

MetaInfoSci: Visualize trends and understand facts

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Introduction

The exponential growth of scientific literature has created an imperative need for effective analysis by understanding and analysing publication trends and to navigate the complex requirements of academics, research institutions, and policymakers (Jacob and Meek, 2013). The ability to gauge the growth of scientific disciplines, author collaboration, and institutional partnerships offers valuable insights that can inform research directions, funding decisions, and educational strategies (Bozeman, Fay and Slade, 2013). However, this requires users to possess technical expertise in data cleaning and formatting, which results in creating barriers to entry for researchers from diverse disciplines and their ability to comprehend the full scope of their fields.

Current bibliometric tools often fall short, providing quantitative outputs such as citation counts and co-authorship networks without the necessary interpretation to make these figures meaningful (Zupic and fater, 2015). This gap leaves researchers without a clear understanding of how their work contributes to broader scientific progress and a barrier for the adoption of these tools. Further, existing

network platforms typically require users to input data in clean formats, which can be daunting for those lacking technical expertise. To bridge this gap, we propose the development of innovative MetaInfoSci, a comprehensive web tool designed to streamline both qualitative and quantitative analysis of research literature. It will not only automate data preprocessing and cleaning, making it accessible to non-technical users, but will also employ advanced AI algorithms to interpret and contextualise research findings.

Objective of the study

The MetaInfoSci web tool is designed as an all-in-one, user-friendly platform for conducting bibliometric, scientometric, and network analysis of bibliographic databases such as Scopus, WoS, and OpenAlex. It features real-time visualization updates and AI integration for result interpretation. Additionally, the tool will incorporate network science metrics, Gender API integration, Journal Quartile integration, and more.

Relevant Existing Tools

Table 1. shows major tools with their purpose, features, and limitations.

Tool Name	Purpose	Features	Limitations
VOSviewer, Van Eck and Waltman, 2017	Bibliometric visualization	Co-occurrence analysis, Bibliographic coupling, Network visualization, Clustering	Lacks advanced citation metrics, limited interoperability with other tools, steep learning curve for beginners

Gephi, Bastian, Heymann and Jacomy, 2009)	Network visualization	Graph visualization, Network clustering, Community detection, Dynamic graph analysis	Resource-intensive for large networks, lacks built-in bibliometric functions, steep learning curve
ScientoPy, Ruiz-Rosero, Ramírez-González and Viveros-Delgado, 2019	Bibliometric analysis	Trend analysis, Performance metrics, Bibliographic coupling, Statistical analysis	Limited visualization options, requires manual data preparation, lacks cloud-based accessibility
BibExcel, Persson, Danell and Schneider, 2009	Bibliometric analysis	Bibliographic data conversion, Excel output, Network preparation, Citation analysis	Not user-friendly for large datasets, lacks real-time updates, limited interactivity
Biblioshiny, Aria and Cuccurullo, 2017	Bibliometric analysis	Shiny-based GUI, Bibliometrix integration, User-friendly statistical visualization	Limited customization, requires R setup, lacks real-time bibliometric updates

Demonstration

Home Page

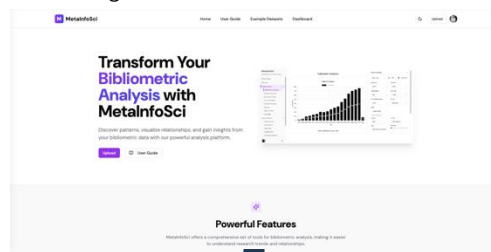


Figure 1. Uploading data and mapping columns.

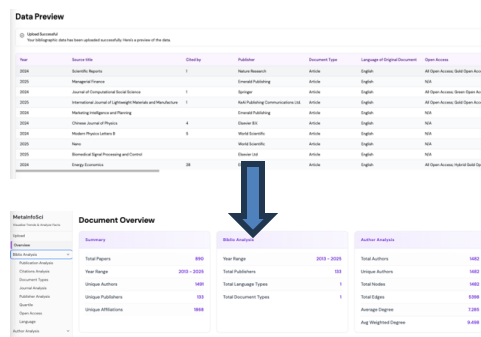


Figure 2. Displaying data and overview of data.

Publications Analysis

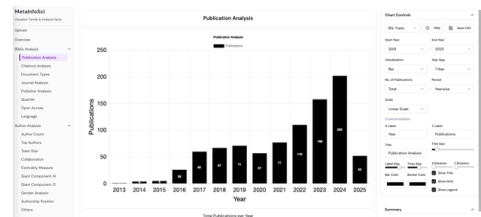


Figure 3. Under publication trends analysis tab, displaying year-wise trend analysis.

Journal Analysis

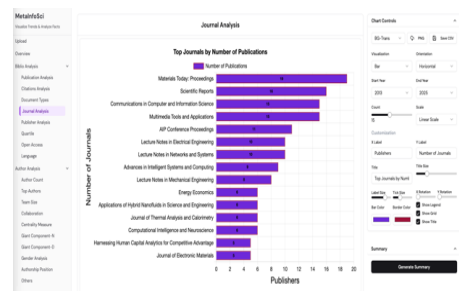


Figure 4. Under journal analysis tab, displaying bar plot of journal count.

Author's Analysis

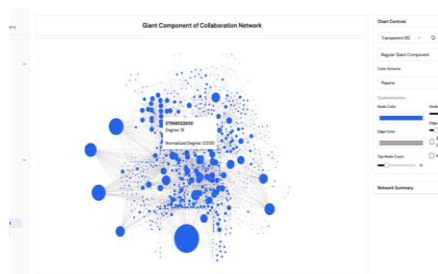


Figure 5. Under author's analysis tab, displaying authors 'collaboration network.

How it is different from existing tools?

1. Interactive visualization tool box
2. AI-integrated result interpretation
3. Advanced network metrics and analysis
4. Advanced bibliometric analysis like journal quartile, gender analysis, etc.

Conclusion

The proposed study aims to develop MetaInfoSci, an advanced web tool for both qualitative and quantitative research literature analysis, integrating bibliometric, scientometric, and network analysis. Unlike existing platforms, MetaInfoSci will unify data from multiple sources such as Scopus, Web of Science, OpenAlex, etc. into a single dataset. The tool will offer features like publication trend analysis, identification of key contributors, and detailed collaboration networks at the author, institution, and country levels. Powered by AI-driven algorithms, MetaInfoSci will provide meaningful context and interpretation for bibliometric data, enabling researchers to better understand the broader impact of their work. Additionally, it will incorporate outer datasets on journal quality metrics (e.g., Quartiles, h-index, impact factor) and author gender, facilitating in-depth and customizable analysis with flexible visualizations. By automating data merging, cleaning, and analysis, MetaInfoSci will make bibliometric tools more accessible to non-technical users, while empowering researchers with advanced

analytical capabilities. The platform will also serve as a valuable training resource, equipping users with essential skills for

navigating the evolving landscape of research evaluation.

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