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Research Paper

Thematic Clusters of the Intellectual Structure in the Field of Digital Content Management

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Abstract
Purpose: The research aims to visualize and analyze co-word network, and thematic clusters of the intellectual structure in the field of digital content management during 2010-2020. Method: The study is an applied research with a descriptive approach which is conducted by techniques of co-word, and social network analysis. Data analysis and visualization of the co-word network were represented by SPSS, UCINet, and Python programming language. Findings: 8 main clusters are identified. The cluster multimedia content management & retrieval is the most mature and central thematic cluster. The USA and various sub-categories of Computer Science are located in the top ranks of WOS in the field. Most productions were published in 2020. Generally, the Clusters were labeled in two contexts of health and LAM (Libraries, Archives, Museums and cultural heritage). Conclusion: Content-based management and retrieval are focused on artificial intelligence, decision supported, knowledge-based and ontological techniques which are conducted as novel approaches and underlying trends in the field.

Keywords: Digital content management, Co-word analysis, Hierarchical Clustering, Thematic clusters, Intellectual Structure, Strategic Diagram.

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Introduction

Co-word analysis was introduced in the 1980s, it indicates that the use of common terms in two or more documents implies the proximity of those texts to each other. In other words, the more common words of two articles, the more content and semantic relevance similarity can be found between them (Noyon and Van Raan, 1998). In other words, it implies that if two terms are used together in a document and their frequencies are high, these two words have more semantic relationships (Ahmadi and Osareh, 2016). Hence, it helps to identify hidden patterns and relationships of keywords (Osareh et al., 2016) to determine various trends and cognitive relation between a set of documents (Salemi and Kousha, 2014). Additionally, the method can cluster the concepts of scientific fields (Whitaker, 1989) to predict future research paths (Soheili et al., 2016; Lee and Su, 2010). Moreover, it can be used as a powerful tool for tracking structural changes and the evolution of perceptual and social networks (Makkizadeh et al., 2016).

Having emerged in the 1990s, the concept of digital libraries has become very popular among the disciplines of computer science, cognitive science, and library and information science (LIS) (Islam & Ikeda, 2014). Digital libraries work in complex and heterogeneous scenarios. The quantity and variety of resources, when combined with the diversity of agents involved in this context, as well as the ongoing evolution of user-generated content, require knowledge to be formally and flexibly organized (Pani, Porru & Ibba, 2015). The set of processes and technologies that enable the collection, management, and publication of information in any form or medium is known as content management. However, there are different types of content management systems and each type manages content for different purposes or reasons (Murugan, 2015). Some varied types of CMSs are Component Content Management System (CCMS), Web Content Management System (WCMS), Enterprise Content Management System (ECMS), semantic CMS, and so on.

Surveying the literature indicates that co-word analysis is used as a method of scientometric technique to represent the intellectual and thematic structure in various scientific fields such as information management (Khademi and Heidari, 2017), information retrieval (Ding et al., 2001), knowledge management (Sedighi and Jalalimanesh, 2014), library and information science (Wang et al., 2011), digital library in china (Liu et al., 2012). In fact, no related studies were found in the field of digital content management.

Hence, the present study aims to analyze the intellectual structure in the field of digital content management during 2010-2020 focusing on techniques of co-word analysis by answering the following questions:

1- What are top scientific productions in the field of digital content management in terms of funding agency, organization enhancement, publication year, author, country, WoS categorization, and research area?

2- How is the intellectual structure of digital content management analyzed in terms of top co-word pairs, co-occurrence matrix, and hierarchical clustering (HC)?

3- How are the determined clusters of digital content management visualized and analyzed by the strategic diagram (SD) in terms of maturity and development?

Method

The research community includes all the author keywords extracted from all English articles which were indexed in core collection web of science during 2010-2020. A researcher-made query was searched including prominent and important keywords, and phrases related to the field in advanced search in WOS in March 28th 2021:

TS= ("digital content management" OR "digital content*" OR "content management" OR "knowledge engineering" OR "content management system*" OR "information management" OR "multimedia content*" OR "content based retrieval" OR "enterprise content management" OR "web content management" OR "enterprise content management system*" OR "semantic content management") AND LANGUAGE: (English) AND DOCUMENT TYPES: (Article)

Totally, 8643 documents were retrieved. The column of author keywords for some records were blank. As a result, 1395 documents analyzed as final records (without blanks). The final data from this section led *to answering the first question*.

