

Generative AI vs Agentic AI: A Comparative Analysis of Capabilities, Autonomy and Limitations

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Abstract: *The fast development of intelligence has led to a change from systems that were mainly made to create information toward systems that can plan and carry out tasks. Generative Artificial Intelligence (Generative AI) has shown abilities in making text, images, code, audio and other digital content from natural-language instructions. Agentic Artificial Intelligence (Agentic AI) adds to these abilities by including reasoning, planning, memory, tool use, interaction with the environment and acting on its own. Even though both approaches are similar and often use the base models they are very different in their goals and how they work. This paper gives an analysis of Generative AI and Agentic AI with a focus on abilities, independence, interaction, execution, flexibility and limits. The analysis shows that Generative AI is mainly about reacting and creating content while Agentic AI is about goals and doing -step tasks with different levels of independence. However more independence does not always mean an AI system is better for every problem. Agentic systems bring problems like errors spreading, unexpected behavior, security making sure the AI is aligned with humans, who is responsible and the cost of computing. The paper also says that the difference between the two types is better seen as a change over time than a fight. Generative AI gives the ability to understand and create information while Agentic AI adds ways to use that ability in longer action-focused steps. The paper ends by saying future AI systems will probably mix intelligence with controlled independence and human check rather than replace one way with another.*

Keywords: Generative AI, Agentic AI, Artificial Intelligence Agents, Autonomy, Large Language Models, Planning, Memory, Tool Use, AI Systems

I. INTRODUCTION

The fast development of intelligence has led to a change from systems that were mainly made to create information toward systems that can plan and carry out tasks. Generative Artificial Intelligence (Generative AI) has shown abilities in making text, images, code, audio and other digital content from natural-language instructions. Agentic Artificial Intelligence (Agentic AI) adds to these abilities by including reasoning, planning, memory, tool use, interaction with the environment and acting on its own. Even though both approaches are similar and often use the base models they are very different in their goals and how they work. This paper gives an analysis of Generative AI and Agentic AI with a focus on abilities, independence, interaction, execution, flexibility and limits. The analysis shows that Generative AI is mainly about reacting and creating content while Agentic AI is about goals and doing -step tasks with different levels of independence. However more independence does not always mean an AI system is better for every problem. Agentic systems bring problems like errors spreading, unexpected behavior, security making sure the AI is aligned with humans, who is responsible and the cost of computing. The paper also says that the difference between the two types is better seen as a change over time than a fight. Generative AI gives the ability to understand and create information while Agentic AI adds ways to use that ability in longer action-focused steps. The paper ends by saying future AI



systems will probably mix intelligence with controlled independence and human check rather than replace one way with another.

II. PROBLEM STATEMENT

The rapid development of Generative AI and Agentic AI has created uncertainty regarding the differences between their capabilities, levels of autonomy, and limitations. Although both approaches often use similar foundation models, they differ significantly in how they reason, use tools, interact with environments, and perform tasks. The increasing use of Agentic AI also introduces concerns related to reliability, security, error propagation, and human control. Therefore, a comparative analysis is required to clearly distinguish Generative AI from Agentic AI and examine the advantages and limitations of increasing AI autonomy.

III. CONCEPTIONAL BACKGROUND

The distinction between Generative AI and Agentic AI is not based solely on the underlying machine-learning model. In many modern systems, both rely on large foundation models. The difference lies largely in how the model is organized into a larger system and what it is allowed to do.

Generative AI can be broadly understood as a foundation-model-based system that generates digital artifacts from natural-language or other human-understandable instructions. The output may be a paragraph of text, an image, a piece of software code, or another form of digital content. Its principal objective is therefore generation.

Agentic AI extends this concept by enabling a system to pursue a task that may involve multiple actions and interaction with an external environment. Schneider characterizes this distinction through two foundational differences: deeper reasoning and interaction with an environment or external tools. Agentic systems can therefore perform workflows rather than merely producing a single response.

This distinction can be summarized conceptually as:

3.1 Generative AI:

Generative AI is about systems that make things by learning from big data. Its fast growth is because of base models and big deep-learning setups. These systems can make things in ways and are getting used more in daily software and work.

The main thing about Generative AI is its ability to turn a person's instruction into a digital thing. A user might ask for a report, code, summary, image or translation and the system makes the thing they want. This makes Generative AI really good when the task is clear. The result is mainly about information or creativity.

Generative AI also has a way to talk to people. The person usually sets the task checks the result and decides what to do. This gives the person a lot of control over the steps. This doesn't mean that Generative AI can't think or use tools. Modern ones can do thinking and can connect to search systems, APIs, software tools and other sources. The main difference is that these abilities don't always mean the model works on its own. A model might have access to a tool. Still be part of a person-controlled process.

