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Agentic Information Retrieval: Revolutionising Search with AI Agents in the Age of LLMs

Abstract: Recent breakthroughs in large language models (LLMs), such as GPT-4 and Claude Sonnet 3.5 have introduced a new paradigm in information retrieval (IR), termed Agentic Information Retrieval (Agentic IR). In contrast to traditional IR systems, which rely on static, domain-specific architectures, and predefined filtering mechanisms, Agentic IR leverages autonomous AI agents capable of dynamic, multi-step reasoning, and real-time interaction with external data sources. These agents significantly enhance user engagement by adapting to complex queries, refining results, and personalising responses across a variety of applications, including web searches, e-commerce, and customer support.

In this study, we examine the limitations of traditional IR systems, which are constrained by their inability to manage iterative queries or multistep reasoning processes. We then introduce the architecture and methodology behind Agentic IR, focusing on the integration of advanced techniques, such as prompt engineering, retrieval-augmented generation (RAG), and reinforcement learning. These techniques enable AI agents to autonomously adjust their search and recommendation strategies in response to user feedback and new information, leading to enhanced retrieval accuracy and personalised user experiences.

We also present real-world applications that highlight the transformative potential of Agentic IR. For example, in the e-commerce domain, AI agents can dynamically tailor product recommendations by analysing evolving user preferences. In customer support, these agents autonomously handle complex technical queries by retrieving relevant data, summarising findings, and delivering customised solutions. However, the adoption of Agentic IR presents challenges, particularly in terms of scalability and the mitigation of inherent biases within LLMs.

Finally, we discuss the future of Agentic IR, including its potential for real-time adaptation, cross-lingual capabilities, and ethical implications of its deployment. Agentic IR marks a substantial leap forward in information retrieval by shifting from fixed to flexible, agent-based systems. This transformation has the potential to reshape various sectors, ranging from internet search engines to tailored recommendation services.

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Biography: Oluwole Fagbohun is the founder of Readrly, an artificial intelligence-driven platform for enhancing literacy in young readers, is Oluwole Fagbohun. He has authored "The TensorFlow Developer Certificate Guide" published by Packt Publishers and is presently crafting his upcoming book, "AI in Action", for Manning Publishers. Oluwole has delivered keynote addresses at prominent academic symposiums in the United Kingdom and internationally, discussing the impact of AI on education and innovation. With over seven years of experience in AI development and educational technology, Oluwole is a Google Certified TensorFlow developer and machine learning researcher with peer-reviewed publications. His expertise lies in creating comprehensive AI solutions that boost learning outcomes. As an industry visionary, Oluwole is devoted to employing state-of-the-art AI to address literacy challenges and equip educators and parents with tools to deliver tailored, captivating learning experiences for children.