Comparing Twitter and Facebook user behavior: Privacy and other aspects

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ABSTRACT

Understanding online-social-network (OSN) user behavior is an important challenge in the field of social network analysis, as OSNs play a significant role in people's daily lives. So far, many studies considering only one OSN or, at most, comparing results obtained for a single OSN, have been provided. Nowadays, users typically join more OSNs and this is an important aspect that should be taken into account for user behavior analysis. In this paper, we give an important contribution in this direction, by analyzing the behavior of users belonging to both Facebook and Twitter. This way, the analysis is well-founded because it is conducted on a common set of users and, further, a number of specific analyses become possible (as common friendship). Our study is carried out on data extracted from the web, and allows us to find important specificities of these users about their privacy setting, the choice of friends and the activity they do, which are generally consistent with the recent findings in this field.

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1. Introduction

In a few years since their launch, online social networks (OSNs) have reached a huge level of popularity around the world. This rapid growth, leading OSNs to be large-scale, ubiquitous, and any-time services, has attracted the interest of researchers coming from disparate fields, also to study this new form of computer–mediated human interaction that facilitates people interaction and helps maintaining ties (Ellison, Steinfield, & Lampe, 2007). Understanding OSN user behavior is important to different entities (Jin, Chen, Wang, Hui, & Vasilakos, 2013): For Internet and OSN providers to guide infrastructural and application-level actions, for users themselves to enhance awareness in this potentially insecure world, for companies and government institutions to make better use of this huge network of people for their finalities, for scientists to better understand individuals and communities.

Several studies in the literature have analyzed many aspects of OSNs, such as connectivity, interaction, traffic activity, mobile social behavior, malicious behavior and privacy awareness (Burke, Marlow, & Lento, 2009; Cha, Kwak, Rodriguez, Ahn, & Moon, 2007; Gill, Arlitt, Li, & Mahanti, 2007; Hassan, 2009; Leskovec, Adamic, & Huberman, 2007; Maia, Almeida, & Almeida, 2008; Pfeil, Arjan, & Zaphiris, 2009; Watts, Peretti, & Frumin,

2007; Zhang et al., 2014b, Zhang, Zhang, Ordóñez de Pablos, & Sun, 2014a), and all the analyses have been conducted by focusing on only a single OSN (see Section 2). However, a multiple-social-network perspective may be much more fruitful to understand new aspects of people's interaction with OSNs. Indeed, each social network is a different environment providing a virtual "square" where a user expresses a different trait of personality (Barash, Ducheneaut, Isaacs, & Bellotti, 2010), sometimes almost a different identity. The relevance of this perspective has been shown in the recent literature, from the point of view of both structural analysis (Buccafurri, Lax, & Nocera, 2015, 2014b, 2013) and applications (Buccafurri, Lax, Nicolazzo, Nocera, & Ursino, 2014a; Nguyen et al., 2013; Zhang, Nguyen, Zhang, & Thai, 2015). However, less effort has been so far devoted towards comparative behavioral studies.

Observe that, in this case, the trivial comparison of the behavior of (different) users on different social networks does not give correct information, so we cannot just elaborate the results obtained in the literature in the different social networks. To give a trivial example, if we want to study how the behavior of a driver changes in cars A and B, we should study a sample of people driving both the cars, and observing the differences in the two experiences. We cannot simply study the expected behavior of drivers of car A and the expected behavior of drivers of car B and compare them, because the result would be affected by those traits prompted people to use car A instead car B. The same happens for comparative studies on behavioral aspects of online social networks, leading

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to the necessity of considering *membership overlap* (i.e., users belonging to all the studied OSNs) as the right perspective from which to draw meaningful and well-founded results.

Following the above multiple-social-network perspective, this paper aims to compare people's behavior in the two most popular social networks, which are `Facebook` and `Twitter`. On the basis of the previous observation, we base our analysis on the concept of membership overlap, to study a number of behavioral aspects.

The first one is about privacy and disclosure of personal information. Recent studies on `Facebook` have shown that both a strong association between low engagement and privacy concern (Staddon, Huffaker, Brown, & Sedley, 2012) and a significant relationship between privacy awareness and privacy concerns/self-disclosure (Zlatolas, Welzer, Heričko, & Hölbl, 2015) exist. Our study aims to answer the question "Is there a connection between user awareness about privacy threats and membership overlap between `Twitter` and `Facebook`?".

The second aspect we study is about friendship. OSNs are important for maintaining social relations and previous studies have found that friendship is positively correlated with bridging social capital (Bohn, Buchta, Hornik, & Mair, 2014; Burke, Kraut, & Marlow, 2011; Johnston, Tanner, Lalla, & Kawalski, 2013). As for this aspect, we study what is the attitude of users to have friendship relations overlapping between `Facebook` and `Twitter` and if a correlation between number of friends in `Twitter` and `Facebook` exists.

