AgentGit: A Version Control Framework for Reliable and Scalable LLM-Powered Multi-Agent Systems

Yang Li[1], Siqi Ping[1], Xiyu Chen[1], Xiaojian Qi[1], Zigan Wang[2], Ye Luo[3], Xiaowei Zhang[4]

[1]University of Hong Kong, Hong Kong SAR
[2]Tsinghua University, China
[3]University of Hong Kong, Pokfulam Road, Hong Kong SAR, kurtluo@hku.hk
[4]Hong Kong University of Science and Technology, Hong Kong SAR, xiaoweiz@ust.hk
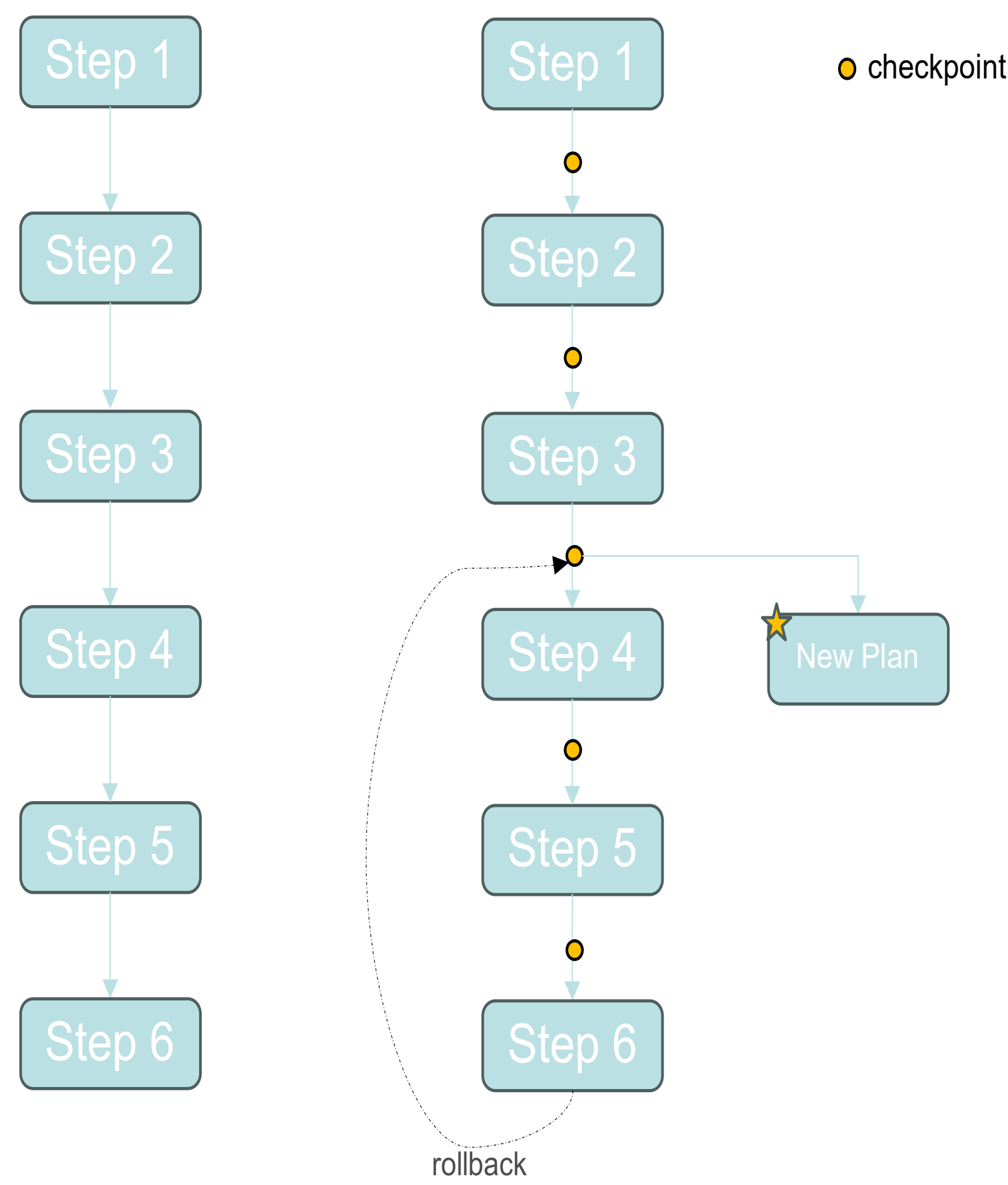
Abstract

