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THE PERFORMANCE COMPARISON OF AI TOOLS IN COGNITIVE DEVELOPMENT

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Abstract
This paper discusses the growing concern about Artificial Intelligence tools, that having inadequate ability to improve cognitive growth and creative project work. Even though ChatGPT and Gemini are widely used, these platforms frequently fall short in understanding the nuances and complexity of human reasoning. They lack the intuitive comprehension required for abstract or context-rich queries and instead rely on formal cues. Because of this, users might grow unduly reliant on AI, which would impair their ability to think critically and creatively, particularly in professional and academic contexts. Furthermore, gathering vast amounts of data sometimes without explicit user consent is a common step in the creation of AI systems. The risks of unlawful data use for manipulation and behavioral impact are highlighted by previous reported events, such as disputes involving large internet companies like Facebook. Despite the fact that some AI tools make the claim to mimic emotional intelligence, their limitations originate from the fact that they are human-made, subject to biases, and have the capacity to spread false information that is frequently influenced by big corporate interests. Concerns regarding AI's legitimacy in academic settings are also raised by the dearth of trustworthy sources and the technology's propensity to generate erroneous or mixed content.

INTRODUCTION

Many occupations, including indoor and outdoor, can now be finished in a matter of seconds due to development of AI. However, critical thinking has decreased as a result of this quick efficiency. People are depending more and more on AI for immediate solutions rather than thinking critically or solving problems on their own. As convenience starts to supplant mental work, this increasing reliance threatens human intellectual growth. Unchecked technology growth without careful management has historically resulted in societal complacency and cognitive stagnation; this pattern is reflected in the fast-paced digital world of today. The incapacity of AI systems to efficiently interpret ambiguous or irregular inquiries is a major drawback.

These systems frequently generate insufficient or useless responses when inputs deviate from predetermined parameters. Furthermore, they are usually unable to fulfill requests for complicated deliverables, including full projects with graphical user interfaces. In these situations, ChatGPT and other AI techniques typically provide merely sample

code rather than fully functional systems. Responses are frequently insufficient or off-topic in the absence of clear and structured instructions, such as the programming language. To guarantee that AI continues to be a tool for assistance rather than a replacement for human intellect, these constraints must be addressed.

Supposedly, AI will not formulate an answer until given clarifying prompts like the following: "Do you want a fully equipped website with a functioning GUI, or a ready-made template that can be customized? What kind of template do you want: portfolio, e-commerce, blog, or dashboard?" responses illustrations a distinct hindrance repeated human input in AI-guided project work. Even after baseline prerequisites are set, the AI constantly requires additional information. More often than not, the AI complete code—generally in frameworks such as React.js—only after multiple iterations of manual direction through modification refinement. This emphasizes an important drawback: AI tools do not have contextual understanding to independently provide coherent answers or fully working solutions without ongoing human management.

Following are research questions for our research.

Analyzing the impact of AI tools on human cognitive development.

Examining how AI affects project creativity and innovation.

Identifying the limitations of AI in understanding human queries.

Proposing balanced approach to AI usage that encourage critical thinking.

AI in various Cognitive Levels

In this section, the authors have discussed about AI in Cognitive Creativity, Cognitive Development, Human Co-Creation and Understanding Human Queries.

AI and Cognitive Development

Studies reveal that hands-on learning activities, critical thinking, and problem solving are all essential for cognitive growth [1]. But artificial intelligence technologies usually provide immediate responses, so reducing the need of intensive critical analysis. Recent studies reveal that heavy dependency on artificial intelligence reduces cognitive involvement since consumers passively accept results without critical analysis [2]. Furthermore, AI-generated material lacks intentionality, a basic characteristic of human intelligence. The passive consumption of AI results could undermine the significance of internal mental processes emphasized by the "cognitive revolution" in psychology.

