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Birds of a feather locate together? Foursquare checkins and personality homophily

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ARTICLE INFO

Article history:

Received 16 September 2015

Received in revised form

6 January 2016

Accepted 7 January 2016

Available online xxx

Keywords:

Spatial homophily

Personality

Location-based social network

Foursquare

ABSTRACT

In this paper we consider whether people with similar personality traits have a preference for common locations. Due to the difficulty in tracking and categorising the places that individuals choose to visit, this is largely unexplored. However, the recent popularity of location-based social networks (LBSNs) provides a means to gain new insight into this question through checkins - records that are made by LBSN users of their presence at specific street level locations. A web-based participatory survey was used to collect the personality traits and checkin behaviour of 174 anonymous users, who, through their common check-ins, formed a network with 5373 edges and an approximate edge density of 35%. We assess the degree of overlap in personality traits for users visiting common locations, as detected by user checkins. We find that people with similar high levels of conscientiousness, openness or agreeableness tended to have checked-in locations in common. The findings for extraverts were unexpected in that they did not provide evidence of individuals assorting at the same locations, contrary to predictions. Individuals high in neuroticism were in line with expectations, they did not tend to have locations in common. Unanticipated results concerning disagreeableness are of particular interest and suggest that different venue types and distinctive characteristics may act as attractors for people with particularly selective tendencies. These findings have important implications for decision-making and location.

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1. Introduction

It is well-recognised that homophily, the attraction of individuals with similar traits to one another, is a widely occurring human disposition (McPherson, Smith-Lovin, & Cook, 2001). With the advent of the Internet and the popularity of social networking, it has become possible to understand this concept through the electronic ties that individuals choose to make with each other, leading to a wide range of insights from large electronic data sources. Despite these recent advances, relatively little is known about the manifestation of homophily in a physical context, thus the extent to which similar people have a preference for visiting the same places is an important question to ask. Unfortunately, a significant barrier to answering this question has been convenient data collection on a large scale, which until recently has been challenging to accomplish without access to dedicated location tracking equipment. However, the recent advent of smartphones

and location-based social networks (LBSNs) allows new progress to be made. Location-based social networks run on a smartphone as a location-aware application, enabling a user to log their presence at a physical location (referred to as a checkin), which is shared across an online social network in real time. The analysis of checkins thus provides insight into the places that individuals publicly associate with.

Many socio-demographic, behavioural and intra-personal factors (McPherson et al., 2001) can potentially characterise aspects of similarity between individuals. For decisions related to human spatial activity, the most fundamental characteristics are arguably the personality traits, given that these are relatively persistent dispositions, thereby broadly framing an individual's outlook and potential approach to activity, interaction and behaviour. Trait-theorists argue that this is supported by evidence of personality trait correlation with wide-ranging human activities, ranging from consumer marketing (e.g., Kassarjian (1971)) through to organisational behaviour (e.g., Hough and Oswald (2008)) and individual tastes (e.g., Rawlings and Ciancarelli (1997)). The boundaries of scenarios where personal activities are congruent to personality

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traits have been explored in Sherman, Nave, and Funder (2012), with findings that effectively characterise individual freedom consistent with choice in social, consumer-related and location-based decisions. Consequently, we focus on individual preferences regarding assortment.

To explore user similarity in location-based activity, we use data collected by a recently introduced experimental platform (Chorley, Whitaker, & Allen, 2015), which has been designed to allow users of the Foursquare¹ location-based social network to participate in anonymous collection of their checkins and personality profile in return for visualisation of their own personality relative to others at locations where common checkins are made. This novel approach naturally incentivises participation and has allowed viral participant recruitment “in-the-wild” to be accomplished, resulting in data from 174 anonymous participants who have collectively checked in 487,398 times at 119,746 venues. Taking the volume, diversity and broad categorisation of venues visited as variables, the first examination of human mobility behaviour at street level, in relation to human personality (Chorley et al., 2015) identified a number of interesting correlations. In particular, conscientiousness positively correlated with the number of venues visited, openness positively correlated with checkins at both sociable and popular venues, and neuroticism negatively correlated with the number of sociable venues visited.

In this paper we focus on the extent of overlap in personality for common place-based visits, using checkins as the observed signal. As far as we are aware this is the first investigation of personality homophily based on spatial activity.

