International Journal of Information Management 37 (2017) 390–399

Contents lists available at ScienceDirect

International Journal of Information Management

journal homepage: www.elsevier.com/locate/ijinfomgt

Co-citation and cluster analyses of extant literature on social networks

Wen-Lung Shiau[a], Yogesh K. Dwivedi[b,*], Han Suan Yang[c]

[a] Department of Business Administration, Zhejiang University of Technology, Zhejiang, China
[b] Emerging Markets Research Centre (EMaRC), School of Management, Swansea University Bay Campus, Fabian Way, Crymlyn Burrows, Swansea SA1 8EN, Wales, UK
[c] Department of Information Management, Ming Chuan University, Taoyuan, Taiwan

ARTICLE INFO

Keywords:
Social network
Document co-citation
Multidimensional scaling analysis
Cluster analysis

ABSTRACT

Over one billion people are currently using social media such as social websites (Facebook Newsroom, 2015); consequently, numerous academic scholars have developed interest in studying the use of social media and social networks. However, few studies have focused on examining the core factors of social networks. In this study, we collected studies on social-network-related topics that were published between January 1996 and December 2014, assembling a total of 2565 articles and 81,316 citations. Co-citation analysis and cluster analysis were applied to verify seven main factors regarding social networks: (a) the measure of complex social networks; (b) community structure; (c) strong and weak ties; (d) the evolution of social networks; (e) network structure and relationship; (f) value concept and measurement strategies; and (g) social capital. Finally, the results of this study were further discussed to elucidate the core topics relevant to social networks.

1. Introduction

The prevalence of the Internet has facilitated convenience in daily living. Through the Internet, people can acquire information for satisfying their daily needs. In recent years, the rapid development of various types of Internet tool has contributed to the popularity of virtual environments including blogs, chat rooms, online games, virtual communities, and social websites. Through convenient applications on the Internet, people interact with each other and engage in activities related to daily life, electronic commerce (e-commerce), and academics by using virtual platforms (Inbaria, Shayo, & Olfman, 1999; Jarvenpaa, Knoll, & Leidner, 1998; Piccoli & Ives, 2003; Powell, Piccoli, & Ives, 2004). Among the various Internet applications, social media, including social networking sites such as Facebook, Twitter, and LinkedIn have become extremely popular in the past decade. For example, Facebook, founded in 2004, is currently the most popular social networking site in the world. People use Facebook to keep in touch with their friends and family, read about current events, and express and share their feelings with others (Facebook Investor Relations, 2015). Its revenue for the year 2014 reached US$12.47 billion. On average, there were 890 million daily active users and 745 million mobile daily active users in December 2014. As of December 31, 2014, there were 1.39 billion monthly active users and 1.19 billion mobile monthly active users, and approximately 82.4% of the daily active users were outside the United States and Canada (Facebook Newsroom, 2015). Social network sites have penetrated people's lives and transformed the ways they communicate. A growing development on social network sites has been devoted to the design and uses of information technology in social contexts. Social network sites are used to gather, manage, distribute, and present information to users and managers. Social network sites analyses utilize the use of the digital networks and related network-based information for understanding relationships among people, teams, departments, organizations, or markets (Ngai, Tao, & Moon, 2015; Haynes, Bawden, & Robinson, 2016). Thus, social network sites provide an opportunity for practitioners and scholars to trace, visualize, analyze, explain, and simulate the structures and behaviors of human (Agarwal, Gupta, & Kraut, 2008). As a result, social network sites have been recognized as an important factor which impacts knowledge sharing (Chai & Kim, 2012; Mäntymäki & Riemer, 2016), marketing and product co-creation (Dwivedi, Kapoor, & Chen, 2015; Haynes et al., 2016; Kapoor, Dwivedi, & Piercy, 2016; Rathore, Ilavarasan, & Dwivedi, 2016; Shareef, Dwivedi, & Kumar, 2016), privacy of personal data (Külcü & Henko & lu, 2014; Haynes et al., 2016), and people's connection with others (Ngai et al., 2015).