We propose AgentGit, a framework addressing key challenges in reliability and scalability for multi-agent systems (MAS). By introducing Git-like rollback and branching mechanisms, AgentGit significantly improves execution efficiency in complex tasks. Experiments validate its advantages in reducing redundant computations and optimizing runtime.
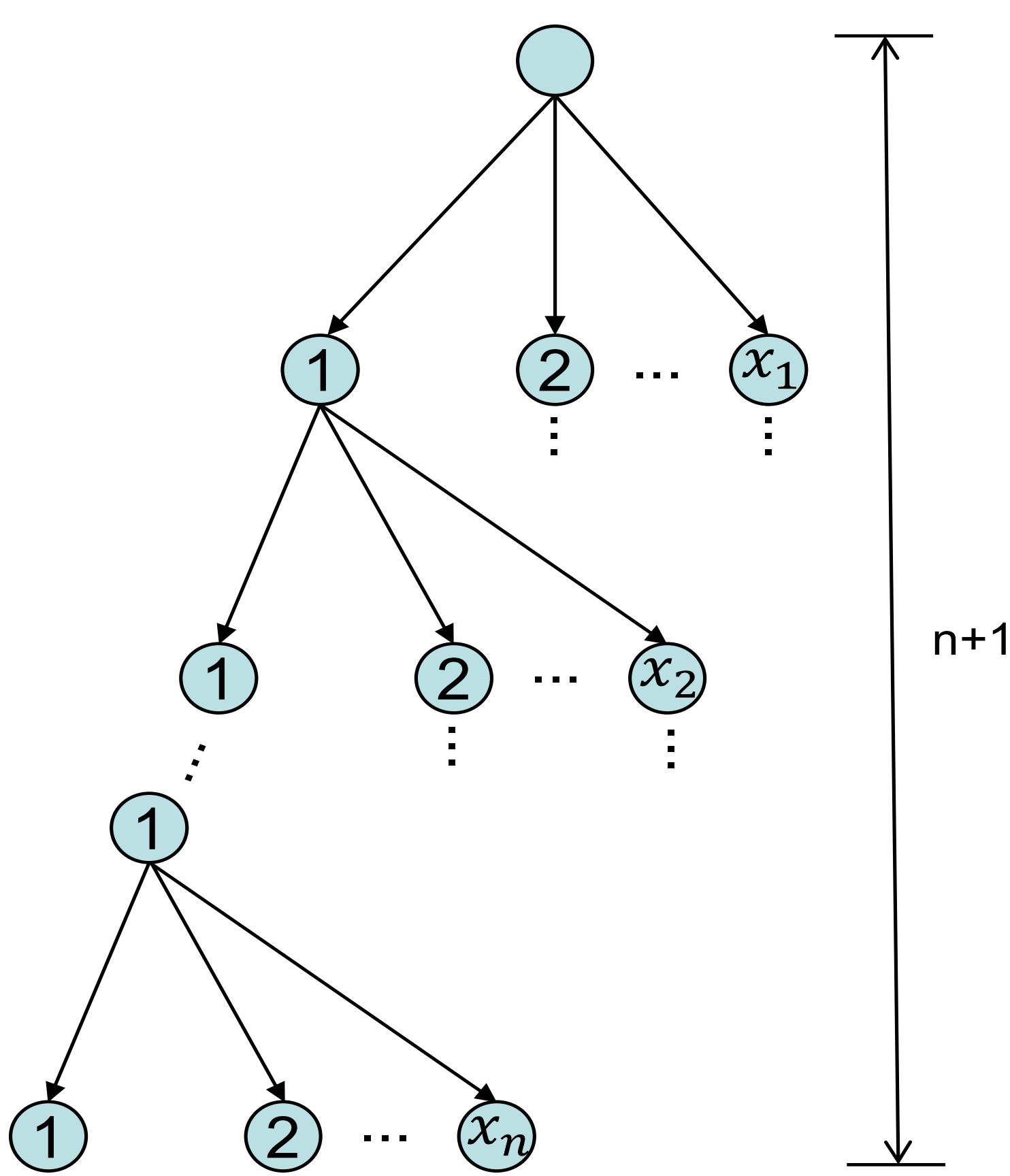
Background

