

Large Language Model Powered Agents for Information Retrieval

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- Tutorial Website:
 - ❖ Slides
 - ❖ Videos
 - ❖ Future updates



- Part 1: Introduction of LLM-powered Agents
- Part 2: LLM-powered Agents with **Tool Learning**
- Part 3: LLM-powered Agents in **Social Network**
- Part 4: LLM-powered Agents in **Recommendation**
- Part 5: LLM-powered **Conversational Agents**
- Part 6: Open Challenges and Beyond



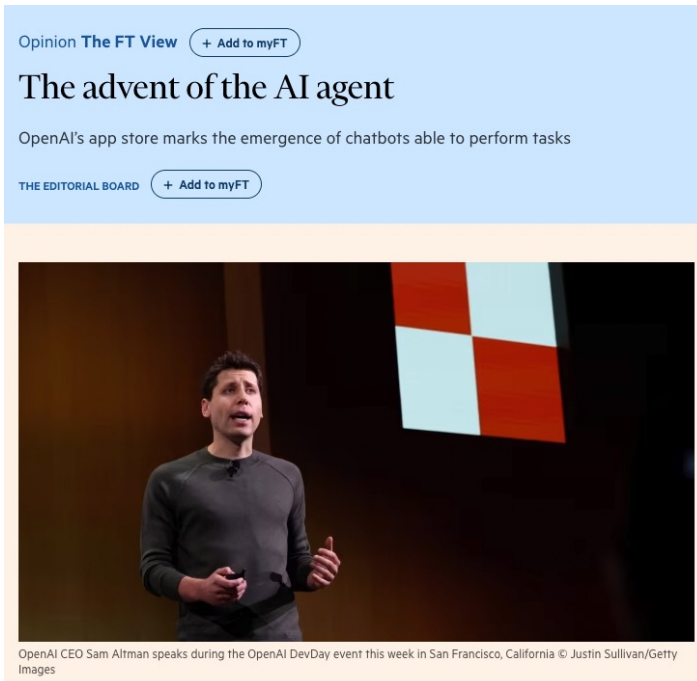
Aim of AGI

- Large LLMs exhibit characteristics of **artificial general intelligence (AGI)**, which has **cognitive abilities** similar to that of human.
- In other words, AI can now perform most functions that humans are capable of doing.



AI Agents

- **LLM-powered Agents** are artificial entities that **enhance LLMs** with **essential capabilities**, enabling them to sense their environment, make decisions, and take actions.



- **Sam Altman** (Former CEO of OpenAI) himself said in his keynote: *“GPTs and Assistants are **precursors** to **agents**. They will gradually be able to plan and to perform more complex actions on your behalf. These are our first step toward AI Agents.”*
- **Bill Gates** said in his BLOG: *“**Agents** are not only going to change how everyone interacts with computers. They’re also going to **upend the software industry**, bringing about the biggest revolution in computing since we went from typing commands to tapping on icons.”*



AI-powered visual assistance.

- Application:

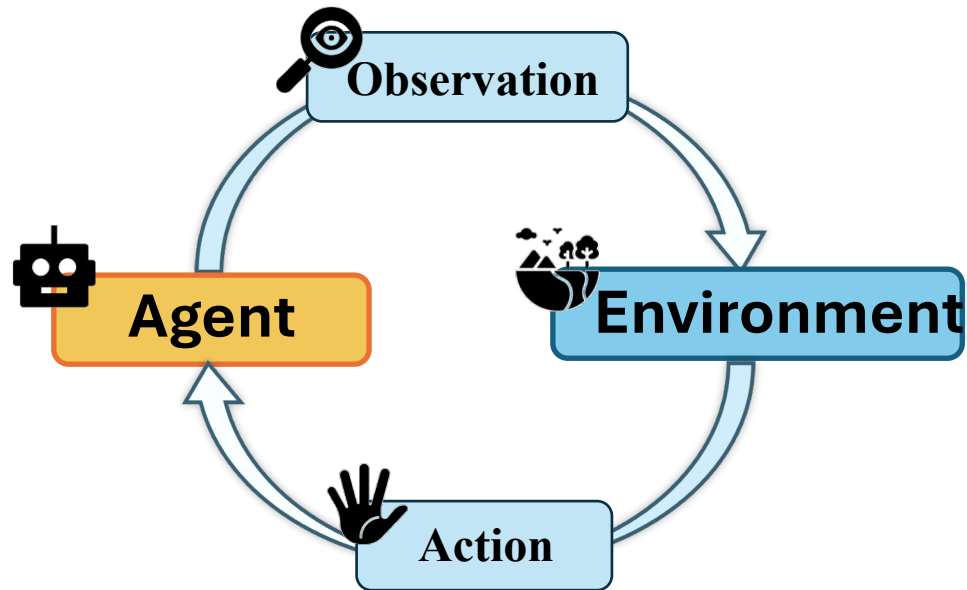
News in Financial Times. ["The advent of the AI agent"](#).

