A Novel Sequence Graph-Based Approach to Find Academic Research Trends

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ABSTRACT

Research trends are dynamic, changing from time to time. It is an indicator of the latest innovations in each field of research, current areas of research, the latest technologies, and developments in each field of research. It also helps with future innovations and developments by providing current challenges and opportunities. This article proposes an efficient method to find research trends in each field of research of any subject area by using the graph-based subject classification of published papers. This methodology can be efficiently used to find research trends at any point of time, based on the published year of academic publications. A study of change in research trends in three subject areas - physics, mathematics, and computer science have been successfully conducted based on a total of 4500 publications since 2004.

KEYWORDS

Academic Publications, Graph Database, Research Trends, Subject Classification

1. INTRODUCTION

The scope and importance of research are increasing day by day. Research trends help to find out the hotspots and emerging trends in each field. It is an indicator of the latest innovations in each field of research, current areas of research, the latest technologies, and developments in each field of research. It also helps with future innovations and developments by providing current challenges and opportunities. Academic publications are also increasing day-by-day, and scientific trends analysis plays a significant role in the academic field. Finding research trends helps researchers to find the current research areas of interests and provides a pathway for upcoming researchers to follow. This also helps to improve the quality of research and can be efficiently used to analyze scientific production in each field of research and to predict the rise and fall and stability of research topics (Bobadilla et al., 2019; Prabhakaran et al., 2016).

This paper proposes an efficient method to find scientific trends of any subject area by utilizing the graph based subject classification of academic publications. Scientific trends can be identified based on a specific year or a period. This helps us to find the change in research trends from time to time in each field of research. The main backbone of this work is the word sequence graph representation of scientific papers using full-text indexing approach with subject classification using graph-based classifier model. The entire work is based on previous work of authors to classify journal articles according to its subject, categories, and subcategories based on contents using Graph-based Subject Classifier, GSC (Soumya et al., 2017; Soumya et al., 2019). This approach can be used to find academic research trends based on a period of years or for any year.

2. RELATED WORKS

Finding research trends using scientometric review is an active research area, and a lot of papers are there in this field. Mainly content or citation analysis is done to find research trends. Identifying research trends can have a no: of applications and uses. It can be used to identify current research trends or hot topics in a subject area, rise and fall of different topics in a different subject, to identify future research directions, etc. Most of the work to find out research trends in a subject area is based on content analysis. The authors tend to find out the research trends in science education for a period of five years using 1088 articles published from 2013-2017 is mentioned in (Lin et al., 2019) by analyzing the contents of articles. They also tried to find out the declining topics, emerging topics, and persisting topics too in the field of science education. A similar study is conducted in (Bodily et al., 2019) to find the research trends in instructional design and technology journals by extracting the IDT scholarships obtained by reviewing Scopus journals from 2007-2017 using a total of 65 journals. Finding research trends can also be used to identify frequent topics of a selected journal, to find out the research theme of a journal, etc. as discussed in (Lei & Liu 2019) to find out the research theme and contribution of System journal. While the authors tried to find out the geographical and thematic trends in environmental management system using the web of science database articles in (Salim et al., 2018), the trends and opportunities in requirements engineering are determined in (Ambreen et al., 2018). Using visualization analysis to find out the current state of big data research related to the medical field using journal papers published in this area is done in (Liao et al., 2018). Again, the various trends and issues related to nursing studies based on mobile learning is investigated in (Chang et al., 2018) using related published papers for a period from 1971 to 2016. Game-based learning is a new hot research subject area in this mobile era. Authors tried to find out trends in game-based learning in (Chang & Hwang 2019) using paper published from 2007 to 2016. Using 71 papers to measure the social impact of entrepreneurship is performed in (Rawhouser et al., 2019). A study and meta-analysis of research in health information systems using 126 articles are done in (Haried et al., 2019). By reviewing dental literature, the authors tried to find out research trends in emporomandibular disorders, and bruxism is described in (Manfredini et al., 2019). A review of studies conducted in the e-Grocery area to find out trends and gaps is discussed in (Martín et al., 2019). To identify the trends in tourism, IT research is done in (Yuan et al., 2019) in addition to identifying whether the no: of articles in this area is incrementing or not. Future scope of IC research is discovered in (Bisogno et al., 2018). The different trends and current status of Digital supply chain are studied in (Büyüközkan & Göçer, 2018). The different trends in collaborative learning supported with the aid of mobile technology are discussed in (Fu & Hwang 2018). How research related to food and gastronomy evolved in the area of tourism and hospitality is studied in (Okumus et al., 2018). Knowledge management related research trends are studied in (Wang et al., 2018). Research trends in automotive head-up display systems are reviewed in (Betancur et al., 2018) in addition to implementation trends. Authorship and content analysis is employed in (Bond et al., 2019) to find out trends in educational technology. Scientometric reviews related to early literacy learning is studied in (Teale et al., 2018). Hot research areas in power system reliability are analyzed in (Wang et al., 2018). Research trends in services provided by insects in the ecosystem are studied in (Noriega et al., 2018). A combination of content and citation-based analysis method is used in (Olawumi & Chan 2018) to identify various trends and structures related to sustainable development.

3. IDENTIFICATION OF ACADEMIC RESEARCH TRENDS USING GRAPH-BASED SUBJECT CLASSIFIED SCIENTIFIC PUBLICATIONS

The main backbone of the work being Word Sequence Graph (WSG) model representation of keys of GSC, Graph-based Subject Classifier and Key Sequence Graph (KSG) model representation of submitted papers followed by the subject classification of research papers using GSC (Soumya et al.,

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