Hierarchical clustering (HC) used as a technique for co-word analysis (Soheili et al., 2016). Hierarchical relationships between words in clusters can be represented by mappings in SPSS software and it is fruitful *to answer the second question*.

The x-axis in a strategic diagram indicates centrality and the y-axis stands for density. In other words, strategic diagram includes 4 different quadrants containing various degrees of density and centrality. As it is shown in "figure 1", quadrant I, including mature clusters which are placed at the core of the field due to high centrality and density. Hence, high centrality indicates that the cluster has a more important position in the field (Hu et al., 2013).As a result, they have powerful internal correlation and maturity and stand in an expanded and powerful relation with other clusters. Moreover, Quadrant IV includes central clusters that are not developed. They are central, but immature due to high centrality and low density (Hu et al., 2013). Furthermore, the clusters located in quadrant III include low centrality and low density. It indicates marginal topics or emerging/declining themes with little attention. In other words, they have a relatively discontinuous structure and considered as underdeveloped themes. Moreover, quadrant II is well-developed, but isolated clusters which indicate low centrality and high density, and contain clusters that are not central are well-developed. In other words, clusters located in this place are not axial, but developing (Khasseh et al., 2017).

Finally, a square matrix (co-occurrence matrix) and then a correlation matrix was created. Then, the centrality and density of each cluster were measured by using UCINet software and a strategic diagram was drawn by SPSS software which *led to answering the third question.*

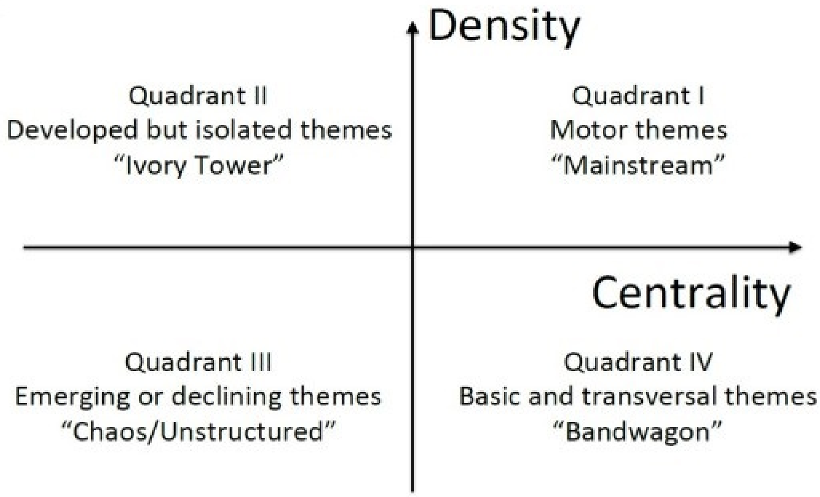

Figure 1: 4 Quadrants in a Strategic Diagram (HU et al., 2013)

Findings

Q1: What are top scientific productions in the field of digital content management in terms of funding agency, organization enhancement, publication year, author, country, WoS categorization, and research area?

Table 1: Top scientific productions in the field of digital content management from WoS

Funding Agency	NATIONAL NATURAL SCIENCE FOUNDATION OF CHINA NSFC (479)	EUROPEAN COMMISSION (327)	UNITED STATES DEPARTMENT OF HEALTH HUMAN SERVICES (290)	NATIONAL INSTITUTES OF HEALTH NIH USA (263)	NATIONAL SCIENCE FOUNDATION NSF (177)
Organization Enhanced	UNIVERSITY OF CALIFORNIA SYSTEM (147)	UNIVERSITY OF LONDON (103)	UNIVERSITY OF TEXAS SYSTEM (98)	HARVARD UNIVERSITY (94)	STATE UNIVERSITY SYSTEM OF FLORIDA(87)

Web of Science categories	COMPUTER SCIENCE INFORMATION SYSTEMS (1, 626)	ENGINEERING ELECTRICAL ELECTRONIC (1, 132)	INFORMATION SCIENCE LIBRARY SCIENCE (924)	COMPUTER SCIENCE SOFTWARE ENGINEERING (713)	TELECOMMUNICATIONS (701)
Research Area	COMPUTER SCIENCE (2807)	ENGINEERING (1832)	INFORMATION SCIENCE LIBRARY SCIENCE (924)	TELECOMMUNICATIONS (701)	BUSINESS ECONOMICS (512)
Publication Year	2020 (1, 237)	2019 (1, 081)	2018 (823)	2017 (835)	2016 (793)
Author	EPSTEIN RH (33)	ZHANG Y (28)	KIM J (23)	ZHANG J (23)	DEXTER F (22)
Country	USA (2187)	China (1074)	ENGLAND (624)	AUSTRALIA (455)	SPAIN (440)