Because of the widespread use of Facebook, Twitter, and LinkedIn, a large number of researchers have started to explore social networking sites (Basak & Calisir, 2015; Kim, Sohn, & Choi, 2011; Dwivedi et al., 2016), including Twitter (Johnson & Yang, 2009; Liu, Cheung, & Lee, 2010) and Facebook (Dhaha & Igale, 2013; Park, Kee, & Valenzuela, 2009). Moreover, many articles have examined social networking from different perspectives, including user participation (Hu & Kettinger, 2008; Lankton, McKnight, & Thatcher, 2012), continued usage inten-

* Corresponding author.
E-mail addresses: mac@mail.mcu.edu.tw (W.-L. Shiau), ykdwivedi@gmail.com (Y.K. Dwivedi), ntustyang2009@hotmail.com.tw (H.S. Yang).

http://dx.doi.org/10.1016/j.ijinfomgt.2017.04.007
Received 21 February 2016; Received in revised form 29 December 2016; Accepted 19 April 2017

tion (Basak & Calisir, 2015; Mlaiki, Walsh, & Kalika, 2013), functionalities and features (Kim, Chan, & Kankanhalli, 2012; Lu & Hsiao, 2010), role in electoral campaign (Kapoor & Dwivedi, 2015) gender and age (Brooks & Anene, 2012; Chakraborty, Vishik, & Rao, 2013), culture (Krasnova, Veltri, & Gunther, 2012), and privacy (Lo, 2010; Külcü & Henko & lu, 2014; Haynes et al., 2016). The number of research articles on social media and social networks has increased substantially. However, to the best of our knowledge, no article has addressed the core intellectual structures of social networking sites. To fill this gap, social media and social networking articles were collected and analyzed to explore the core knowledge of the social media and social networking field. The data source was the Institute for Scientific Information (ISI) Web of Knowledge database, from which 2565 articles and 81,316 citations were obtained, spanning from January 1996 to December 2014. We applied citation and co-citation analyses to determine high-value articles and the underlying intellectual structures of social media and social networking literature. Citation and co-citation analyses are commonly used bibliometric methods for assessing consistent study areas among fields (Small, 1973; Sugimoto, Pratt, & Hauser, 2008; Shiau & Dwivedi, 2013; Shiau, 2015; Shiau, Dwivedi, & Tsai, 2015). Moreover, cluster analysis and multidimensional scaling (MDS) analysis were performed to identify the core knowledge of the social networking. The rest of this paper is organized as follows. Section 2 covers the literature review, which included a review of the definition and framework of social networks and co-citation analysis. Section 3 describes the research methodology, explaining the method for obtaining data sources and the research process. Section 4 provides the result and discussion. Section 5 offers the conclusion, which summarizes the results of this study. Section 6 provides the implication for researchers and practitioners. Section 7 presents the study limitations and areas for further study.

2. Literature review

2.1. Social network and social networking sites

Social networks have many prospective users. For example, a social network is the integration of social relationships. Hagel and Armstrong (1997) explained social networks as an interface among users. They analyzed social networks by observing social interactions and discovered that there are relationships and cohesive forces among people causing them to share their interests. Rheingold (1993) defined social networks as an integration of social ties. In other words, a social network pertains to how people in a society interact and form relational ties. In a social network, people can instantaneously share their videos, images, and text files and establish voice communications irrespective of their locations. By communicating through various interactive methods, people with similar interests can assemble online and share their opinions (Huberman, Romero, & Wu, 2009). In sum, social networks are established by people who enjoy sharing activities, hobbies, interests, and communication.

