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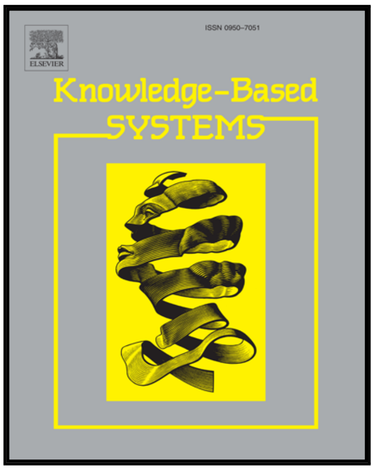

Detecting and predicting the topic change of Knowledge-based Systems: A topic-based bibliometric analysis from 1991 to 2016

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Detecting and predicting the topic change of Knowledge-based Systems: A topic-based bibliometric analysis from 1991 to 2016

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Abstract

The journal Knowledge-based Systems (KnoSys) has been published for over 25 years, during which time its main foci have been extended to a broad range of studies in computer science and artificial intelligence. Answering the questions: "What is the KnoSys community interested in?" and "How does such interest change over time?" are important to both the editorial board and audience of KnoSys. This paper conducts a topic-based bibliometric study to detect and predict the topic changes of KnoSys from 1991 to 2016. A Latent Dirichlet Allocation model is used to profile the hotspots of KnoSys and predict possible future trends from a probabilistic perspective. A model of scientific evolutionary pathways applies a learning-based process to detect the topic changes of KnoSys in sequential time slices. Six main research areas of KnoSys are identified, i.e., expert systems, machine learning, data mining, decision making, optimization, and fuzzy, and the results also indicate that the interest of KnoSys communities in the area of computational intelligence is raised, and the ability to construct practical systems through knowledge use and accurate prediction models is highly emphasized. Such empirical insights can be used as a guide for KnoSys submissions.

Keywords

Topic analysis; Topic detection and tracking; Bibliometrics; Text mining; Knowledge-based Systems.

1. Introduction

Topic detection and tracking (TDT), as a representative approach of topic analysis, can be dated to the 1990s, highlighting the task of identifying topics from a collection of documents [1]. Using co-word, citation statistics, or topic models, TDT has become a significant bibliometric tool [2] and assists in the studies of science, technology, innovation, and policy (STIP), e.g., profiling research performance [3, 4], exploring emergent scientific or technological topics [5, 6], and tracing scientific activities and development trends [7, 8]. However, the development of science and technology is a process with incremental change and disruptive revolution, and both the external representation and the internal content of a scientific topic changes over time [9]. Unfortunately, traditional approaches of topic analysis are relatively static; they apply fixed models to the entire dataset and ignore any possible change resulting from time. As an example, the research scope of knowledge-based systems is always changing, from expert systems in the 1990s to broad disciplines in computer science and artificial intelligence, e.g., machine learning, data mining, optimization, and decision science. Under these circumstances, two questions are