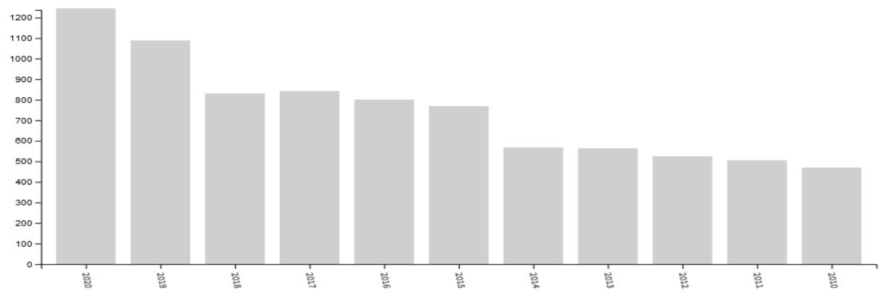

Figure 2: Documents by year in the field of digital content management during 2010-2020 from WoS

Q2: How is the intellectual structure of digital content management analyzed in terms of top co-word pairs, co-occurrence matrix, and hierarchical clustering (HC)?

Due to the excessive volume of data (keywords) we had to create a time series to reduce the amount of data. Therefore, the data were divided into the time series, including 2010-2015, 2016-2020. On this line, the data were processed by the software in order to export adjacency matrices as co-occurrence square matrices. The matrices were exported by a code in the NumPy and Pandas library in Python. As a result, the total numbers of co-words of all the scientific outputs from WOS were recorded in square matrices in Excel files. Due to high volume of data in matrices, keywords including the threshold of sum of co-occurrence in excel file >30 were selected as final keywords. The threshold made the matrices limited including prominent keywords with high co-word co-occurrence. Table 3 implies top and high frequency co-word pairs in various time series.

Table 2: Top and High Frequency Co-Word Pairs in the Field

Time series	Ten Top Co-occurrence of keywords	Time series	Ten Top Co-occurrence of keywords
2010-2015	information management* information management (459)	**2016-2020**	information management* information management (444)
	knowledge engineering* knowledge engineering (118)		knowledge engineering* knowledge engineering (225)
	knowledge management* knowledge management (72)		health information management* health information management (145)
	ontology* ontology (48)		big data* big data (75)
	health information management* health information management (43)		knowledge management*knowledge management (72)
	e-health* e-health (39)		social media* social media (63)
	content management*content management (39)		blockchain* blockchain (60)
	multimedia*multimedia (36)		digital content* digital content (58)
	internet*internet (35)		deep learning* deep learning (57)
	e-learning*e-learning (35)		cloud computing* cloud computing (56)

Subsequently, Dendrogram diagram was visualized by utilizing hierarchical clustering technique, focusing on Ward's Method, and Squared Euclidean Distance by using SPSS software (Version 22). As a result, Figure 3 and figure 4 show the final dendrogram of the matrix in both time series.

As it is shown in both dendrograms, the analysis of the results of co-occurrence of high-frequency words resulted in the formation of eight final thematic clusters. The purpose of using high-frequency keywords was to have the keywords, including the most semantic and direct relationships with the main topic of the field to avoid the presence of unnecessary keywords, with low frequency ones. As a result, the eight final clusters in the time series were analyzed in table 4 and table 5 as follows:

Table 3: Numbers and Names of the Clusters during 2010-2015 based on Hierarchical Clustering

Numbers of the Clusters in the Time series	Number of the cluster	Name of the cluster	Words in clusters
3 clusters during 2010-2015	1	Semantic content management with ontological and knowledge-based approach in the field of health, libraries, and archives.	Evidence based practice, health, health policy, terminology, statistics, computer communication networks, safety, knowledge, information science, documentation, semantics, medical informatics and applications, clinical trials, tele health, technology, policy, information dissemination, computer software, innovation, project management, organization, construction, information management, information, management information systems, health promotion, informatics, student, libraries, culture, collaboration, it-governance, information needs, knowledge sharing, decision making, India, databases, classification, personal health record, comparative effectiveness research, health informatics, , workflow, open source, patient safety, change management, data quality, implementation, medical informatics, hospital information systems, archives, internet, nursing, risk management, document management, crowd sourcing, digital libraries, knowledge management, record management, e government, wireless sensor network, traceability, evaluation, modelling, logistics, disaster management, web 2.0., privacy, disclosure, design, simulation, knowledge based systems, cloud computing, clustering,