With the advancement of large language models (LLMs), LLM-powered multi-agent systems (MAS) have gained attention in academia and industry. However, existing frameworks lack effective rollback mechanisms, limiting their reliability and scalability by preventing localized error recovery.
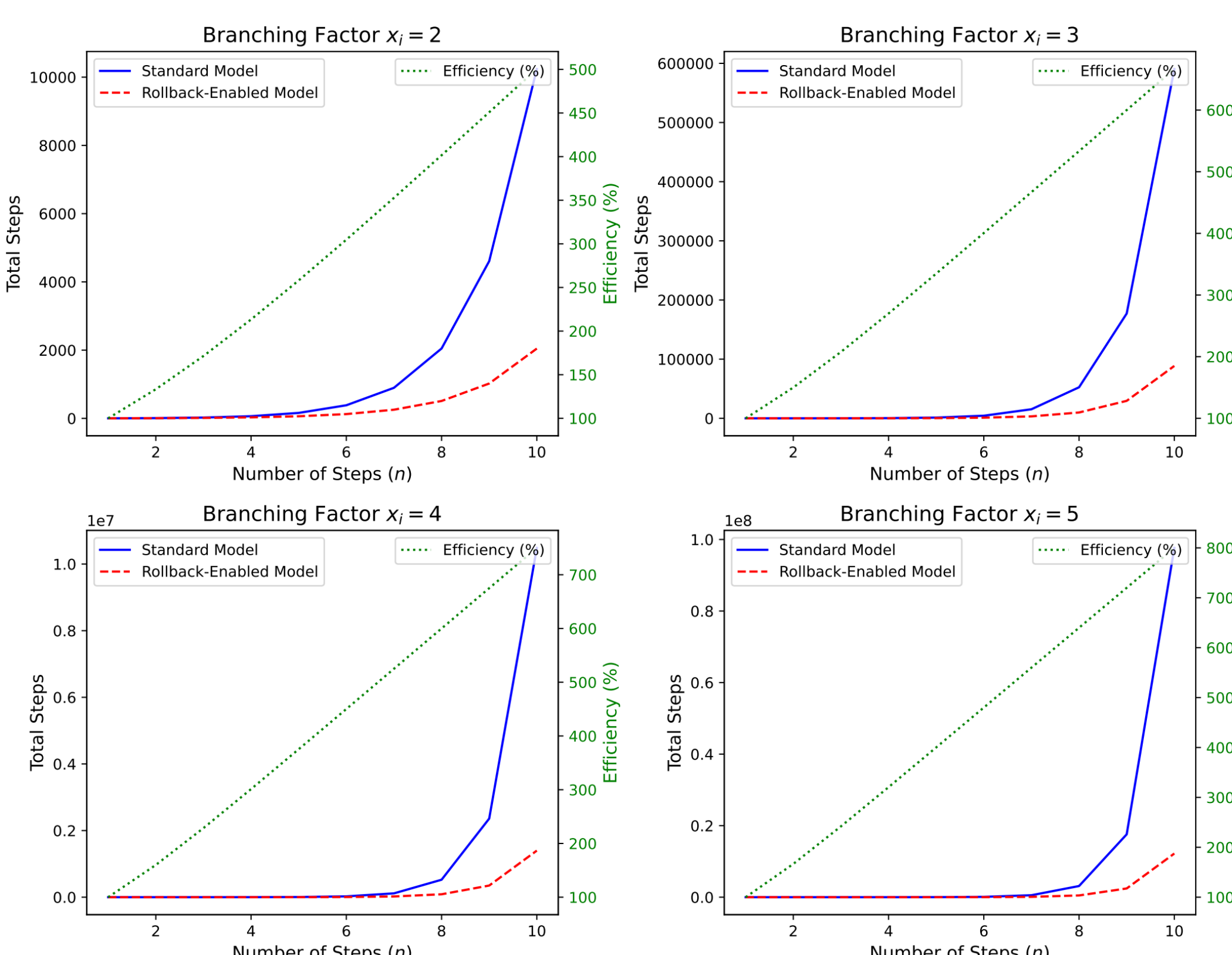
AgentGit Framework
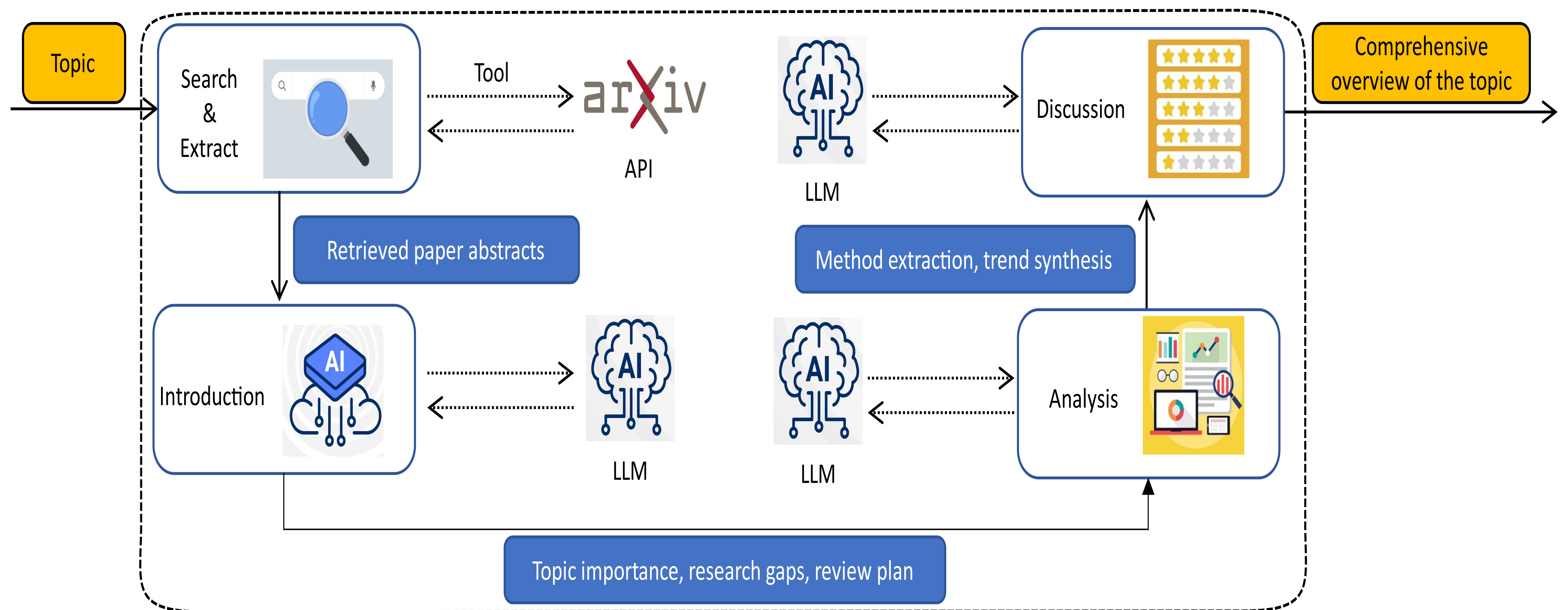
1.Support rollback