So, the good part of Generative AI is that it is fast can do things and is used in many areas. It helps with work, communication, education, software making, research and many other things without people having to make complicated steps.



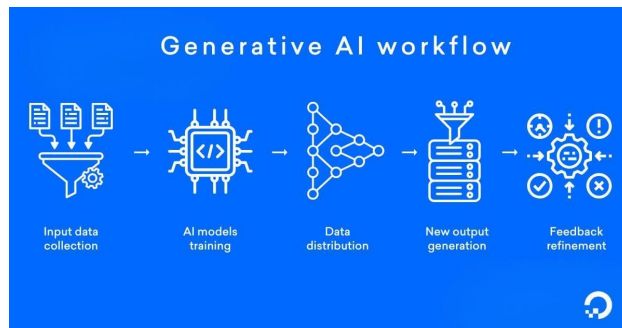


Fig 1. Generative AI Workflow

3.2 Agentic AI:

Agentic AI is when the model becomes part of a system that can reach goals through many steps. Of just making a response the system thinks about what needs to be done chooses actions talks to tools or the environment checks results and changes what it does.

Agentic systems usually have different parts working together. A base model gives language and thinking skills while planning parts decide what actions to take. Memory or managing state lets the system keep information between steps. Tools give access to resources and ways to check results let the agent see how well it did. Approval and safety parts can be added to manage big steps.

Agentic AI is goal-focused works on its own keeps going changes and can plan remember, fix mistakes and talk over time. Schneider also says that agents can work on goals talk to the world and tools and do complex thinking about planning and thinking back.

So, the main thing about an agent is not just that it can make content. It can use the ability to make content as part of a process to reach a goal.

For example, a Generative AI system can make a program when told what it needs to do. An Agentic AI system could understand the goal look at existing code find the parts make changes, test check if it works fix the code and try again until its good. In the case making is part of a process that is about doing something.

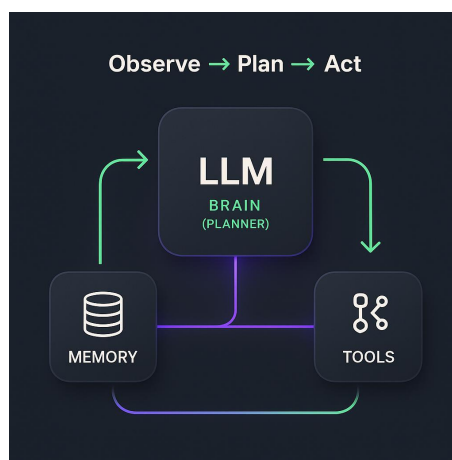


Fig 2. Conceptual architecture of an Agentic AI system



3.3 Evolution from Generative AI to Agentic AI

The emergence of Agentic AI can be understood as an evolution in how generative models are used. Early Generative AI systems mainly gave answers to user prompts. As reasoning models tool-use mechanisms, memory systems and interaction frameworks were built AI systems grew more able to carry out tasks that need steps. This change is a shift from Generative AI, which had only small reasoning and tool-use skills toward systems that have much stronger planning, reflection, environmental interaction and agent coordination.

The path can be shown as:

Generation → Tool Use → Structured Workflows → Planning and Feedback → Execution

The first stage focuses on creating content. The second stage gives access to resources. The third stage brings in predefined sequences of operations. The fourth stage lets reasoning and adaptation happen across steps. The final stage mixes all these abilities into an agent that can work toward a goal with direct supervision.

This evolution does not mean that Generative AI will become useless. In fact, the generative model remains a part of many agents. The difference lies in the control architecture that surrounds the model.

IV. COMPARATIVE ANALYSIS

4.1 Comparative analysis of capabilities

Comparative analysis of capabilities Generative AI and Agentic AI share a base in current AI models but their abilities differ in how they handle tasks and reach outcomes. The main differences are listed below.

