

## **Comparison of the effectiveness of related functions in Web of Science and Scopus**

**Abstract:** This study compares the related functions in Web of Science and Scopus. The results indicate no significance difference in the effectiveness of the related functions by references of the two systems; within Scopus, the related function by references was found to be more effective than those by authors and keywords.

**Résumé :** Analyse comparative des fonctions similaires de Web of Science et de Scopus. Les résultats ne témoignent d'aucune différence significative dans l'efficacité des fonctions similaires des deux systèmes pour les références. Dans Scopus, la fonction similaire pour les références était plus efficace que celles pour les auteurs ou pour les mots-clés.

### **1. Introduction**

In online searching, the size of the initial search output could be too few, just adequate, or too much. To address the quantity of output problems, searchers often adopt search narrowing or broadening tactics. However, even when the quantity of output is okay, the examination of the retrieved documents may indicate deficiency in terms of quality, i.e., the retrieved set contains many irrelevant documents. To address this, some retrieval refinement methods have been suggested (Salton & McGill, 1983). These include relevance feedback, clustering, and citation searching.

Over the years, online retrieval systems have provided practical ways of conducting these refinements. In the case of relevance feedback, the systems allow the users to view the terms (whether keywords, identifiers or descriptors) that have been used to index a document, and by clicking on a particular term for a relevant document, one can retrieve other documents that have been indexed by that term. Clustering of search output is common with clustering search engines, such as Clusty, though traditional retrieval systems such as Scopus and Web of Science now provide categorization of search output by subject areas. In the case of citation searching, many of the retrieval systems either allow searchers to view the list of references or citations to a selected document. However, due to the limitations of citing practices, such as honorific or perfunctory citations, citing methodological procedures or sources of data, or negative citations, (Libmann, 2007), some of these references or citations might not be relevant to the original query. Hence, it has been suggested that the use of bibliographic coupling or co-citation might produce better results.

Bibliographic coupling is the act of relating two documents together based on having a certain number of common references while co-citation is based on having a certain number of common citations (Wissmann, 1993). While no retrieval system has provided means of retrieving documents having a certain number of common citations with a selected document, Web of Science and Scopus allow users to view documents related to a selected document by common references. These related documents are normally ranked in decreasing order of the number of common references with the selected

document. In the case of Scopus, documents can also be related by having a certain number of common keywords (similar to what is provided by Google or PubMed) or authors. How relevant to the original query are additional documents produced through bibliographic coupling? The objective of this study is to answer this question by determining (and comparing) the effectiveness of the related functions of Web of Science and Scopus. In addition, given that Scopus also relates documents by common authors and keywords, we intend to compare the three methods of relatedness in Scopus.

## **2. Methodology**

30 queries were formulated based on queries collected from assignments given in an information retrieval course and those found in TREC. The queries were selected in such a way that they were evenly distributed among the three subject areas of Web of Science (i.e. arts and humanities; social sciences; and science) as well as among the six subject areas in Scopus (i.e. life sciences; physical sciences; health sciences; social sciences; and arts and humanities). In Web of Science, each query was searched and its results ranked in order of relevance. The topmost relevant document was then selected and its top 30 related documents (or all the related documents in cases where fewer than 30 related documents were retrieved) assessed for relevance. The number of related documents was limited to 30, as previous studies have shown that most users hardly view more than the top 30 documents retrieved in response to a query (Spink and Wolfram, 2001). In the case of Scopus, each query was searched and its results also ranked by relevance. However, 30 related documents to the topmost relevant document were obtained using each of the three methods available in Scopus (i.e. by references, authors, and keywords). The 30 documents in each set were then examined for relevance to the original query, and a precision ratio obtained for the set. The precision ratio was calculated as (number of relevant related documents/number of related documents examined).

## **3. Results**

For Web of Science, we could only determine the effectiveness of the related function for 27 of the queries, as the topmost document for each of the other three queries did not produce any related documents. The three documents did not produce related documents because they had too few numbers of references (one, one and two respectively). For the 27 queries, the mean and median precision values for the related documents retrieved were 0.58 and 0.63 respectively. For Scopus, we could only determine the effectiveness of the related function by references for 20 of the queries. The mean and median precision values were 0.59 and 0.62 respectively. Finding that the distributions of precision values above were skewed, we used the Wilcoxon test to determine if the median precision values were the same for Web of Science and Scopus. This hypothesis was accepted, as the Z-score was -.218 with a p value of .828.

We also compared the effectiveness of the three related functions in Scopus. For the related function by authors, the mean and median precision values were .41 and .42 respectively, while the related function by keywords' mean and median values were .44 and .43 respectively. Friedman's test was used to determine if the median precision values for all the three functions were the same. The chi-square value of the test was 6.125 with a degree of freedom of 2 and a p-value of 0.047. Hence, we rejected this hypothesis, and a multiple comparison test indicated that the related function by references was more effective than the other two functions.

#### **4. Conclusion**

The related functions by references for both Web of Science and Scopus were found to be moderately effective in retrieving additional relevant documents and there was no significant difference in their performances. However, the related function by references of Scopus was found to be more effective than the system's related functions by authors and keywords.

#### **5. References**

Libman, F. 2007. Web of Science, Scopus, and classical online: philosophies of searching. *Online* 31: 36-40.

Salton, G. and McGill, M.J. 1983. *Introduction to modern information retrieval*. New York: McGraw-Hill, Inc.

Spink, A. and Wolfram, D. 2001. Searching the web: the public and their queries. *Journal of the American Society for Information Science and Technology* 59: 2070-2086.

Wissmann, C. 1993. Techniques of data retrieval for scientometric research in the ISI citation indexes. *Journal of Information Science* 19: 363-376.