GatesNotes. ["The Future of Agents: AI is about to completely change how you use computers"](#).

The Framework of LLM-powered Agents

From LLM to AI Agent

- This paves the way for the use of AI agents to simulate users and other entities, as well as their interactions.



Environment

➤ The external **context** or **surroundings** in which the agent operates and makes decisions.

- Human & Agents' behaviors
- External database and knowledges

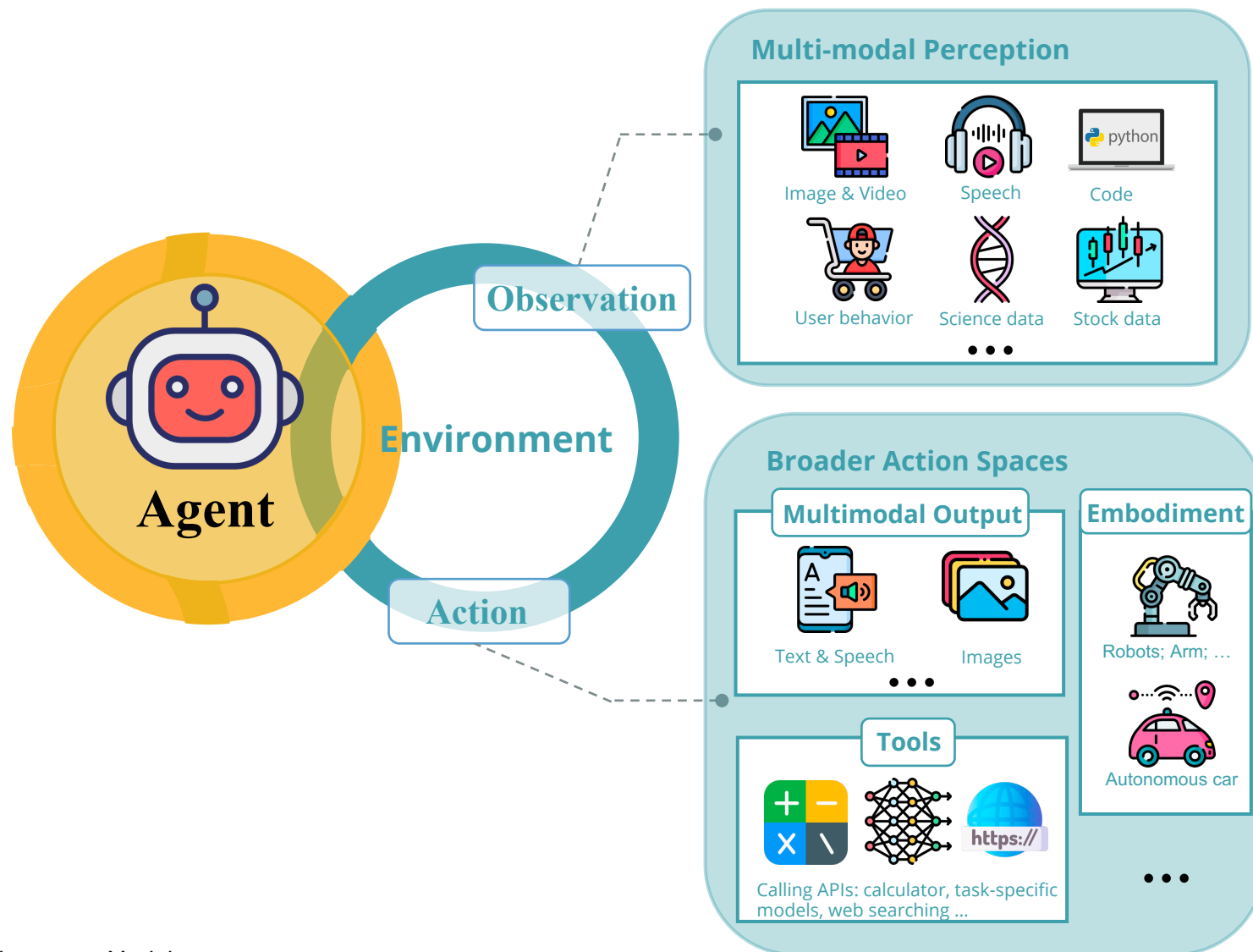


- Virtual & Physical environment



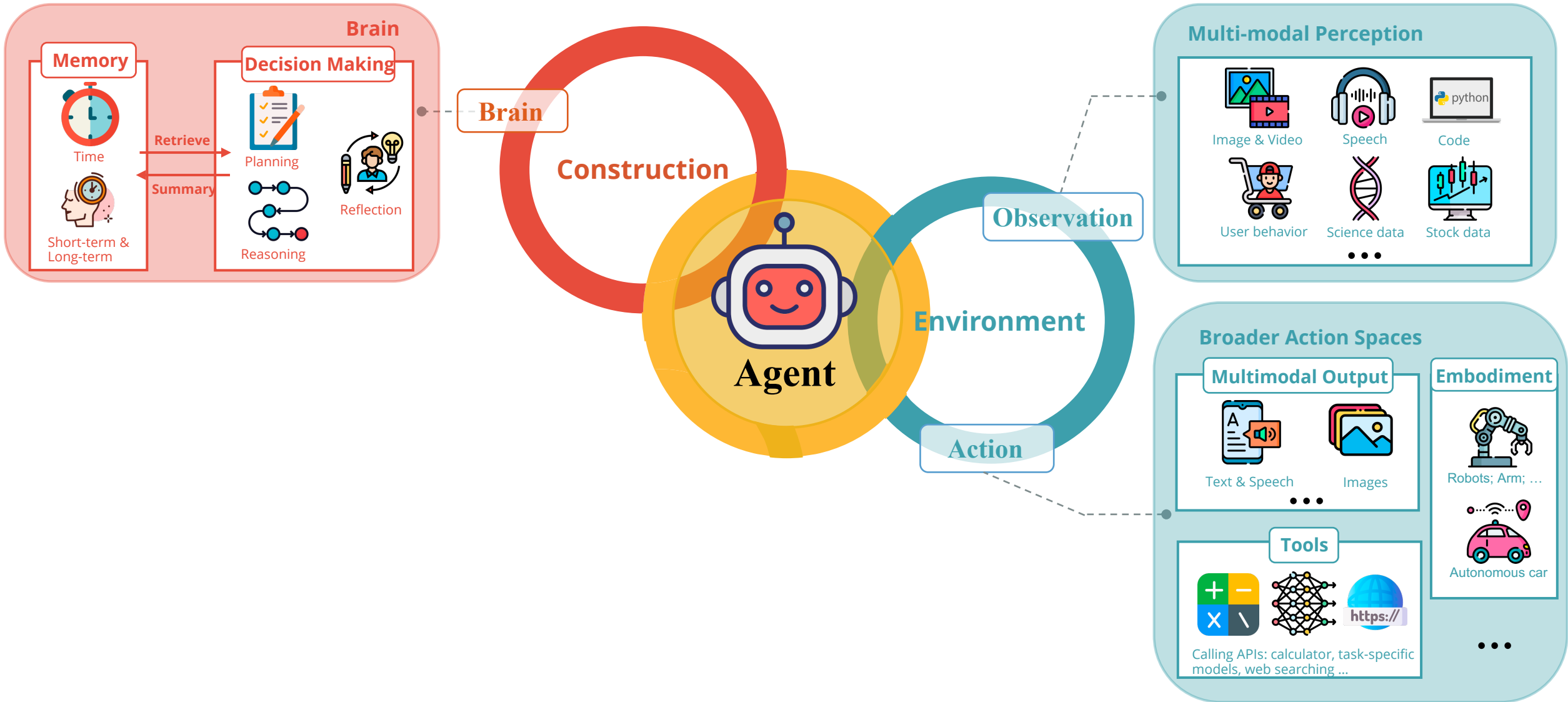
The Framework of LLM-powered Agents

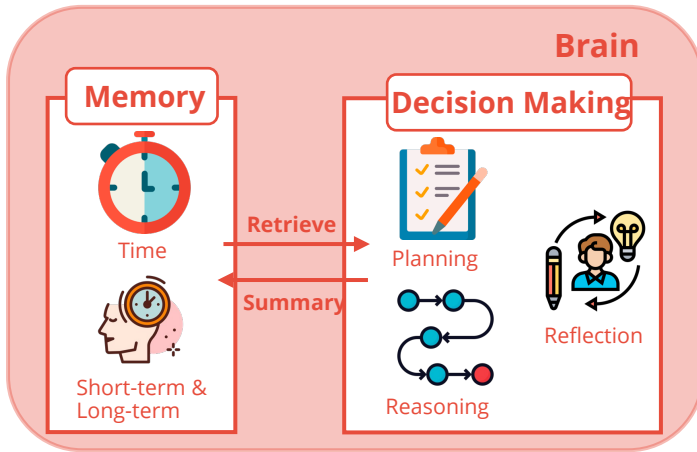
Observation & Action



The Framework of LLM-powered Agents

Brain





- ❑ **Memory:** “memory stream” stores sequences of agent’s past observations, thoughts and actions:
 - Sufficient space for long-term and short-term memory;
 - Abstraction of long-term memory;
 - Retrieval of past relevant memory;
- ❑ **Decision Making Process:**
 - **Planning: Subgoal and decomposition:** Able to break down large tasks into smaller, manageable subgoals, enabling efficient handling of complex tasks.
 - **Reasoning:** Capable of doing **self-criticism** and **self-reflection** over past actions, **learn from mistakes** and **refine** them for future steps, thereby improving the quality of final results.
- ❑ Personalized memory and reasoning process foster **diversity** and **independence** of AI Agents.

The Framework of LLM-powered Agents

Overview