2.Support branching

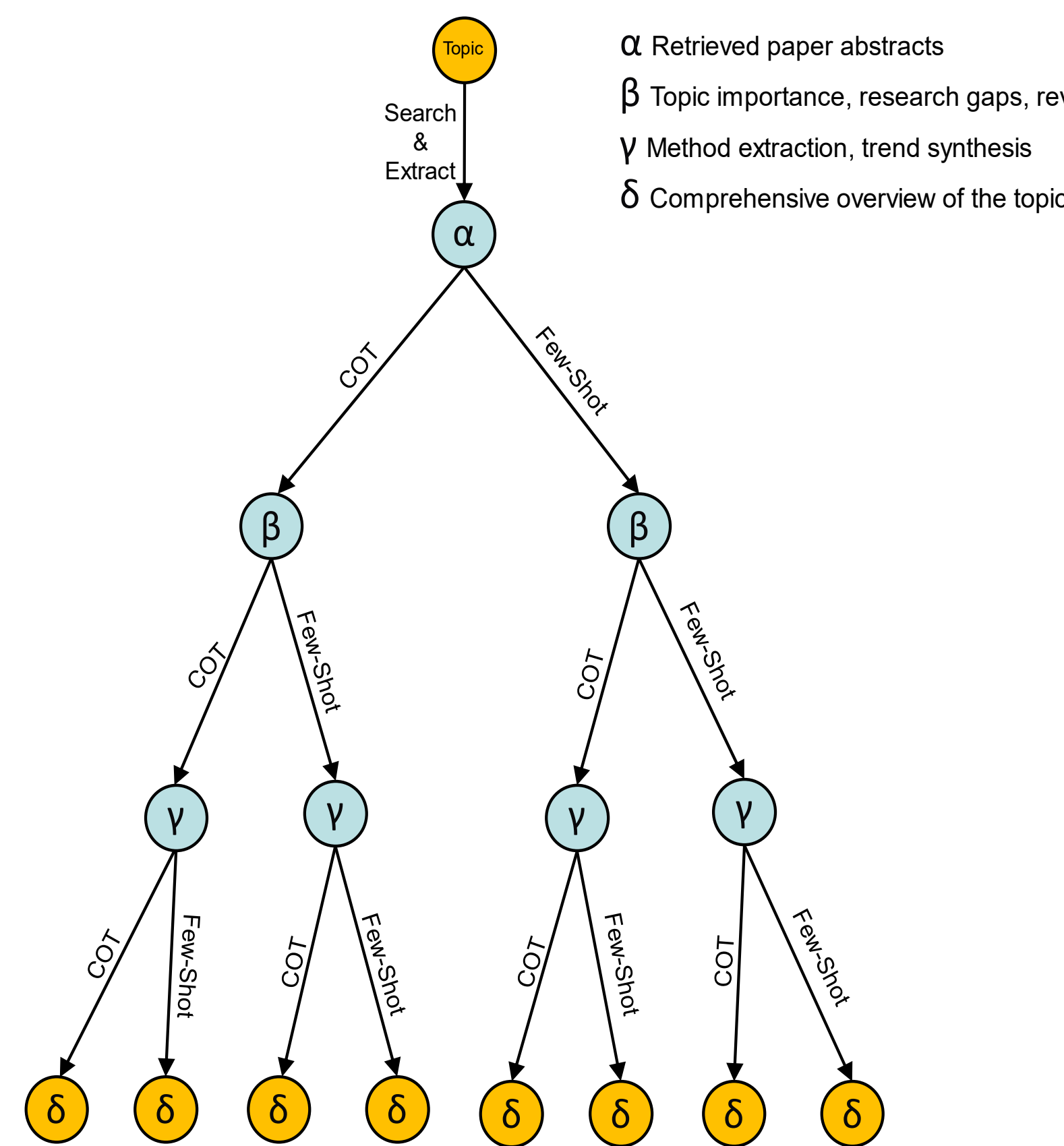3.Efficiency comparison between standard model and rollback-enabled mode