Numbers of the Clusters in the Time series	Number of the cluster	Name of the cluster	Words in clusters
			social networks, fuzzy logic, expert systems, ontology, tagging, quality improvement, China, education, confidentiality, data standards, laboratory information management systems, integrity, clinical decision support, adolescent, information communication technologies, university students, knowledge representation, knowledge engineering, Bayesian networks, newspapers, media, management, genomics, lims, quality assurance, uncertainty, Canada, modelling, human factors, automation, decision support system, ICT, space, personal information management, indexing, query processing, genetic algorithm, content based image retrieval, XML, standards, metadata, semantic annotation, machine learning, affective computing, semantic web, content strategy, multimedia communication, humans, female, self-care, quality of service, quality of experience, scalable video coding, recommender systems, advertising, QOS, multimedia content, content-based retrieval, user experience, online learning, eLearning, game theory, measurement, virtual reality, internet of things, visualization, digital content, information management system, rectal cancer, ubiquitous computing, similarity search, perception, multimedia streaming, iptv, content distribution, performance evaluation, optimization, social networking, health information management, stroke, exercise, performance, theory, cryptography, digital rights management, anonymity, digital content, digital watermarking, authentication, watermarking.

Numbers of the Clusters in the Time series	Number of the cluster	Name of the cluster	Words in clusters
	2	Decision support capabilities in the context of public health	Sphere, actions, oversights, objectives, incident command system, humanitarian reform, goals, centers, command, authority, public health, priorities, resources, surveillance, decision making.
	3	Healthcare content management systems & Services	Office of management and budget, federal government, office of civil rights, connect, approved testing and certification body, value set authority center, national institute of health, health resource and service administration, national academies, public health information network, office of surveillance, national committee on vital and health statistics, standards and interoperability framework, cancer registry, biosense, immunization information system, electronic health record systems, information supply chain, business process, public health essential services, centers for Medicare and medical services, health insurance portability and accountability, world health organization, centers for disease control and prevention, human services, nationally notifiable conditions, taxing and spending authority, police power, paper work reduction act, electronic laboratory reporting.

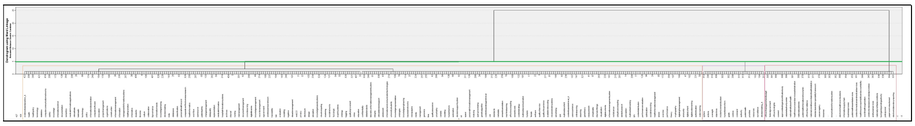

Figure 3: Clusters during 2010-2015 Based on Hierarchical Clustering

Table 4: Numbers and Names of the Clusters during 2016-2020 based on Hierarchical Clustering

Numbers of the Clusters in the Time series	**Number of the cluster**	**Name of the cluster**	**Words in clusters**
5 clusters during 2016-2020	4	Artificial intelligence-based on digital content management & retrieval in the field of medicine & LAM	Sudden death, electric counter shock, accessory atrioventricular bundle, valsalva maneuver, electro physiologic techniques, cardiac, data accuracy, data quality, health information management, data security, medical records, suicide, data collection, personal health records, primary healthcare, health policy, mhealth, decision making, documentation, healthcare, quality assurance, health, physicians, Ghana, evidence-based medicine, challenges, supply chain management, knowledge sharing, virtual reality, mathematical model, decision support systems, digital transformation, governance, big data analytics, motivation, recordkeeping, information sharing, survey, biodiversity, qualitative analysis, information society, law firms, asset management, Facebook, technology, information, risk management, information science, strategic management, information technology, information systems, computer applications, computer applications, information exchange, tele health, content-based retrieval, video processing, cbir system, magnetic reasoning imaging, acute coronary syndrome, echocardiography, biomarkers, dct, robustness, digital watermarking, stroke, balance, walking, d2d communication, qos, wireless networks, multicast protocol, social networks, 5g, context, dementia, anxiety, mobile devices, pandemic, architecture, building information management, online learning, digital literacy, globalization, children, interactivity, copyright, mobile device,