Social networking sites provide various interactive communications. For example, Facebook, Twitter, and LinkedIn have user-friendly interfaces that enable people to follow the lives of friends, keep track of their families, discover useful information, and engage in commercial transactions (Goldsborough, 2009; Huberman et al., 2009). With the increase in the popularity of social media and social networking sites, scholars and practitioners would like to understand the user behaviors of people using these applications. For example, Shi, Lee, Cheung, and Chen (2010) studied factors affecting the intention to continue using Facebook through user satisfaction; the factors included disconfirmation of maintaining offline contacts, disconfirmation of meeting new people, disconfirmation of information seeking, and disconfirmation of entertainment. Kim et al. (2011) examined the factors affecting the intention to continue using social networking sites, including perceived usefulness, perceived enjoyment, interpersonal influence, media influence, confirmation, and satisfaction. Chang and Zhu (2012) investigated the antecedents of the intention to continue using social networking sites including perceived bridging social capital, perceived bonding social capital, confirmation, flow experience, age, and gender. Basak and Calisir (2015) studied factors that affect the intention to continue using Facebook. Their results revealed that the intention of 62% of the Facebook users to continue using Facebook is explained by attitude and satisfaction. Entertainment and status seeking have indirect significant effects on the intention to continue using Facebook. However, information seeking and self-expression have insignificant effects on the intention to continue using Facebook. Moreover, Kwon, Park, and Kim (2014) studied motivational factors for using social networking sites and explored user acceptance of Facebook and Twitter. Their results showed that perceived mobility, usefulness, connectedness, security, and system and service quality play an important role when deciding to use Facebook and Twitter.

2.2. Co-citation analysis

Small (1973) proposed cocitation analysis for exploring and organizing knowledge structures and core topics of distinctive scientific fields (Grover, Ayyagari, Gokhale, Lim, & Coffey, 2006; Small, 1973). This analysis is a type of bibliometric method that allows quantifying the cocitation relationship between documents (Small, 1973). Previous studies have indicated that co-citation analysis involves determining the frequency with which two documents are cited by a third document. Two documents are strongly correlated when they are frequently cited together by other documents (Grover et al., 2006; Kessler, 1963; Shiau et al., 2015; Small, 1973). Co-citation is a measure of the semantic similarity among documents that is based on citation relationships. The more co-citations an article receives, the more likely they are to be semantically related (Kessler, 1963; Shiau & Dwivedi, 2013; Small, 1973). Because of the characteristics of co-citation analysis, many scholars use it to explore the core concerns of a field. For example, Taylor, Dillon, and Wingen (2010) used co-citation and cluster analyses to analyze the literature related to information systems from 1986 to 2005. Their results showed that the literature on information systems can be divided into literature on development and introduction, information systems strategy and commercial results, and work groups and resource allocation. Hsiao and Yang (2011) investigated the intellectual development of the technology acceptance model by performing co-citation analysis, multidimensional scaling, factor analysis, and cluster analysis. Their results showed that the intellectual development of the technology acceptance model resulted in e-commerce systems, hedonic systems, and task-related systems. Lee and Chen (2012) investigated the intellectual structure of knowledge management. They performed co-citation analysis of 10,947 articles from 1995 to 2010 and discovered that the three intellectual factors affecting knowledge management were challenges for knowledge management, the importance of knowledge, and the creation of new knowledge. Shiau and Dwivedi (2013) used co-citation, factor, and cluster analyses to identify core factors of e-commerce research. Their results showed that the five core factors are trust, technology acceptance and technology application, e-commerce task-related application, e-markets, and identity and evaluation.

3. Research methods

This study was conducted by collecting articles from the ISI electronic database, which is a premier online research platform and is frequently used by researchers for retrieving information and data. The ISI electronic database has over 1000 valuable journals containing high quality research articles (Hu, Hu, Gao, & Zhang, 2011; Liu, 2005; Pilkington & Meredith, 2009). The keywords “social network” and “social media” were used to collect data. The results of the two keywords overlapped. Moreover, searches for “social network” yielded