1.1. Location-based social networks

LBSNs are an interesting hybrid technology that extends online social networking into the physical “real” world. Facebook, Foursquare, and Google + are, to date, the most commonly used LBSNs, with Foursquare recently reorganising its business to provide the checkin facility through a complementary application called *Swarm*. Users of LBSNs require location-aware smartphones and internet connectivity in order to record their presence at a location, referred to as a *checkin*. This activity triggers a notification to friends within the associated online social network. Rather than a checkin being recorded solely as a geographical reference (e.g., longitude and latitude or street address), it is usually delivered with a meaningful semantic representation, such as a named place at street level (e.g., the name of a coffee shop and its approximate location). Places that are explicitly registered through the LBSN in this way are called *venues*. Many LBSNs operate extensible taxonomies of venues that are populated by users, and these have become widespread for cities and popular areas on a global basis.

Checkins give particular insight into the venues that an individual chooses to record as important, interesting or relevant. However in some LBSNs such as Facebook and Google+, the checkin functionality has been introduced as a secondary function, built on top of other online social networking functionality. The Foursquare LBSN is different in this regard, originating with checkins as its primary function, and with limited secondary content provision. These factors, combined with a rich API² on which third party applications can be developed, have led to Foursquare being a popular basis for academic insight to a range of human behaviours. Primarily these have concerned physical activity, such

as relating to patterns made by users (e.g., Noulas, Scellato, Mascolo, and Pontil (2011)) and with a high degree of location data aggregation. This has led to insights into the effect of social relationships and routine on spatial behaviour for example (Cho, Myers, & Leskovec, 2011).

1.2. User motivation

A LBSN users' checkin behaviour may be motivated by several factors, such as establishing a social connection with friends, discovering new places to visit, keeping track of already visited places, fighting boredom and gamification (Lindqvist, Cranshaw, Wiese, Hong, & Zimmerman, 2011). LBSNs allow users to select certain locations as a means of self-presentation, referred to as the *spatial self* (Schwartz & Halegoua, 2014). This is frequently consistent with other forms of online self-presentation and can involve venue avoidance to counter associations with perceived negative places (Lindqvist et al., 2011). Users have been found to control the volume of checkins in different ways, avoiding spamming their social networks with too many checkins and giving thought to self-presentation (Schwartz & Halegoua, 2014). Different levels of consistency (i.e., venue selection) have been reported. Some users consistently check in to any place they visit, while others select their checked in locations more carefully, based on how interesting or deserving they deem the place to be (Lindqvist et al., 2011). Audience management is a further aspect of user behaviour in LBSNs, with users sharing different checkins with different groups of friends and acquaintances. In some cases, interesting checkins, meaning checkins at unusual or new venues, were reserved for Twitter and Facebook, while more general checkins were shared with friends (Cramer, Rost, & Holmquist, 2011).

These factors mean that the checkin is a potentially noisy signal with varying purposes between individuals. To some degree, checkins represent a unique footprint which is characteristic of the individual user, and are worthy of investigation as a means to understand human behaviour. However, limited existing studies have addressed the role of checkins in relation to individual differences such as personality. Wang, Pedreschi, Song, Giannotti, and Barabasi (2011) have considered the personality characteristics that correlate with individuals sharing checkins in Facebook, and in Chorley et al. (2015), the personality traits of individual users have been correlated with observed checkins.

1.3. Personality

In psychology, trait theory (Allport, 1966) suggests that humans have underlying stable characteristics of biological origin, framing how situations are individually considered and approached. These traits, broadly referred to as *personality facets*, can influence subconscious human behaviour. As such, there has been considerable research exploring the relationships between diverse human activity and personality. Situations where personality facets are particularly influential to human behaviour have been considered by Sherman et al. (2012). These behaviours have been broadly categorised as freedom of self-expression, social interaction, lack of a-priori structure and an opportunity to engage in competencies. Aspects of both online and offline human activity fall into these categories, including checkins and spatial behaviour.

From lexical origins, dimensions capturing personality have progressively emerged since the 1930's, with the NEO Personality Inventory being developed by Costa and McCrae (1985) and validated by McCrae and Costa (1987) in the 1980's. The concept of the Big Five and the NEO Personality Inventory has been updated and revised throughout the years (Digman, 1990), with the revised NEO-PI-3 published by McCrae, Costa, and Martin (2005). Although

¹ Foursquare have recently reorganised their business model and checkins are now made through a dedicated application called *Swarm*: <http://www.swarmapp.com>.

² API stands for Application Program Interface.

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