



Comparing Twitter and YouTube networks in information diffusion: The case of the “Occupy Wall Street” movement

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ABSTRACT

Grounded by the micro approach to network theory, information diffusion theory, and the web ecology model, this study comparatively explores the network structure, interaction pattern, and geographic distribution of users involved in communication networks of the Occupy Wall Street movement on Twitter and YouTube. The results show that Twitter users generated a loosely connected hub-and-spoke network, suggesting that information was likely to be organized by several central users in the network and that these users bridged small communities. On YouTube, homogeneously themed videos formed a dense mesh network, reinforcing shared ideas and meanings. According to the geographic distribution, both Twitter and YouTube networks were actively organized by U.S. users, but the YouTube network was activated mainly by anonymous users. These results highlight differing roles of social media in political information diffusion in which the Twitter network not only organizes and coordinates information but also facilitate the exchange of ideas between different groups. YouTube is suitable for disseminating ideas and reinforcing solidarity among members. The results demonstrate useful analytical techniques for data mining and analyzing Twitter and YouTube networks and have important implications for distinct roles of social media platforms in organizing collective action.

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1. Introduction

Internet communication technologies provide new opportunities for individuals who are likely to initiate, organize, and diffuse information and ideas based on globally distributed social networks (Burgess et al., 2006). Massive like-minded actors exchange and discuss their local problems through horizontal networks beyond geographic boundaries (Khondker, 2011). Social media outlets are everyday communication platforms where users are connected to one another by sharing ideas and discussing social problems (Hsu et al., 2013). In the context of social movements, social media serve as useful communication tools for protesters, who may deploy social media not only to

disseminate their ideas but also to motivate others to engage in collective action (Choi and Park, 2014).

The Occupy Wall Street (OWS) protest aims at decentralizing power and addressing financial inequality and is a recent representative example of how social media contribute to the dissemination of social events across the world (Cottle, 2007). The local protest initially organized in New York City has spread rapidly across the world through social media networks and thus has become an international social issue (Caren and Gaby, 2011).

Previous studies have examined the role of social media in political information diffusion and social networks grounded by diffusion of innovation theory and network theory (Biddix and Park, 2008; Castells, 2009; Caren and Gaby, 2011; Choi and Park, 2014; Danowski et al., 2011; González-Bailón et al., 2011; Hsu et al., 2013; Rogers, 2003). Researchers have focused on which and how political information is spread through social networks (e.g., Biddix and Park, 2008; Caren and Gaby, 2011;

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Danowski and Park, 2014), the capability of communication networks to organize collective action (Benkler, 2006; Best and Kellner, 2001; Castells, 2009; Couldry and Curran, 2003), and the characteristics of key actors in the information diffusion process (e.g., Choi and Park, 2014; González-Bailón et al., 2011; Hsu et al., 2013). However, few studies have examined the distinct role of social media platforms as a channel of information diffusion, although characteristics of each medium may shape the way information is disseminated and shared by users (Nam et al., 2014; Rogers, 2000).

To fill this research gap and provide a better understanding of the dynamics of the political information diffusion process through social media, this study comparatively maps the communication network of the OWS movement on Twitter and YouTube, two global social media platforms. By employing the social network analysis method, this study investigates the structural characteristics of communication networks, patterns of interactions between users, and the geographic distribution of users. A social network analysis is useful for uncovering the structure of communication networks that illuminates how individuals exchange information online (Barnett et al., 2011). Taking the network structure and geographical distribution into account simultaneously is crucial for assessing the strength of an information system (Leydesdorff et al., 2006). In this regard, this study provides important theoretical and methodological insights into the process of protest-related information diffusion and distinct roles of social media platforms as communication channels for organizing collective action.

2. Literature review

2.1. The role of the Internet in civic engagement

Castells (2009) noted the ability of communication networks to generate a new public space in the process of social change. The Internet facilitates horizontal communication networks, allowing ordinary individuals to express their opinions and construct a certain image. Social actors who are willing to change their society against established authorities and institutions use such communication networks to counter these entities. For instance, Castells (2009) provided a case study of Obama's political campaign in 2008 and pointed out that the Internet was used to mobilize young voters who wanted social change and motivate them to participate in the election. This result implies that the Internet is a new means for initiating social change by mobilizing individuals and collective action.

There has been an increasing discussion among scholars that the Internet creates a new form of citizenship reflecting the less formal construction of one's identity, representation, and ideology through one's everyday practices in popular culture. Hermes (2005) defined cultural citizenship "as the process of bonding and community building, and reflection on that bonding that is implied in partaking of the text related practices of reading, consuming, celebrating, and criticizing offered in the realm of (popular) culture" (p. 10). Hof (2006) adapted this idea to examine scrapbook sites and suggested that online communities serve as platforms for forming cultural citizenship. She illustrated that a visible forum allows members to get a sense of what and whom others care about and which society they live in with which cultural values. This

implies that such online activities entail certain obligations and responsibilities to maintain attention to others and social issues as members of society.

Burgess et al. (2006) extended this concept to social networking sites (SNSs) such as photo-sharing, storytelling, and chatting sites. They described that producing everyday creative content and social networking represent an important element of a digital culture and emphasized that such social networking practices shift the way one's identity is politicized from a homogeneous public sphere mediated by the mass media to a heterogeneous, open cultural sphere based on everyday participation through social media. In this process, users experience both conscious and unconscious cultural citizenship practices. These discussions lead to the assumption that the greater the popularity of social networking platforms, the greater their capability to constitute and practice cultural citizenship based on daily use and a highly participatory culture. Along this line, Burgess and Green (2009) pointed out that globally popular social media such as YouTube are potential communication channels for constructing cosmopolitan cultural citizenship through which individuals share their identities and perspectives with others in diverse geographic locations. They also illustrated that during the 2008 U.S. presidential campaign, YouTube videos played a crucial role in constituting the cultural citizenship among posters and audiences. These findings provide support for the idea that social media users can build a collective identity by sharing common ideas and cultural values through their interaction. This view can be applied in a social movement context in which protesters can employ social media as tools for mobilizing other users by sharing cultural meanings to facilitate collective action.

2.2. Network theory and information diffusion

Network theory explores human behavior in terms of relationships among members of societies (Castells, 2009; Monge & Contractor, 2003). Two major theoretical approaches have been employed by network theorists. They can be classified into 1) the macro network approach and 2) the micro network approach in terms of the definition of networks and the unit of analysis (Monge & Contractor, 2003). The macro approach treats a network as a social system or structure constituting a society and focuses on power relationships between human collectives or individuals who struggle with achieving their interests and values (Castells, 2009). On the other hand, the micro approach regards a network as an association of individuals and focuses on who act together for what, how collectives construct a society, and how they produce cultural meanings (Granovetter, 1973; Latour, 1987).

As a type of structural analysis, the social network analysis method is used to examine characteristics of network structures, relationship properties of networks, patterns of communication between actors, and roles of actors embedded in networks (Danowski et al., 2011). Scholars have argued that networks are important in innovation diffusion because social ties and communication between individuals can facilitate the spread of an innovation (Danowski et al., 2011; Monge & Contractor, 2003; Rogers, 2003).

Recent studies grounded in network theory and diffusion of innovation theory have explored the role of social networks, the network structure, and the pattern of interactions between

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