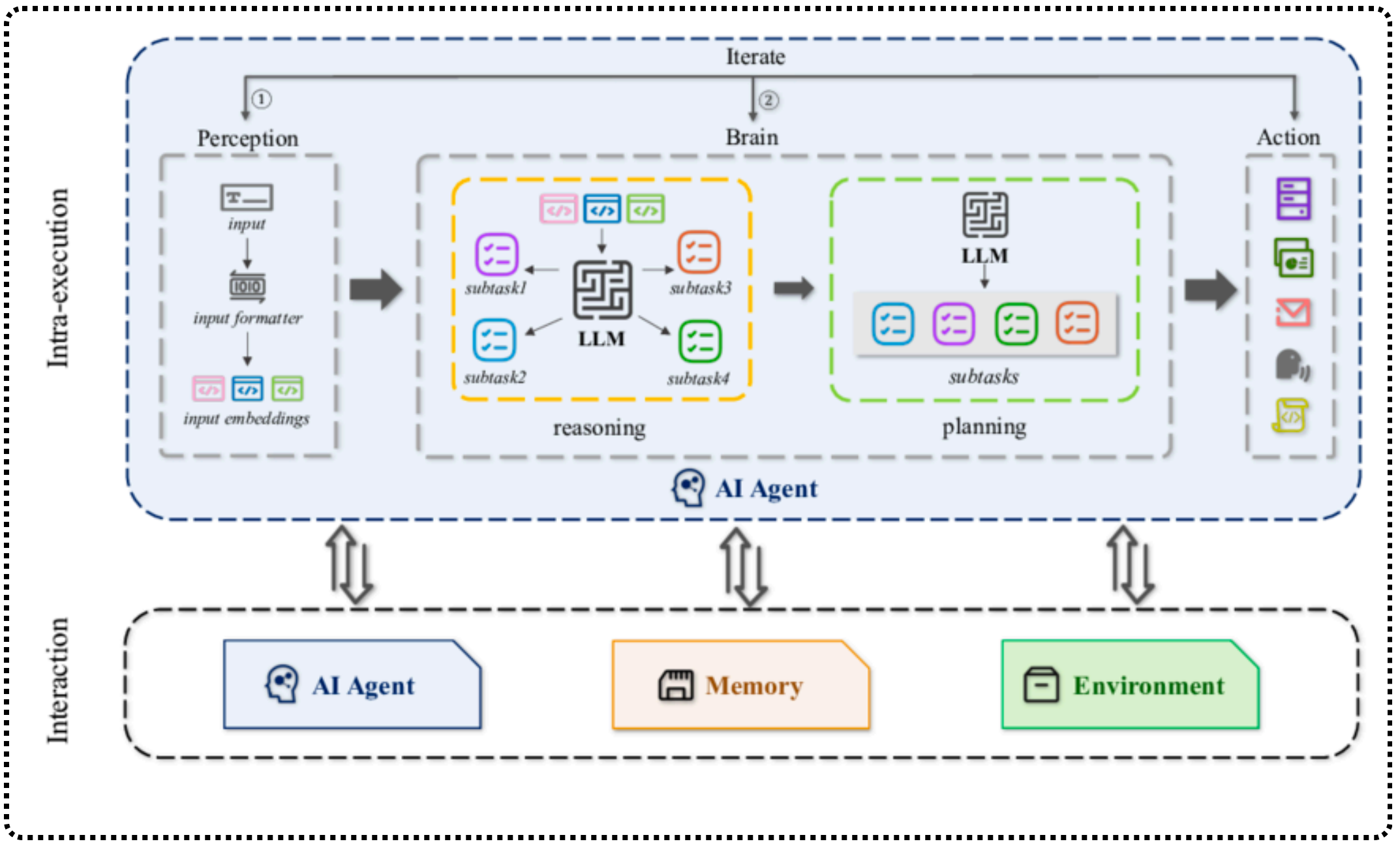
Analytics Vidhya

Day 2 of Mastering AI Agents

Core Components of AI Agents





Perception (Sensing the Environment)

This is where the agent gathers data from the outside world. Depending on the environment and application, this can include:

- Human input (text, voice, clicks)
- Camera or visual data (for computer vision agents)
- Sensor readings (like in robotics or self-driving cars)
- APIs or digital environments (for software agents)

Basically, this is the agent's "eyes and ears"—it's how it knows what's going on.

Knowledge Base (What the Agent Knows)

This is the internal memory or world model that the agent uses to make sense of its environment. It can be:

- Pre-programmed facts or logic rules
- Learned models from data (e.g., neural networks, decision trees)
- Ontologies or knowledge graphs (structured semantic data)
- Context memory (in LLMs and task agents)

Reasoning/Planning

Once the agent knows the situation, it needs to decide what to do next. This is where logic, learning, and sometimes search algorithms come in.

- Rule-based reasoning (IF-THEN logic)
- Search algorithms (like A*, DFS, etc. for pathfinding)
- Goal-based planning (deciding steps to reach an outcome)
- Reinforcement learning (learning what actions yield rewards)

This part is like the strategist brain of the agent—analyzing, weighing options, and planning.

Learning (Getting Smarter Over Time)

Good agents don’t just act—they improve. Learning can be:

- Supervised (learning from labeled data)
- Unsupervised (finding patterns on its own)
- Reinforcement (learning through trial and error)

This is how agents become more effective and adapt to new environments or challenges.

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Actuation (Doing the Thing)

This is how the agent interacts with the world.

- Robots move, grab things, navigate
- Chatbots send messages or speak
- Software agents trigger actions, run code, or manipulate data

It’s the “hands and mouth” of the agent—how it executes its decisions.

Feedback Loop (Learning from Outcomes)

Finally, smart agents check if their actions worked and update accordingly.

- Did the action succeed?
- Did it fail?
- Did it improve the state of the environment?

This feedback fuels learning and helps the agent refine its behavior.

Bonus: Goal/Utility Function

A lot of agents are goal-driven or utility-maximizing. That means they're designed to:

- Achieve a specific objective (e.g., win a game, complete a task)
- Maximize a numerical reward or utility
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This gives the agent direction—a reason to choose one action over another.

Putting It All Together

The flow looks something like this:

Perceive → Understand → Plan → Decide → Act → Learn → Repeat

Every AI agent—whether it’s a chatbot, game bot, robot, or task automation tool—relies on some version of this cycle.