

Title: The combined application of bibliographic coupling and the complete link cluster method in bibliometric science mapping

Abstract:

This thesis connects to previous research in bibliometric science mapping and citation indexing. A method was suggested for science mapping purposes and evaluated. The suggestion of this method was motivated by the fact that the prevailing method of citation based science mapping of documents, the cocitation cluster analytical method, can not map the most current published research, a feature that is a characteristic of the proposed method. On theoretical grounds, it was assumed that neither of these methods could substitute for the other and that they would have complementary functions in relation to one another.

The prime objective was to evaluate the proposed method's capability to generate subject coherent clusters, i.e. to identify coherent research themes, and the assumed context of application was scientific information provision. The proposed method has two primary components: (1) a measure of document similarity, bibliographic coupling and (2) a cluster analytical method for the partition of document populations, the complete link cluster method.

The research design comprised four different research settings of which three correspond to specific fields of research and one to a large multidisciplinary environment. Methods of evaluation comprised quantitative approaches as well as more qualitative ones. For the establishment of cluster coherence, measures of density and average coupling strength in clusters were applied. The relevance of generated clusters was assumed to be reflected by these measures and was substantiated by field experts' evaluations of clustering results. In order to assess the agreement between field experts' apprehensions of their fields' cognitive structures, intellectual-manual partitions of document populations were performed by field experts and compared with partitions generated by the proposed method.

Findings showed that the proposed method has the capability to identify and map current and coherent research themes on the level of a single research field as well as in a multidisciplinary environment. However, based on theoretical considerations as well as on empirical findings, it was concluded that it would not suffice as a standard science mapping method where exhaustive depictions of specialties' cognitive structures are aimed at. The reasons for this were:

- i. As for now, the method of bibliographic coupling can not identify the most central concepts of a research specialty.
- ii. The dependency of consensual referencing implies that only minor shares of original document populations will be available for analysis.
- iii. The lack of a method for the decision of appropriate thresholds of coupling strength implies arbitrary threshold settings.
- iv. The partition of document populations brought about a fragmentation of research fields.
- v. Partitions generated by field experts deviated considerably from partitions generated by the complete link cluster method.

It was therefore concluded that the proposed method may be complementary to the cocitation cluster analytical method and to traditional citation indexing. Based on the empirical findings, a tentative outline for such an application was given.

Keywords: bibliometrics, bibliographic coupling, science mapping, citation indexing, cocitation analysis, cluster analysis, scientific information provision