AI and Creativity

Including ideation, experimentation, and the production of original ideas, creativity is a fundamental component of human intelligence [3]. Although artificial intelligence algorithms can generate apparently original material, their fundamental reliance on current data limits their ability to inspire real innovation [4]. Research indicates that AI-generated results lack creativity or emotional impact, therefore they are less interesting than human produced work [five]. Moreover, constant exposure to such content might limit the variety of human ideas since people start to reflect AI-generated patterns instead of participate in free creative thought [6].

Human-AI Co-Creation and Its Limitations

Creative disciplines including writing, painting, and design have among other things seen much study on human-AI cooperation [6]. Although AI can help with content generation and brainstorming, studies reveal it cannot replace human creativity [7]. Many consumers find AI-generated material shallow and in great need of great editing to reach depth [8]. Moreover, emphasizing its limits in promoting cognitive growth is AI's difficulty in managing sophisticated problem-solving assignments requiring contextual grasp and nuanced reasoning.

AI's Struggles with Understanding Human Queries

AI also has a great difficulty interpreting difficult or vague questions. Particularly when requested to give thorough justifications or references, AI methods sometimes yield erratic or insufficient answers. This begs questions regarding disinformation [9], as AI-generated content could appear authoritative but lacks trustworthy, verifiable references [10]. Emphasized in the introduction, the dependence on organized cues underlines this basic difficulty [11].

This study looks qualitatively at how poorly AI understands human questions and how this affects human intelligence. It also employs example-based analysis to investigate AI's limitations in advancing creativity, especially in the field of software development. The research examines several AI technologies often employed for creative activities and project development, therefore emphasizing their limitations in replicating human creativity, intuition, and contextual knowledge.

Performance Comparison of Different AI Tool

Table I discusses various AI tools. Each tool performance and other features are also compared and discussed below in finding better tool. The data is retrieved from various sources i-e Google scholar, IEEE, Academia, Research gate, Scopus, Elsevier and other sources.

Table I: Performance Comparison of Different AI Tool

Ref	Tool	Performance	Simple queries response time	Complex queries response time	Limit of chat	Tool types	Extra feature	Chrome extension
[12]	CHATGPT	80%	1.5 second	5 to 30 second or even longer	25-50	large language model	yes	yes
[13]	GEMINI	90%	10-12 second	5 to 30 second or even longer	no limit	large language model	no `	**no**
[14]	PERPLEXITY AI	93%	2.5-12 second	5 to 30 second or even longer	300	large language model	no	no
[15]	CLAUDE AI	90%	45 message every 5 hours	6 to 10 second or even longer	500	large language model	no	no
[16]	GITHUB COPLIT	95%	<1 second	1-5 second or even longer	no	code gen	code completion	yes
[17]	STABLE DIFFUSION	85%	5-15 second	10-60 second or even longer	no	image gen	custom model	no
[18]	DALL-E 2	68%	3-10 second	10-45 second or even longer	no	image gen	image editing	no
[19]	MIDJOURNEY	88%	10-30 second	30-120 second or even longer	no	image gen	discord integration	no
[20]	RUNWAY ML	80%	variable	variable	no	video gen	video editing	no
[21]	DESCRIPT	85%	variable	variable	no	audio / video	transcription	no
[22]	JASPER AI	82%	2-5 second	5-20 second	variable	marketing	templates	yes
[23]	COPY.AI	80%	2-5 second	5-20 second	variable	marketing	workflows	yes
[24]	CANVA AI	85%	1-5 sec	5-15 sec	n/a	design	magic edit	yes
[25]	TOME	90%	3-8 sec	5-15 sec	variable	design	ai presentation	no
[26]	CONSENSUS	95%	1-3 sec	2-8 sec	n/a	research	paper summarization	yes