The last issue we deal with concerns the activity of users belonging to both `Twitter` and `Facebook`. Pempek, Yermolayeva, and Calvert (2009) found that the prime goal of user activity on `Facebook` is to self-promote or to maintain relationships, whereas other studies showed that some types of activity are a sign of narcissism (Bergman, Fearrington, Davenport, & Bergman, 2011; Carpenter, 2012; Rosen, Whaling, Rab, Carrier, & Cheever, 2013). Our study aims to answer the question "What about user activity and how the prevalence of activity on `Facebook` or `Twitter` is correlated to membership overlap?".

The answers to all these questions are interesting and sometimes surprising, showing that one of the contributions of this paper is to trace the beginning of a promising research line.

2. Related work

With the increase in both the number and the dimension of OSNs, the development of approaches aiming to deeply investigate their main features has become welcome. A very interesting trend of the recent literature is to try to characterize user behavior in different platforms.

There are a number of relevant reasons that call for a deeply study on how users act when logging to these sites. First, analysis of user behavior allows the evaluation of the performance of existing social systems, more refined site design (Burke et al., 2009; Wilson, Boe, Sala, Puttaswamy, & Zhao, 2009) and user tailored advertisement placement policies (Williamson, 2007). Second, accurate models of user behavior in OSNs are crucial in applications of social studies such as viral marketing. Indeed, one of the main goals of marketers is the spread of their promotions quickly and widely. For this reason, they need to understand how users interact and to build models representing these interactions in such a way as to foresee how information will flow (Leskovec et al., 2007; Watts et al., 2007). Third, the study of user behavior helps the prediction on how much the future workload of OSNs will influence the whole Internet traffic, which is an essential information to properly dimension the Internet infrastructure and content distribution systems (Krishnamurthy, 2009; Rodriguez, 2009). Benevenuto, Rodrigues, Cha, and Almeida (2009) show an analysis

on a clickstream dataset collected from a social network aggregator, providing users with a common interface for accessing multiple social networks.

As for the analysis about user social behavior in a social network, Java, Song, Finin, and Tseng (2007) and Teevan, Ramage, and Morris (2011) explored search behavior on `Twitter`: while Teevan et al. (2011) make a deep analysis of large-scale query logs and supplemental qualitative data, Java et al. (2007) focus on the study of the topological and geographical properties.

Ross et al. (2009) examine a sample of undergraduate students to understand the nature of `Facebook` use. They study how personality and competency factors influence its use and how the Five-Factor Model of personality (openness, conscientiousness, extraversion, agreeableness, and neuroticism) is related to `Facebook` use.

A systematic measurement study on the statistics of the social network underlying the video sharing service `YouTube` is reported by Cheng, Dale, and Liu (2008), in which a deep analysis on user behavior through a number of ratings, views and comments on `YouTube` videos is carried out. Another study on `YouTube` is presented by Maia et al. (2008) and focuses on the identification of different classes of user behavior to improve recommendation systems for advertisements in OSNs. Cha et al. (2007) analyze properties of the user generated videos, such as popularity shifts, whereas parameters like video traffic, file attributes and bit-rate, are studied by Gill et al. (2007). A study on the age differences and similarities of users w.r.t. their activities in `MySpace` is described by Pfeil et al. (2009), who explore potential differences in social capital among older people compared to teenagers.

Several studies have looked at the comparison of the behavior of sample of users among different OSNs (Ahn, Han, Kwak, Moon, & Jeong, 2007; Dwyer, Hiltz, & Passerini, 2007; Fogg & Iizawa, 2008; Gao, Abel, Houben, & Yu, 2012; Gyarmati & Trinh, 2010; Hughes, Rowe, Batey, & Lee, 2012; Mislove, Marcon, Gummadi, Druschel, & Bhattacharjee, 2007; Shen, Brdiczka, & Ruan, 2013; Zhao et al., 2011). However, all these studies extract trends on the use of social sites and compare them through statistical parameters derived from the analysis of large sets of users. Thus, they do not observe the behavior of the same user in the two systems. Gyarmati and Trinh (2010) try to characterize user activities and usage patterns in some popular OSNs like `Bebo`, `MySpace`, `Netlog`, and `Tagged`. In Zhao et al. (2011), instead, the authors consider the differences between `Twitter` and traditional news media content. A comparison of `Facebook` and `MySpace` on the aspects of trust and privacy is reported by Dwyer et al. (2007). The obtained results show that members of both sites have similar levels of privacy concern. However, `Facebook` members report higher trust in both the social network itself and the other `Facebook` users, and are more confident to share identifying information. Shen et al. (2013) collect objective, privacy-preserved behavior data from user that are active in both `Facebook` and `Gmail`. The authors make a comparative analysis on user behavior in OSNs and their way of using email services. The analysis shows that a large portion of social interactions still occur through email messages, whereas participants tend to be more emotional on `Facebook`.

Using a general population sample of 300 users, Hughes et al. (2012) examine the personality correlates (i.e., Neuroticism, Extraversion, Openness-to-Experience, Agreeableness, Conscientiousness, Sociability and Need-for-Cognition) of social and informational use of the two OSNs `Facebook` and `Twitter`. By examining also age and gender they show that personality is related to online socializing and on how people seek and/or exchange information. Moreover, a preference for `Facebook` or `Twitter` is associated with differences in personality. Ahn et al. (2007) analyze sample networks from `Cyworld`, `Orkut`, and