Knowledge Graphs in AI-Powered Research Support Tools

A Preliminary Survey of Architectures, Models and Integration Strategies

How contemporary research assistants combine Large Language Models and Knowledge Graphs to generate more trustworthy results

Giorgia **Rubin** [1 2], Alessia **Bardi** [2] | [1] University of Pisa, [2] CNR-ISTI

KEY FINDINGS

1. The **integration of KGs** in AI research tools relies on diverse LM, from traditional NLP architectures to advanced LLMs.
Academic systems typically use **open-weight and open-source models**, whereas industry applications favor **proprietary LLMs**, often within **agentic architectures** connected to **large-scale scholarly KGs.**

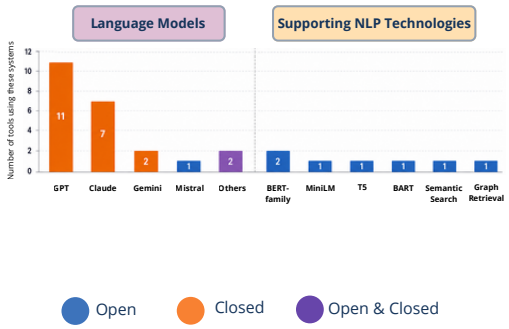
2. KG-enabled research tools span from **knowledge-driven systems** with limited LLM use to **LLM-centric applications** where KGs provide contextual grounding.
Emerging **MCP-based approaches** enable agentic AI systems to directly interact with large-scale scholarly KGs.

DATASET SNAPSHOT

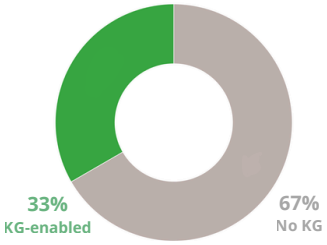
- **21** Tools Surveyed
- **7** KG-enabled (33%)
- **6** Academic (28%)
- **9** Open (42%)

MODELS & KNOWLEDGE GRAPHS (RQ1-RQ3)

RQ1. WHICH LANGUAGE MODELS and NLP TECHNOLOGIES ARE USED?



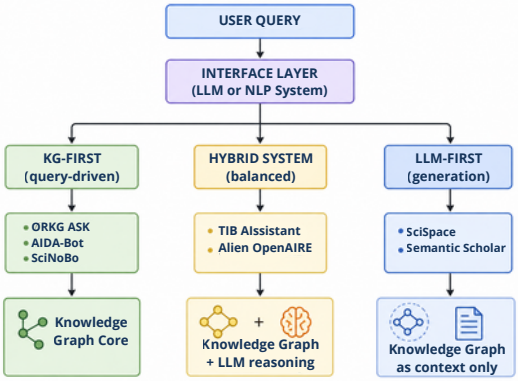
RQ2. DO TOOLS USE KNOWLEDGE GRAPHS?



WHICH GRAPH?

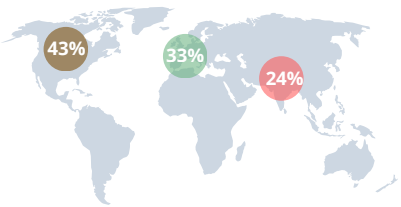
- AIDA-KG
- OpenAIRE Graph
- ORKG (2)
- OpenAlex (3)
- Semantic Scholar (4)
- Wikidata

RQ3. HOW ARE KGs INTEGRATED?

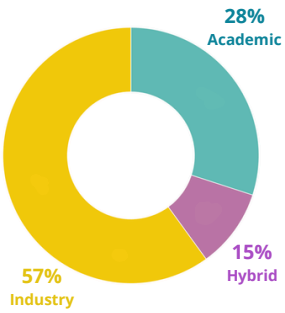


ECOSYSTEM ANALYSIS (RQ4-RQ7)

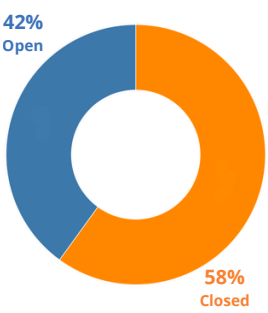
RQ4. GEOGRAPHICAL DISTRIBUTION



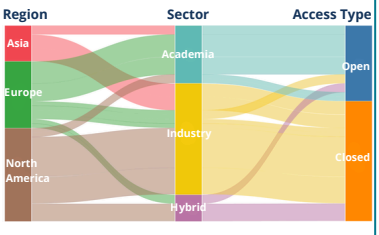
RQ5. ACADEMIA VS. INDUSTRY



RQ6. OPEN VS. CLOSED



RQ7. CORRELATION BETWEEN DIMENSIONS



FUTURE DIRECTIONS

Future efforts should prioritize:

- **hybrid neuro-symbolic approaches**,
- integration of **open knowledge resources**,
- reproducible, **FAIR-compliant infrastructures,**

to support trustworthy and explainable research workflows.

CALL FOR CONTRIBUTIONS

This preliminary survey was conducted through a literature review complemented by web based exploration of Research Support Tools.

As the ecosystem is evolving rapidly, **we welcome feedback, tool suggestions, and community contributions to expand and refine this ongoing mapping effort.**

Help this survey grow: Scan & fill it out!