Building Agents

with LangChain, CrewAI and various services

Jan 19, Yifei Gu

Objective

- Learn and understand the concept of agent
- Build a simple agent that can use tools and external services
- Build a swarm of autonomous agents with different tasks and roles

Prediction

- In the near future, large percent of work can be augmented & automated by agents based on foundation models
- We will see more and more agents based services, think about:
  - **Workflow automation:** agents learn redundant and repetitive tasks
  - **Research:** agents will browse and summarize content, news, etc.
  - **Planning:** agents can plan trips, allocate daily tasks, etc.
  - ...
- We will see assistants integrated in every day life more often, like Microsoft Copilot, Apple Siri, Google Voice Assistant...

Exploring and developing practical applications for AI agents represent the **forefront** of advancements in Gen AI.

What is an agent 🤖

- **Autonomy:** Operating independently to achieve predefined objectives and goals.
- **Decision Making:** Processing information to make decisions.
- **Action:** Perform tasks, actions or tool use to influence its environment.
- **Adaptability:** Ability to learn from outcomes, update and plan for future actions.
- **Social ability:** Interact with other agents (and humans) to complete its tasks or to learn from others.

Swarm of Agents:

- Multiple Agents are deployed and assigned to different roles to achieve a same goal
  - Agents can be hierarchical and will interact with each other e.g. a CEO and a software engineer.
- **Modularity:** Each agent do one task and do it well
- **Composability:** Tool use will be combined for agents

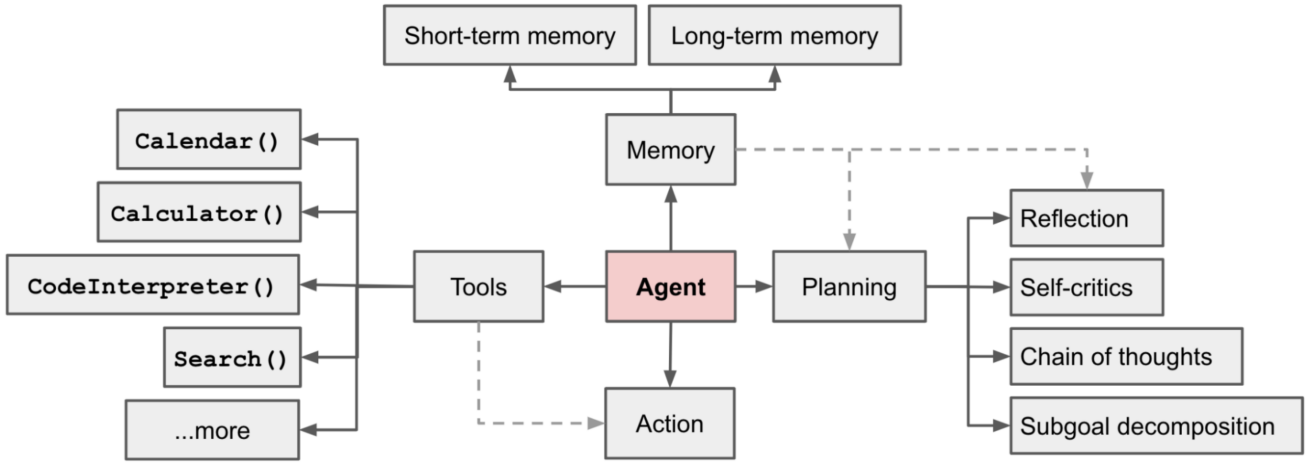
Mixture of Experts Model (MoE):

- Multiple expert networks (learners) are used to divide a problem space into homogeneous regions.

Agent System Overview

Planning

- **Task Decomposition:**
  - Chain of thought
  - Tree of thought
  - ...
- **Self-Reflection:**
  - ReAct (Reasoning + Act)
  - Self-Rewarding LMs (Reinforcement learning)
  - Improve with synthetic data (Q*)



https://lilianweng.github.io/posts/2023-06-23-agent/

Memory

- **Short-term memory:** Prompts
- **Long-term memory:**
  - Facts and events can be recalled from Vector Databases
  - Unconscious and involves skills and routines that are performed automatically

Tool use

- Toolformer
- Recall GPTs can have actions that interact with APIs through defined schema
- Agent frameworks: LangChain, AutoGen from Microsoft, CrewAI

The project

`www.github.com/g-1f/workshop`

Final Remarks

- We are in a beginning of new era that is similar to how personal computing revolutionized how we work and think.
- There are various projects working on generic AI agents, e.g. AutoGPT, BabyAGI, and cool projects like Large Action Model that understand intentions and learn tasks from demonstration etc.
- Hope the brief introduction gives you a high-level idea of current state of LLMs and their applications ☺