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Where are the active users? Initiating Common User Access: Active learning, Collaborative learning, Novel Interfaces and Qualitative methods.

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1. Introduction

People are beginning to learn and use very powerful and sophisticated information processing technology as a matter of daily life. As Vannevar Bush highlighted, making knowledge accessible is paramount for societal progress [1]. A core challenge in our increasingly information-rich world is enabling users to effectively engage with and learn from advanced AI systems, particularly large language models (LLMs). The world operates on a structure of language. Humans communicate through these structures, and every day, our capabilities grow as we process information flowing through the paths of input and output—sending and receiving data. The combination of pre-trained LLMs and prompts brought renewed excitement to this vision. For intelligent agents, I aim to build systems that encourage non-textual engagement, create a paradox of active user participation, and foster an environment of active and social learning.

“I want to build Cognitive augmentation systems [1].”

“Augmenting human intellect [28] through machine intelligence [29] [30].”

As an HCI researcher, I intend to focus on several complementary research threads over the next few years. My scientific focus is on *Augmenting Human Intellect through Machine Intelligence.* Specifically, I would like to pursue (1) Active learning, (2) Social Computing, (3) Novel interfaces and (4) Qualitative methods that empower novice users to harness the power of LLMs, fostering a future where AI augments human intellect in a way that is accessible and beneficial to all. future where AI augments human intellect in a way that is accessible and beneficial to all [31].

2. Learning to Use

To set context: The analogy called "blooming, buzzing confusion" comes from William James' 1890 work "The Principles of Psychology" [2] and refers to how a baby experiences the world when first encountering multiple sensory inputs simultaneously.

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Likewise, the world of the new user of a computer system is often correlated with the quote. Moreover in computing perspective, Users don't always want complex interactions—they just want to get their tasks done. That's the whole point of using a computing system. Raskin Jef and Carroll John explain this perfectly:

"If a system's one-on-one interaction with its human user is not pleasant and facile, the resulting deficiency will poison the performance of the entire system, however fine that system might be in its other aspects. [3]"

"A system difficult to learn will not merely be an obstacle and an inconvenience; it may actually be discarded or returned to the vendor for a refund. [4]"

The role of prior knowledge in learning to use computer systems was another focus of user modeling work. It was widely noted that new users tried to understand computers as analogical extensions of familiar activities and objects [5] [6]. From early days of computing, People have considerable trouble learning to use computers [6] [7] [9], Word Processors and Text editors [8] [10] [11] [12] [13] [14], Smalltalk [15] [16], and now in AI systems [17] they often accidentally or deliberately get off track and end up in lengthy and complex tangles of errors or misguided exploration. Large language models (LLMs) are a key part of this future of communication, but they must be usable and intuitive for all users, not just experts like researchers or someone well at communication.

3. Research areas

In Human-AI Interaction, I will focus on four key research areas to enhance AI through human-computer interaction (HCI) and create truly usable cognitive augmentation systems: active learning, social computing, direct manipulation, and qualitative studies.

3.1 Active Learning

Where are the active users? [18] The traditional approach to learning new systems often involves passive consumption of information, leading to a fragmented understanding and difficulty in applying knowledge. I propose systems to leverage conversational agents to create active learning environments that encourage user engagement and deeper understanding. To build a model that stimulates an active learning environment and augments human intellect, we must explore innovative approaches from a human-computer interaction (HCI) research perspective.
This raises several critical questions:

1. How can we design an active learning environment that harnesses reduced verbiage engagement to enhance user learning during interactions with conversational agents like ChatGPT or Claude?
2. What strategies and features can be implemented in conversational agents to foster "New Verbal Discovery," introducing users to concepts beyond their initial queries?

By addressing these questions and beyond, I aim to create systems that actively immerse users in rich learning environments, pushing the boundaries of AI-assisted education and knowledge acquisition.

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3.2 Social Computing

Recognizing that social learning plays a vital role in human learning [19] [20] this research proposes the development of collaborative systems specifically designed to support novice users in learning and interacting with LLMs.

