Evaluation of micro vs macro agents in LLM workflows

Insight into the use of different agent types for optimal performance.

Saddik Khaddamellah - HCAIM - Orq.ai

Micro VS **Macro** — Agent / Agent / Agent / Agent / Agent / Agent / Agent / Agent

Abstract

This study compares micro-agents and macro-agents in LLM platforms, focusing on when each type of agent should be used for specific use cases. By investigating the impact of task coordination, memory strategies, and the need for human control, the study provides insights for selecting the right agent structure depending on the task and context.

Introduction

LLM platforms can benefit from different types of agents: micro-agents that are highly specialized in a single task and macro-agents that can handle a broader range of tasks. This study aims to clarify in which situations micro-agents or macro-agents should be deployed by examining the impact of task coordination, memory strategy, and the degree of human control.

Research question

How do the coordination of tasks and short- and long-term memory of micro and macro-agents affect efficiency, task accuracy, and the need for human control within LLM workflows, and when should each type of agent be used for specific use cases?

Literature review

Recent research shows that memory and planning are crucial for AI agents. According to [1], memory helps AI agents collaborate better with their environment, which is useful for task coordination and reducing the need for human assistance. In [2], an AI agent is discussed with three types of memory: short-term, episodic, and semantic memory. This helps the agent remember past experiences and perform better on new tasks. [3] shows that AI agents use various strategies to plan and solve problems. This research demonstrates which methods work best for complex tasks.

Research methodology

Our methodology consists of three main phases:

1. Literature review
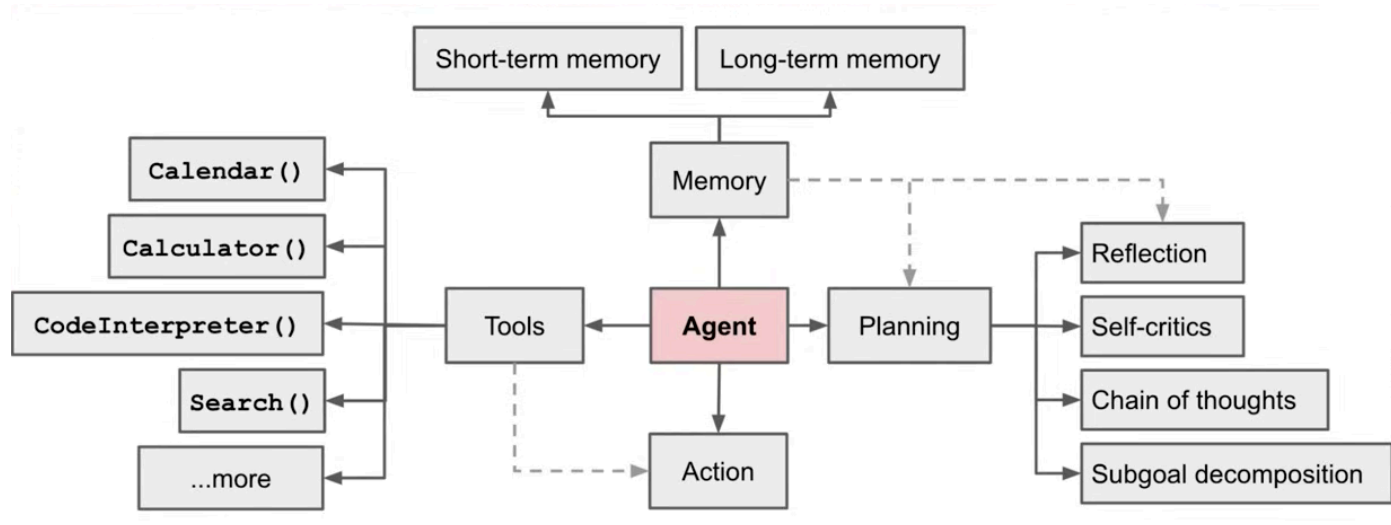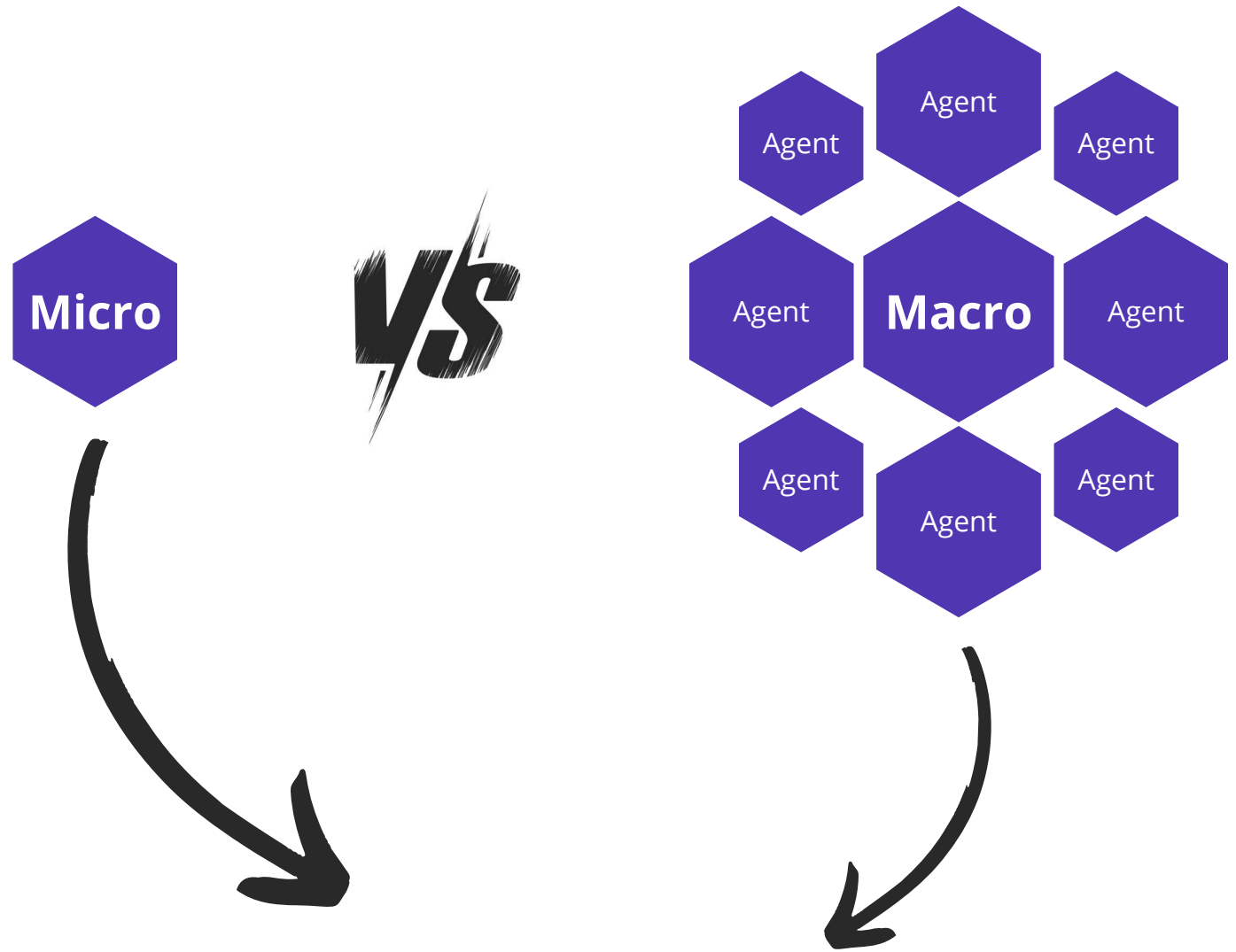2. Use case development
3. Evaluation

Fig. 1. General components of an AI Agent (Source: https://youtu.be/pBBe1pk8hf4)

Preliminary considerations

This study will help understand when to deploy micro-agents or macro-agents in LLM workflows. The findings can guide decisions in AI system design.

Conclusions

This study will clarify when micro-agents and when macro-agents should be deployed in LLM workflows, providing practical guidelines for selecting the right agent structure based on the task, memory management, and human control needs.

References.
[[1] Zhang, Z., Bo, X., Ma, C., Li, R., Chen, X., Dai, Q., Zhu, J., Dong, Z., & Wen, J. (2024, April 21). A Survey on the Memory Mechanism of Large Language Model based Agents. arXiv.org.
[2] Kim, T., Cochez, M., Francois-Lavet, V., Neerincx, M., & Vossen, P. (2023). A Machine with Short-Term, Episodic, and Semantic Memory Systems. Proceedings of the AAAI Conference on Artificial Intelligence, 37(1), 48–56.
[3] Masterman, T., Besen, S., Sawtell, M., & Chao, A. (2024, April 17). The landscape of emerging AI agent architectures for reasoning, planning, and tool calling: a survey. arXiv.org.