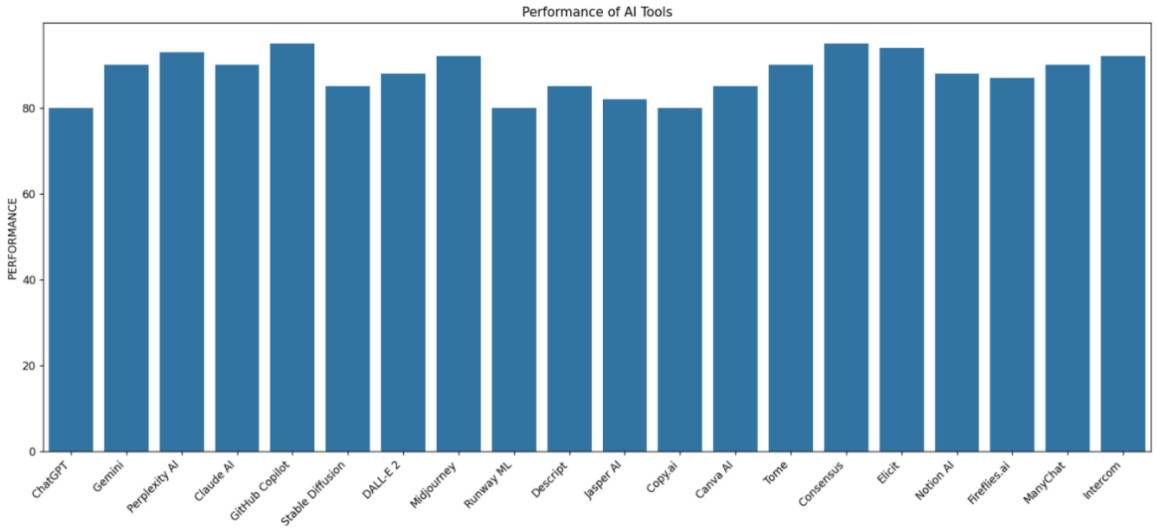
[27]	ELICIT	94%	1-3 sec	2-8 sec	n/a	research	data extraction	no
[28]	NOTION AI	88%	2-5 sec	5-15 sec	variable	productivity	writing assistance	yes
[29]	FIREFLIES.AI	87%	variable	variable	n/a	productivity	meeting transcription	yes
[30]	MANY CHAT	90%	<1 sec	1-3 sec	variable	customer service	chatbot flows	no
[31]	INTERCOM	92%	<1 sec	1-3 sec	variable	customer service	live chat	no

According given data, we can estimate the performance of each AI tools.

Performance of AI Tools

In terms of performance, the majority of AI tools achieve an accuracy rate of over 90%, with the exception of a few, such as ChatGPT and Stable Diffusion, which demonstrate slightly lower performance in certain contexts.

Figure No. 1 Performance of AI Tools



Simple Queries Response Time

Based on the given data, it is estimated that the response time for simple queries varies across different AI platforms. This variation indicates that an AI tool's performance is highly dependent on the nature of the problem. By "Simple Queries Response Time," we refer to the amount of time an AI tool takes to respond to or solve a basic question.

In the graph above, we analyze the relationship between simple query response time and various AI tools, focusing on how different platforms handle basic tasks—such as building a simple e-commerce website. The objective is to assess how effectively AI tools respond to straightforward user queries. While most tools tend to generate generic responses, the quality and usability of those responses can vary significantly. Even when the output appears relevant, it often requires careful review and refinement before it can be implemented effectively.