Building on successful collaborative platforms like Microsoft Word or Facebook, to produce joint actions these systems would enable users to share their experiences, troubleshoot problems together, and observe and learn from each other's prompt engineering strategies. By fostering a community of practice around LLM use, these systems can accelerate the dissemination of knowledge and empower users to collectively navigate the complexities of human-AI interaction.

3.3 Direct Manipulation

Remember Alan Kay's personal perspectives about the User Interface. Where he said *"Many are just now discovering that user interface is not a sandwich spread—applying the Macintosh style to poorly designed applications and machines is like trying to put Béarnaise sauce on a hotdog! [21]"*. Likewise, I believe there is much more to research and develop regarding interfaces beyond messaging metaphors and reducing verbal complexity. There is scope to build active learning interfaces [10] [13] and social learning interfaces to enable augmentation.

Interface forms are significantly different and greatly impact users' tasks. Comparing the 1981 IBM PC 5150 [22], which had a command-line interface, with the Xerox Star 8010 [23] [24] from the same year, which introduced the graphical user interface and desktop metaphor, both had differentiated impacts on task performance and user intuitiveness.

Current LLM interfaces are primarily text-based, posing a significant barrier for novice users who may lack the specialized knowledge to formulate effective prompts. This research proposes exploring direct manipulation techniques as a more intuitive and accessible way to interact with LLMs.

Ben Shneiderman coined the term [25] "Direct Manipulation," which refers to interacting with computing systems through physical objects rather than commands. Drawing inspiration from systems like the 1981's Xerox Star system which employed engaging visual metaphors, this research will investigate how visual representations and interactive elements can empower users to manipulate use of LLM and outputs directly, fostering a deeper understanding of the relationship between input and output. While technical advancements in Large Language Models (LLMs) have been significant, as an HCI researcher, I question: What about the interactions? In terms of LLMs, we remain in the command-line interface era, primarily relying on prompting. I contend that numerous unexplored methods exist for interacting with LLMs beyond writing or dictating zero-shot to comprehensive prompts?

3.4 Qualitative Methods

To understand how to bridge the gap between expert and novice LLM use, this research proposes conducting qualitative studies on how professionals effectively utilize LLMs in their work. By observing their practices, strategies, and problem-solving approaches, this research seeks to extract the underlying principles of successful LLM interaction and translate them into training materials and system designs that empower *novice users*.

By understanding how people learn and interact with complex systems, this research can contribute to the development of AI technologies that truly empower individuals.

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4. Conclusion

In my perception, the research agenda is fundamentally driven by my experience, belief and axioms (Refer to Table 1) that technology should enhance and extend human cognitive capabilities [1] [28] not create additional barriers to understanding and utilization. The proposed research threads - active learning, social computing, direct manipulation interfaces, and qualitative methods - are carefully chosen to address the current challenges in human-AI interaction while adhering to several core principles that guide this work.

No's	Axioms	References
Axiom 1	The primary goal of technology should be to enhance and extend human cognitive capabilities.	[1] [28] [31]
Axiom 2	Intuitive interfaces are fundamental to bridging the gap between human cognition and technological capabilities.	[3] [21] [25]
Axiom 3	The synergy between human intelligence and artificial intelligence has the potential to revolutionize problem-solving and creativity.	[29] [30]
Axiom 4	The future of computing lies in creating seamless, intuitive interactions between humans and AI systems.	[17] [23] [25]
Axiom 5	The ultimate measure of technological advancement is its ability to empower individuals and enhance their cognitive capabilities in meaningful ways.	[1] [18] [19]

Table 1: Axioms I believe that shape future interactions

At the heart of this research lies a set of axioms that I hold as acceptable truths that these axioms aren't merely philosophical statements – they are the foundational principles that have shaped every aspect of this research agenda. From the active learning environments that enhance cognitive capabilities [18] to the direct manipulation interfaces [25] that make technology more intuitive, from the social computing platforms that foster human-AI synergy [19] [20] to the qualitative methods that ensure seamless interactions, every research thread is deliberately chosen to manifest these axioms. I believe these principles, when realized through careful research and implementation, will fundamentally shape how humans interact with and benefit from AI systems.

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