Comparison of Software Tools for Science Mapping Analysis: A Systematic Review

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ABSTRACT

Introduction: Science mapping software tools are crucial in analyzing and evaluating academic research output. This systematic review aims to provide a comprehensive overview of six essential science mapping software tools: BibExcel, CiteSpace II, CitNetExplorer, SciMAT, Sci2 Tool, and VOSviewer. By examining their strengths and limitations of these tools, this review aimed to guide researchers in selecting the most suitable software for their specific analytical needs.

Search Strategy: A systematic search was conducted to identify freely available and full science mapping software tools for complete data analysis. Academic databases, including conference proceedings, such as Scopus, PubMed, Web of Sciences, Embase, and Gray Literature were searched. We searched databases for publications published between January 1, 1990, and June 1, 2024. The search keywords were "scientific mapping", "scientific visualization", "data visualization", and "software applications". A total of 1,356 records were obtained. Eventually, 17 papers were determined to fit the research inclusion criteria after duplicates were eliminated, and articles were screened based on title and abstract. The tools were evaluated based on their preprocessing capabilities, bibliographic network analysis options, and normalization techniques. Data processing features, visualization options, and compatibility with various data formats were also considered in the analysis.

Results: The review highlights the various functionalities offered by each science mapping software tool. BibExcel provided data and network reduction capabilities, while CiteSpace II offered time-slicing and data reduction features. CitNetExplorer focused on co-citation and association strength analysis, while SciMAT and Sci2 Tool exceled in duplicate detection and data reduction. VOSviewer standed out for its network reduction and association strength visualization options. The variability in measures and network analyses across these tools underscored the importance of understanding their main characteristics to adapt expectations and obtain complementary outputs.

Conclusion and Discussion: Science mapping software tools are essential for conducting bibliometric analyses and exploring trends within scientific communities. By leveraging the capabilities of tools such as BibExcel, CiteSpace II, CitNetExplorer, SciMAT, Sci2 Tool, and VOSviewer, researchers can gain valuable insights into research growth, main actors, and intellectual development. The selection of a specific tool should be based on the type of analysis required and the desired output. These software tools offer powerful functionalities that can enhance the quality and productivity of scholarly research endeavors.

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