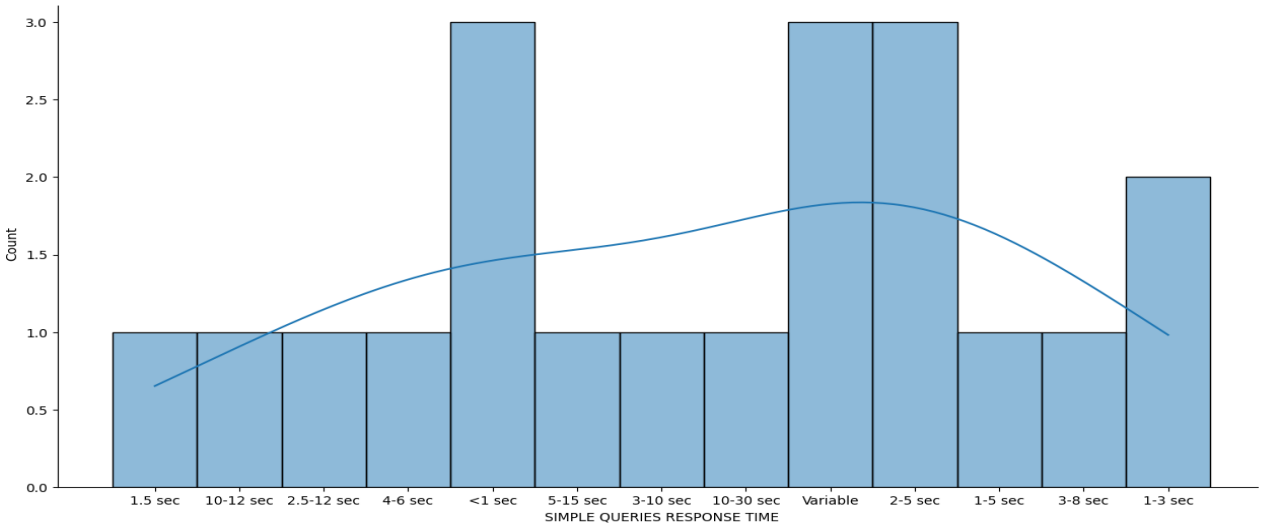
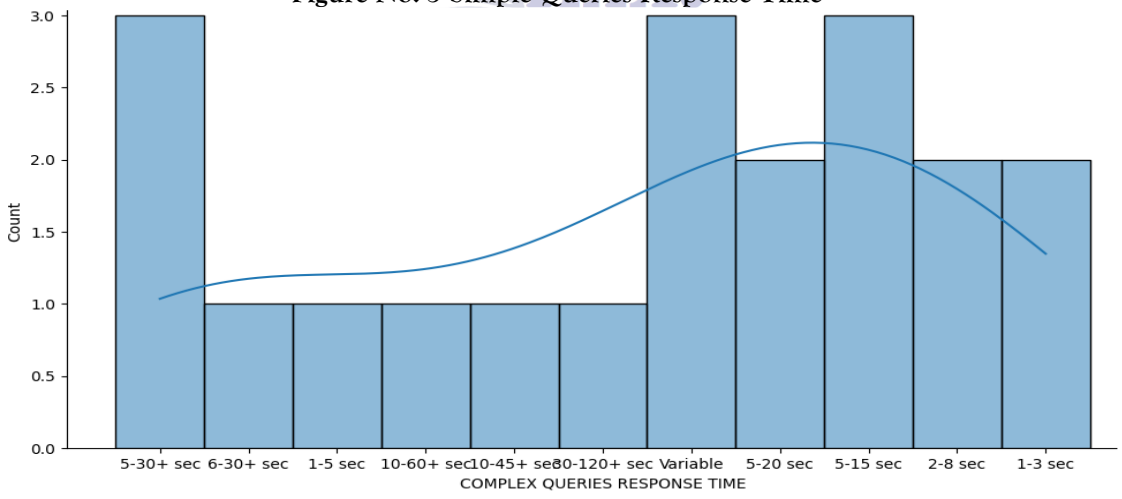


Figure No. 2 Simple Queries Response Time

Complex Queries Response Time

This graph clearly demonstrates that AI struggles with complex problems that require human creativity and problem-solving skills. The data suggests that AI performance is highly dependent on its ability to efficiently solve a problem; however, to achieve this, AI requires proper input formation and structure to effectively understand the given situation.

Figure No. 3 Simple Queries Response Time



Conclusion

This research provides insightful and valuable contribution to ongoing discussion about the role of AI in society. This study demonstrates the limitations of AI Tools in cognitive development and project creativity and also raising the important concerns about data privacy. The research focuses on the balance use of AI Tool and also encourages critical thinking, foster human creativity and protects user data. As with time, AI will evolve but it will be remained vigilant and ensure the use with proper responsibility and ethical manners.

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