Capability	Generative AI	Agentic AI
Content Generation	Generative AI writes text, code makes images creates other content.	Agentic AI generates content as part of a larger task or workflow.
Reasoning	Generative AI uses reasoning to produce an answer or solution.	Agentic AI uses reasoning to decide actions and solve multi-step problems.
Planning	Generative AI can suggest a plan when prompted.	Agentic AI can create, execute and modify plans autonomously.
Tool Use	Generative AI may use tools when provided or instructed.	Uses tools according to task requirements.
Memory	Generative AI mainly depends on context.	Agentic AI can maintain memory and task state across steps.
Task Execution	Generative AI primarily provides information or instructions.	Agentic AI can perform actions through tools and systems.
Adaptability	Generative AI mainly responds to the prompt.	Agentic AI uses feedback to modify actions.
Environmental Interaction	Generative AI interaction with external systems.	Agentic AI can interact with websites, APIs, databases, files and applications.
Goal Orientation	Generative AI usually focused on completing the request.	Agentic AI focused on achieving an objective.
Autonomy	Generative AI mostly human-directed.	Agentic AI can operate with high autonomy.

4.2 Comparative Analysis of Autonomy

Autonomy represents one of the most important differences between Generative AI and Agentic AI. It refers to the degree to which an AI system can make decisions and perform actions without requiring continuous human instructions.



Aspect	Generative AI	Agentic AI
Human involvement	It is high; user usually guides each task.	It is lower; system can handle intermediate steps independently.
Decision-making	It mainly responds to user instructions.	It can make decisions based on goals and current conditions.
Task execution	It primarily generates information or recommendations.	It can execute actions using connected tools.
Planning	It can suggest a plan when asked.	It can modify plans during execution.
Goal orientation	It is focused on the immediate prompt.	It is focused on achieving an objective.
Adaptation	It is limited to the interaction.	It can adapt actions based on feedback and results.
Memory	It mainly depends on context.	It can maintain task state and memory across steps.
Interaction	It is usually limited.	It can interact with APIs, databases, software and other environments.
Level of autonomy	It is low to moderate.	It can range from partial to full autonomy.
Risk of action	It is relatively lower.	It is higher because the system can take actions independently.

4.3 Comparative Analysis of Limitations

Both Generative AI and Agentic AI have limits. Agentic AI brings extra challenges because it can plan and act with more independence.

Aspect	Generative AI	Agentic AI
Hallucination	It may generate misleading information.	Incorrect information can influence decisions and actions.
Hallucination	It may generate incorrect or misleading information.	Incorrect information can influence decisions and actions.
Planning	It usually depends on steps.	It can create plans. May produce incomplete or wrong plans.
Autonomous action	It is limited; mostly gives answers.	It can act independently, raising the impact of mistakes.
Error propagation	Its errors are usually limited to the output.	Its errors can affect steps and the final result.
Tool misuse	Its misuse is lower when tool access is limited.	It may use a wrong tool or API.
Security Risks	It faces privacy, bias, misinformation and prompt manipulation.	It faces risks from accessing APIs, files, databases and external systems.
Memory	It can struggle with long-term context.	It can keep wrong memory.
Predictability	Its responses can be unpredictable.	Its actions can be harder to predict because the agent changes dynamically.
Human control	It usually needs human involvement.	It may become harder to control with human intervention.
Evaluation	It mainly checks quality and accuracy of output.	It needs evaluation of planning, actions, safety, efficiency and final result.
Computational cost	It often costs less for tasks.	It can cost more because of repeated reasoning, tool calls and many steps.



Accountability	Its responsibility is easier to identify.	Its responsibility becomes more complex when many systems act.
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V. APPLICATIONS

- **Education:** Making content explaining things helping students learn and giving study assistance.
- **Software development:** Writing code fixing bugs testing software and making software workflows run on their own.
- **Healthcare:** Summarizing documents helping with information and making administrative tasks automatic.
- **Business:** Writing reports making marketing content automating workflows and helping people make decisions.
- **Research:** Looking through literature gathering information summarizing data and providing research assistance.
- **Customer service:** sending automated responses finding information and helping customers through steps.
- **Finance:** Analyzing finances, writing reports keeping an eye on data and automating workflows.

VI. FUTURE SCOPE

In the future researchers will work hard to make the planning, reasoning, memory, security and reliability of AI much better. I think we will see human-, in-the-loop systems because people need to control high-risk actions. We also need ways to measure how well Agentic AI finishes a whole task instead of just looking at what Agentic AI writes. When we mix Generative AI and Agentic AI together we will get strong hybrid AI systems. These hybrid AI systems will do work on their own while still staying safe and letting humans stay in control.

VII. CONCLUSION

Generative AI and Agentic AI are close. They mainly differ in how much autonomy they have. Generative AI concentrates on making content and helping users while Agentic AI adds planning, memory, tool use and independent task execution. Generative AI works best for content-focused jobs while Agentic AI works better for multi-step workflows. More autonomy also brings bigger risks like error spread, security problems and less human control. So future AI systems should mix both approaches. Keep strong human oversight, reliability and security

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