

Characterizing the Evolving Landscape of Modern Information Seeking

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Abstract

Information seeking (IS) evolves, as does the human IS process. Since the rise of Generative AI (GenAI), modern IS has shifted by introducing more interfaces, more complex interactions, and expanded system capabilities. We argue that these changes in modern IS should be systematically examined. This PhD research characterizes the changes in the modern IS process. We use mechanisms, including online crowdsourcing survey experiments, theoretical IS frameworks, and in-lab experiments with neurophysiological signals, to characterize the shifts in modern IS, especially those driven by GenAI. We offer insights into the current landscape of search interface preferences and the cognitive efforts involved in seeking information. We believe this PhD research will contribute to and inform future designs of personalized, cognition-aware IS systems.

Keywords

Information seeking, User modeling, Theoretical framework, Neurophysiological signals

1. Introduction

Information environments evolve, and emerging information technologies can reshape human behavior and cognition [1, 2]. In recent years, Generative AI (GenAI) chatbots have gained popularity and reshaped the information seeking process (ISP) [3]. Within modern information environments (MIEs), search user interfaces (SUIs) have diversified, and GenAI chatbots intensify this trend. We argue that the landscape has shifted, and its changes require systematic attention. Understanding what people adopt, and how, is critical to informing future Information Retrieval (IR) system design and interaction paradigms. This PhD research investigates how the diversification of SUIs, especially GenAI chatbots, reshapes information seeking (IS) in terms of SUI preference, ISP constructs, and the human cognition involved. We believe this PhD research will contribute to future designs of personalized [4], cognition-aware [5] IR systems and ecosystems.

2. Proposed Research Questions and Methodology

Our research questions (RQs) are listed below in the conceptual order of this PhD research:

RQ1. Do we have a conceptual framework to characterize modern IS? If not, what would one look like?

RQ2. How do people choose among diversified SUIs according to search scenarios within MIEs, and which contextual and interface factors drive their preferences?

RQ3. Within modern ISPs, how do people's cognitive efforts differ when interacting with information produced by traditional search engines versus GenAI chatbots? Specifically, if information coverage is controlled, which presentation factors affect human cognition?

RQ4. (Preliminary) Can we characterize the ISPs with GenAI chatbots using neurophysiological (NeuroPhys) signals, emphasizing multi-turn interactions? How do the neuro correlates differ in ISPs with GenAI chatbots than with search engines?

We examine how the rise of emerging SUIs (including GenAI chatbots) affect modern ISP. We first raise a fundamental question (RQ1): does a framework exist to theoretically characterize the evolved ISP within MIE? Theoretical frameworks are critical conceptual instruments that can be used to characterize information environments and identify confounding variables. To address RQ1, we conduct a literature

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review, which reveals a conceptual gap within MIE. We therefore propose the Information Seeking in Modern Information Environments framework (ISMIE) [1], which conceptualizes and characterizes the modern ISP. The ISMIE framework identifies four essential components, four activities and six variables, emphasizing the dynamics within MIE.

We then view the larger picture of people’s IS behavior (RQ1), characterizing it by modeling human preferences for primary SUIs, including search engines, GenAI chatbots, and social media platforms. We conduct a two-phase online crowdsourcing survey study to involve a larger population. We believe contexts are critical. Therefore, we first collect real-life search scenarios via structured survey questions in Phase 1. The collected scenarios are manually reviewed and standardized into a uniform template. In Phase 2, the context-dependent discrete choice experiments [6, 7] are conducted to understand people’s preferences for SUIs. We present templated scenarios and ask participants to indicate their preferences among SUI alternatives. Then by using qualitative and quantitative analyses, we surface the contextual and interface factors that shape people’s preferences.

We anticipate a large use of GenAI chatbots. However, evidence shows that the use of GenAI chatbots cause cognitive effects [8, 9, 10, 11] and potentially cognitive decline [12]. Such a fact prompts IR researchers to investigate and contribute from IS perspectives. IR community has paid attention on user cognition and studied ISP through brain activity [e.g., 5, 13, 14, 15, 16], offering empirical practices and evidence for the feasibility of deeper investigation. To address RQ3, we conduct in-lab experiments and use NeuroPhys signals (e.g., Electroencephalography (EEG)) to characterize the effects of information produced by traditional search engines and GenAI chatbots. Specifically, we ask a question: *if information coverage is the same, then which factors affect user cognition?* We focus on the *acquiring* activity in the ISMIE framework where people examine the presented information and alter their internal cognitive states. Our experiments focus on two aspects, potentially trade-offs: cognitive effort and search outcomes. Cognitive effort, such as cognitive load and attention, is represented through multiple NeuroPhys signals [13]. In experiments, participants are required to execute search tasks and produce search outcomes based on provided information, during which their NeuroPhys signals are recorded. The provided information is then systematically altered to answer RQ3.

The RQ4 is preliminary and proposed to extend Moshfeghi and Pollick [14] and Ji et al. [13]’s understanding of ISP. As a further investigation, we emphasize the multi-modal and multi-turn interactions that are common within MIE [1]. Our experiments mimic the interactions between users and GenAI chatbots. This study is necessary due to shifts in the interaction paradigm, such as from keyword queries to prompts, follow-up questions in a single search session, etc.

3. Attending FDIA 2026 and Future Plans

This PhD research is positioned at the intersection of IR, Human-Computer Interaction (HCI), and cognitive science. The key components of this PhD research intersect with the expertise of the FDIA community. I anticipate meaningful discussion and feedback from FDIA 2026 attendees.

The ISMIE framework for RQ1 was published at SIGIR-AP’25 [1], serving as a cornerstone of this PhD research. The work for RQ2 is granted ethics approval (project ID: 30284) and is now ready to proceed with experiments. The investigations of RQ3 and RQ4 have a preliminary methodology design that will benefit substantially from discussion at FDIA 2026. I believe FDIA 2026 will help inspire their methodology designs, positioning, and potential collaborations with like-minded researchers.

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