Numbers of the Clusters in the Time series	Number of the cluster	Name of the cluster	Words in clusters
			adaptive management, open source, integration, development, hands on learning, community, tuberculosis, WordPress, cultural heritage, open access, digital archives, surgery, user experience, digital communication, content marketing, privacy protection, professional development, India, personal information management, context awareness, information management system, image processing, energy efficiency, eLearning, multiple sclerosis, fake news, social influence, digital piracy, platform, smart city, sentiment analysis, support vector machine, video, transmedia, curriculum, learning, lifecycle, safety, secrecy, metadata, marketing, information literacy, creativity, information quality, quality control, RFID, building information modelling (BIM), web application, interoperability, epilepsy, bibliometrics, health system, qualitative methods, Africa, Computer security, media, advanced metering infrastructure, remote monitoring, recurrent neural networks, smart contract, servers, security, plagiarism, adaptation models, training, computational modelling, neurons, learning systems, data models, knowledge graph, deep neural networks, transfer learning, convolution, convolution neural networks, vibration measurement, complexity theory, object detection, transforms, entrepreneurship, open source software, organization, collaboration, game theory, correlation, software, social network services, communication networks, estimation, licenses, real time systems, standards, encoding, image classification, videos, data driven

Numbers of the Clusters in the Time series	**Number of the cluster**	**Name of the cluster**	**Words in clusters**
			engineering, machine learning, natural language processing, text mining, network topology, catching, approximation algorithms, wireless communication, resource management, physics education, data analysis, convergence, collaborative filtering, emotion recognition, knowledge extraction, leadership, decision support, emotion, knowledge base, sustainability, semantic web, diagnosis, ali, www, multimedia security, solid modeling, in computing methodologies, simulation, e educational simulations &lt, information technology and systems, artificial, modeling.
	5	Content-based imagement of retrieval techniques	two-dimensional dual-tree complex wavelet transform, weighted similarity matching scheme, unique shape feature extraction, shape feature similarities, weighted distance-based feature comparison scheme, intensity dominant part, texture feature, shape recognition, content based image retrieval system, image texture, image matching.
	6	Multimedia Content management & retrieval	Trecvid2002, account the statistics, abrupt shot boundary detection, unique solution, goal an abrupt cut detection scheme, psychological behavior, hierarchical structures , video data necessitates, publicly available videos, image sequences, video retrieval, background segmentation, sequence-to-sequence mapping, cursive caption text, context-dependent shape variations, video text recognition, video optical character recognition systems, urdo text, character recognition rate, convolutional neural network.
	7	Shared decision	Theophylline, sinos node dysfunction, sinus bradycardia syndrome, pacing,

Numbers of the Clusters in the Time series	Number of the cluster	Name of the cluster	Words in clusters
		making in arrhythmia diagnosis & treatment	pacemaker, isoproterenol, intraoperative, cardiac surgery, cardiac sinus pause, bradyarrhythmia, beta-adrenergic agonist, ambulatory electrocardiography, electrocardiogram, share decision making.
	8	Health-related quality of life & risk factor assessment	myocardial infarction, antihypertensive agents, tobacco smoke pollution, tobacco, second hand smoke, risk enhancing factors, lifestyle, ldlcholesterol, dietary fats, dietary patterns, blood cholesterol, behavior therapy, aspirin, quality indicators, blood pressure, nutrition, smoking cessation, coronary heart disease, risk assessment, physical activity, cholesterol, cardiovascular disease, measurement.

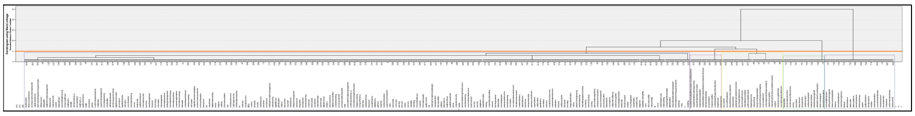

Figure 4: Clusters during 2016-2020 Based on Hierarchical Clustering

Q3: How are determined clusters of digital content management visualized and analyzed by the strategic diagram (SD) in terms of maturity and development?

A strategic diagram can be represented by utilizing SNA indicators such as degree of centrality and density. As a result, it is helpful to analyze the maturity and development of each cluster. The indicators are represented in table 5.

