

Tasks, Copilots, and the Future of Search

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ABSTRACT

Tasks are central to information retrieval (IR) and drive interactions with search systems [2, 4, 10]. Understanding and modeling tasks helps these systems better support user needs [8, 9, 11]. This keynote focuses on search tasks, the emergence of generative artificial intelligence (AI), and the implications of recent work at their intersection for the future of search. Recent estimates suggest that half of Web search queries go unanswered, many of them connected to complex search tasks¹ that are ill-defined or multi-step and span several queries [6]. AI *copilots*, e.g., ChatGPT and Bing Chat, are emerging to address complex search tasks and many other challenges. These copilots are built on large foundation models such as GPT-4 and are being extended with skills and plugins. Copilots broaden the surface of tasks achievable via search, moving toward creation not just finding (e.g., interview preparation, email composition), and can make searchers more efficient and more successful.

Users currently engage with AI copilots via natural language queries and dialog and the copilots generate answers with source attribution [7]. However, in delegating responsibility for answer generation, searchers also lose some control over aspects of the search process, such as directly manipulating queries and examining lists of search results [1]. The efficiency gains from auto-generating a single, synthesized answer may also reduce opportunities for user learning and serendipity. A wholesale move to copilots for all search tasks is neither practical nor necessary: model inference is expensive, conversational interfaces are unfamiliar to many users in a search context, and traditional search already excels for many types of task. Instead, experiences that unite search and chat are becoming more common, enabling users to adjust the modality and other aspects (e.g., answer tone) based on the task.

The rise of AI copilots creates many opportunities for IR, including aligning generated answers with user intent, tasks, and applications via human feedback [3]; understanding copilot usage, including functional fixedness [5]; using context and data to tailor responses to people and situations (e.g., grounding, personalization); new search experiences (e.g., unifying search and chat); reliability and safety (e.g., accuracy, bias); understanding impacts on user learning and agency; and evaluation (e.g., model-based feedback, searcher simulations [12], repeatability). Research in these

and related areas will enable search systems to more effectively utilize new copilot technologies together with traditional search to help searchers better tackle a wider variety of tasks.

CCS CONCEPTS

• **Information systems** → Users and interactive retrieval; Task models; Retrieval tasks and goals; • **Computing methodologies** → Artificial intelligence.

KEYWORDS

Tasks; Task models; Task intelligence; Complex tasks; Artificial intelligence; Copilots; Web search; Search systems; Search experience

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BIOGRAPHY

Ryen White is General Manager and Deputy Lab Director of Microsoft Research in Redmond. His research takes a user- and task-centric view on AI, focused on search and assistance. Ryen led applied science for the Microsoft Cortana digital assistant, and he was chief scientist at Microsoft Health, establishing a science culture and infusing AI in both products. Technology derived from his and his team's research has shipped and significantly improved key business metrics in many Microsoft products, including Bing (e.g., using search context to improve result relevance), Windows, Office, and Azure. Ryen is a Fellow of the ACM and of the British Computer Society. He has published over 300 articles on search and related areas, including significant work on mining and modeling search activity at scale. Ryen was named "Center of the SIGIR Universe" (most central author in the co-authorship graph) in the 40 years of ACM SIGIR. He has received over 20 awards for his technical contributions, including three SIGIR best paper awards and a SIGIR test of time award. Ryen has received the Karen Spärck Jones Award (2015) and the Tony Kent Strix Award (2022) for outstanding contributions to information retrieval. He serves as editor-in-chief of ACM Transactions on the Web and as the Vice Chair of SIGIR. See ryenwhite.com for more information and Ryen's publications.



¹<https://blogs.microsoft.com/blog/2023/02/07/reinventing-search-with-a-new-ai-powered-microsoft-bing-and-edge-your-copilot-for-the-web/>

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