AI Research Support Systems and Tools: A Survey

Giorgia Rubin[12], Alessia Bardi[2]

[1]University of Pisa, Italy

[2] Institute of Information Science and Technologies, National Research Council, Italy

name.surname@isti.cnr.it

Context

The rapid advancement of Artificial Intelligence (AI), particularly Large Language Models (LLMs), has transformed the landscape of research support systems [3]. Contemporary tools increasingly aim to augment researchers capabilities across the entire research lifecycle, including literature discovery, hypothesis generation, conceptual modeling, and synthesis [7, 1]. In parallel, the integration of structured knowledge sources such as Knowledge Graphs (KGs) has emerged as a promising approach to improve reliability, transparency, and explainability [5, 2, 4, 6]. Despite this proliferation of AI powered tools, a systematic understanding of their architectural choices, data strategies, reasoning capabilities and how many of them leverage KGs remains limited.

Research Questions

This survey tries to investigate this gap addressing the following research questions:

1. To what extent do AI research support tools rely on KGs?
2. How many tools are conversational and capable of reasoning over data and which paradigms do they adopt?
3. What proportion of tools are free and open source and adopt open models and KGs?
4. What is the origin of these tools (academia, industry, or hybrid initiatives)?

Methodology

Via literature review and systematic web exploration, we surveyed 21 research support tools covering both academic prototypes and production level systems from Europe (33%), Asia (24%), America (43%).
The tools were analysed and classified according to multiple dimensions [1]:

- General info: name, version, release year, origin, and development context, target users, domain specificity.
- Supported functionality: literature discovery, conceptual mapping, and hypothesis generation.
- Methodology: LLM fine-tuning, retrieval augmented generation (RAG).
- KG adoption: presence and type of KG.

[1]https://github.com/giorgiarubin/AI-RSS-taxonomy.git

- KG and reasoning: symbolic, neuro-symbolic reasoning; use of patterns such as GraphRAG; and support for explainability.
- Legal: open source status, license, access mode, openness of used LLMs and KGs.

Results

A minority of tools explicitly incorporate KGs, with a predominance of open KGs such as OpenAlex, OpenAIRE, ORKG, Wikidata, DBpedia. Conversational interfaces are widespread; however, advanced reasoning capabilities primarily rely on prompting strategies rather than on formal neuro-symbolic integration (33%).
Most tools use closed LLMs (GPT-like or Claude-like models), while open source LLM adoption remains limited (19%). Less than half of them are fully open source (42%), with many adopting freemium or commercial models.
Few tools are purely academic initiatives (28%), while the majority originates from industry or hybrid collaborations, underscoring the technology transfer potential of the field.

Conclusions

Despite the limited number of surveyed tool, results highlight a fragmented but rapidly evolving ecosystem. While LLM driven conversational interfaces are becoming the norm, deeper integration with structured knowledge and explicit reasoning mechanisms remains underdeveloped. The limited adoption of open KGs and the prevalence of proprietary infrastructures raise concerns regarding transparency, reproducibility, and FAIR (Findable, Accessible, Interoperable, Reusable) compliance. Future research should focus on hybrid neuro-symbolic architectures, open data integration, and open, reproducible toolchains to better support trustworthy and explainable research workflows. To extend the survey, we plan to adopt a crowd-sourcing approach to collect information about additional tools and suggestions for refining the classification taxonomy from the research community.

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