Table 5: Degree of Centrality and Density of 8 Main Clusters from UCINet

cluster	density	centrality	Quadrant	Cluster	Density	Centrality	Q
1	0.418	0.273	II	2	0.810	0.137	II
3	1	0	II	4	0.121	0.258	III

cluster	density	centrality	Quadrant	Cluster	Density	Centrality	Q
5	0.018	0.1	III	6	0.526	0.526	I
7	1	0	III	8	0.016	0.082	III

The strategic diagram was visualized in figure 5 based on the origin of the centrality average (0.172) and density average (0.488) respectively.

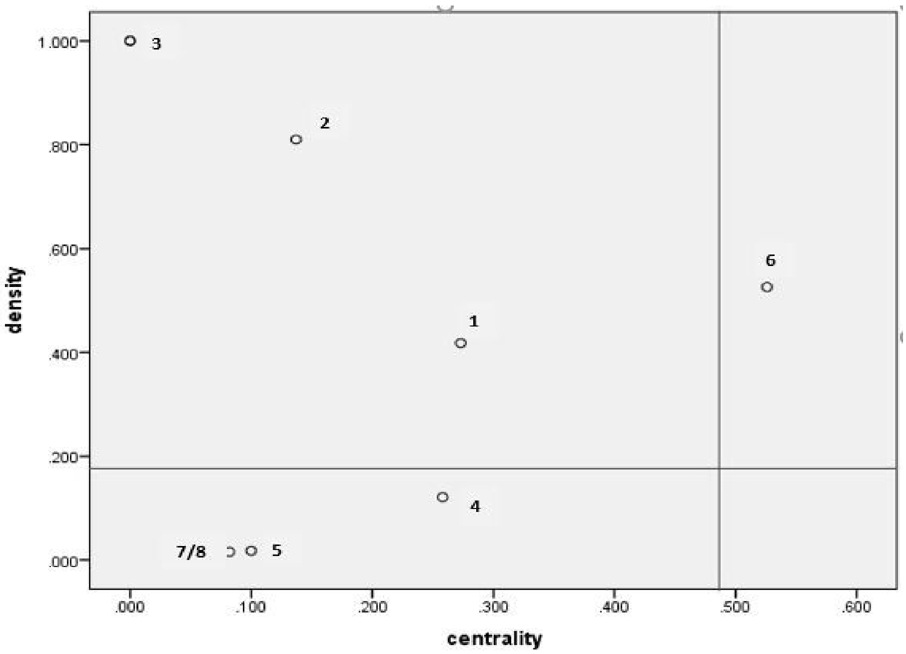

Figure 5: Strategic Diagram of the 8 main Clusters

Conclusion

The present study tried to use technique of co-word analysis and social network analysis (SNA) to represent a perspective of the intellectual structure governing the scientific productions of digital content management. The findings of the research revealed that the top scientific products in the classification of the web of science (WOS) are related to various fields of computer science. Moreover, the research area of *information science library science* was located in the third rank. In addition, the USA is the most productive country in the field, while Iran was located in the 19th rank among 119 countries. Subsequently, *Iran University of medical sciences* was located in the 149th rank among organizations. The most productions were published in 2020 and the least including 462 articles were published in 2010. Words which are mentioned in Table 3 (top co-pair words), illustrate the high degree of conceptual interactions that are closely related conceptually and semantically in the field.

Totally, the analysis of both dendrograms based on the hierarchical clustering represented eight major clusters. Generally, the clusters were labeled and identified in two contexts of health and LAM (Libraries, Archives, Museums and cultural heritage).

Moreover, according to the Table 5, the sixth cluster with the highest centrality has a central and a major position in this field, and especially, with the highest density, has more potential to maintain and develop itself in the future. As it is emphasized by Liu et al. (2012) and Soheili et al. (2016) that the higher density of a cluster indicates more potential to be developed in the future. In other words, it is the most mature and central cluster, namely *multimedia content management and retrieval*. This cluster has the most comprehensive thematic concepts in this field and is more developed than other themes, and the concepts of this cluster are at the heart of the subject and have a more important position in the field (Hu et al., 2013).

Further, the first, fourth, fifth, seventh, and eighth clusters are located in the quadrant III of the strategic diagram. The placement indicates that they are emerging clusters and are known as chaos and unstructured clusters. These clusters are marginal with little attention. In other words, they have a relatively discontinuous structure and considered as underdeveloped themes. Moreover, the first, second, and third clusters are located in the second quadrant of the strategic diagram. It means that they have strong internal relationships and a good level of maturity in this field. In other words, it indicate low centrality and high density, and contain clusters that are not central clusters but well-developed and isolated (Khasseh et al., 2017).