Experiment & Results

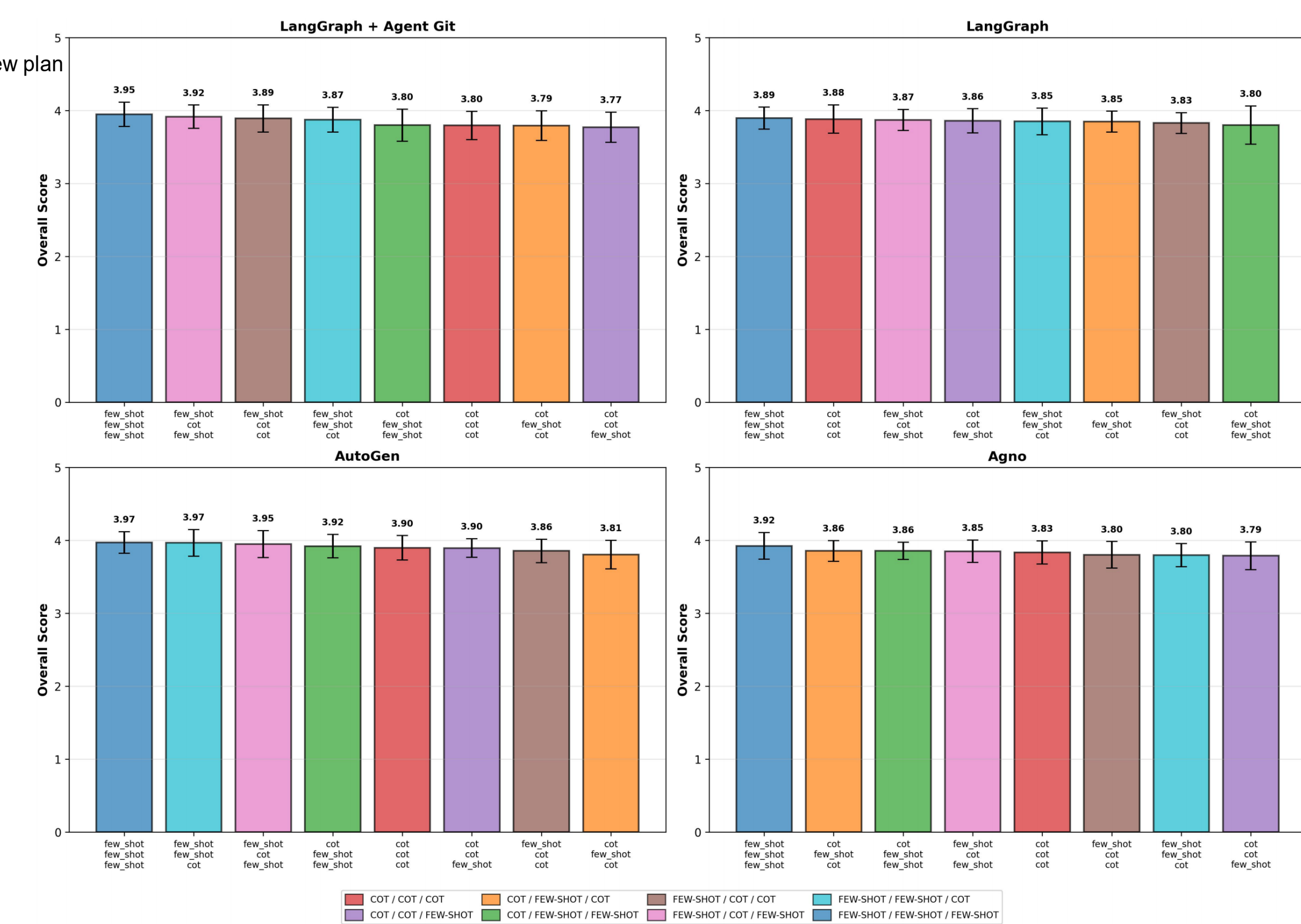1.We designed an A/B test task to retrieve and analyze paper abstracts from arXiv on a specific topic.
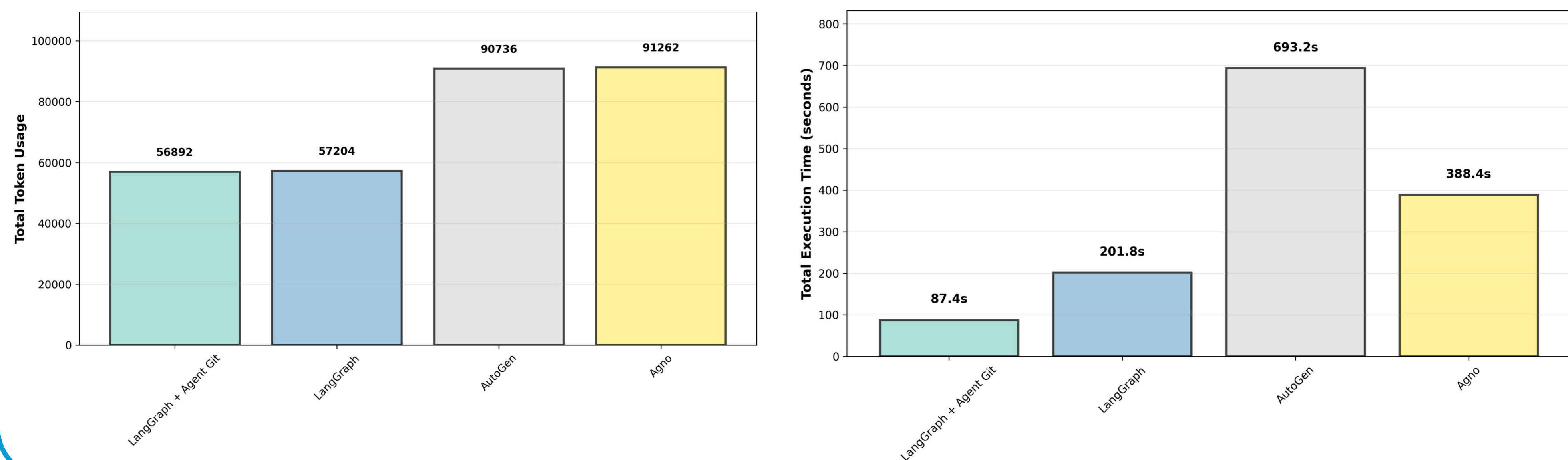

2. Branching structure of the task

3. G-eval scores for output quality with different prompt generation strategies

4. Token usage and execution time comparison of different frameworks for completing the task

Conclusion

1. AgentGit is the first multi-agent framework toolkit that introduces Git-like rollback and branching mechanisms into LLM-powered agent systems, enabling efficient and reversible execution in complex workflows.

2.Theoretical complexity demonstrates AgentGit's scalability and efficiency in reducing redundant computations during iterative tasks.

3. Experiments show AgentGit significantly improves testing efficiency by reducing token consumption and optimizing runtime.

4. We fully open-source our dataset, codebase, and the AgentGit framework to facilitate further research and development in the field of MAS.