Finally, there is no cluster in the quadrant IV of the strategic diagram. It means that, in this field, there is no central and undeveloped cluster.

Eventually, the results can be used as a thematic policy map for policy makers, designers and developers of the digital technologies, managers of digital transformation, and active organizations in the field of digital content management. Besides, they can be planned predictably in order to improve scientific outputs and trends quantitatively and qualitatively to develop the topics in balance for the future. The results also can highlight thematic gaps, prevent repetitive studies, and identify the underlying trends, core topics, and popular areas of the field. At last, analysis of the intellectual structure of knowledge in the related themes such as names of the clusters, is highly suggested for future works to identify common concepts and sub-clusters as well as research gaps in these related themes. Additionally, further studies on semantic-based co-word analysis in this field and related areas are highly recommended for future works.

Reference

Ahmadi, H. and Osareh, F. (2016), Co-word Analysis Concept, Definition and Application, *National Studies on Librarianship and Information Organization (NASTINFO)*, 28(1), 125-145. (Persian).

Ding, Y., Chowdhury, G. G. and Foo, S. (2001), Bibliometric cartography of information retrieval research by using co-word analysis, *Information Processing and Management*, 37(6), 817–842.

Hu, C.P., Hu, J.M., Deng, S.L. and Liu, Y. (2013), a co-word analysis of library and information science in China, *Scientometrics*, 97(2), 369-382.

Islam, M. A. and Ikeda, M. (2014), Convergence issues of knowledge management in digital libraries, *VINE*, 44(1), 140–159.

Khademi, R. and Heidari, Gh. (2017), Mapping the intellectual structure of information management using co-words during 1986 to 2012, *Sciences and Techniques of Information Management*, 2(2), 71-111. (Persian).

Khasseh, A. A., Soheili, F., Moghaddam, H. S. and Chelak, A. M. (2017), Intellectual structure of knowledge in iMetrics: A co-word analysis, *Information Processing & Management*, 53(3), 705-720.

Lee, P.C. and Su, H.N. (2010), Investigating the structure of regional innovation system research Information Science, *Innovation Organization & Management*, 19(1), 71-85.

Liu, G.Y., Hu, J.M. and Wang, H.L. (2012), a co-word analysis of digital library field in China, *Scientometrics*, 91(1), 203-217.

Makkizadeh, F, Hazeri, A., Hosininasab, S. and Soheili F. (2016), Thematic analysis and scientific mapping of papers related to depression therapy in PubMed, *Journal of Health Administration*, 19(65), 51-63. (Persian).

Murugan, M. A. (2015), Content management system in electrnic environment. *Knowledge Librarian*, 2(2), 212-222.

Noyons, E. and van Raan, A. (1998), Monitoring scientific developments from a dynamic perspective: Self-organized structuring to map neural network research, *Journal of the American Society for Information Science*, 49(1), 68-81.

Osareh, F., Soheili, F. and Mansouri, A. (2016), *Scientometrics and Information Visualization*, Isfahan University publishing, Isfahan. (Persian).

Pani F., Porru S. and Ibba S. (2015), a Model for Digital Content Management, *4th International Conference on Data Management Technologies and Applications*, 240-247.

Salemi, N. and Koosha, K. (2014), Co-citation analysis and co-word analysis in bibliometrics mapping: A methodological evaluation, *Iranian*

Journal of Information Processing and Management. 29(1), 253-266. (Persian).

Sedighi, M. and Jalalimanesh, A. (2014), Mapping research trends in the field of knowledge management, *Malaysian Journal of Library and Information Science*, 19(1), 71-85.

Soheili, F., Sha'bani, A. and Khasseh A. (2016), Intellectual structure of knowledge in information behavior: A co-word analysis, *Human Information Interaction*, 2(4), 21-36. (Persian).

Wang, L. Y., Zhang, Z. Q. and Wei, J. Z. (2011), A study on foreign research subjects of library and information science based on the co-word analysis during the last ten years, *Journal of intelligence (in China)*, 30(3), 50–58.

Whittaker, J. (1989), Creativity and conformity in science: Titles, keywords and co-word analysis, *Social Studies of Science*, 19(3), 473-496.

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