

# PASNAM - Patterns in Social Network Analysis and Mining

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**Abstract**—Our society is becoming increasingly digitalised. Smartphones and online social networks, along with wireless technologies, are examples of technologies that allow people to connect any time and anywhere. Online social networks (OSN) such as Facebook, Twitter and, more recently, Instagram are now comprised of millions of profiles for individuals and enterprises. Large amounts of user- and firm-generated content allow new types of applications and require a solid understanding of related phenomena which apply to business, security, management, and marketing, to name a few. A special session on Social Network Analysis and Mining is included in the PATTERNS 2017 conference, held in Athens, Greece, to cover some of the new applications that arise from user-generated content (UGC) on social networks. It is a real research challenge to identify and analyse human-based patterns from OSN. The work presented in the special session covers two particular examples of applications on two distinct networks: the analysis of firm-generated content on Instagram in relation to marketing and the analysis of geolocated Twitter data for event detection and characterisation.

**Keywords**—social media, social network analysis, user-generated content, firm-generated content, patterns.

## I. INTRODUCTION

Patterns are an increasing source of analysis for researchers in various fields. It is regularly observed that many activities, which at first appear to be random, are indeed following some patterns. This is a common observation across various fields and uncovering such patterns is usually the first step towards answering or discovering some real-world properties of many complex systems. An illustration of this observation, regarding online social network analysis, is the discovery of the small-world and scale-free nature of social networks [1] [2]. Such patterns, which are observed in many online social networks, have numerous applications and implications (for example, the diffusion phenomenon). Analysing the patterns in online social networks provides an opportunity to discover new patterns for new applications at different scales and with different implications. The big data nature of social networks provides one of the best sources of information for better understanding online and physical human behaviour. An application to business and online marketing concerns the understanding of people's

reactions to certain posts and brand-generated content.

## II. SUBMISSIONS

The content shared on social media has a high potential audience due to the large number of daily active users. When content succeeds in reaching a substantial audience in a short amount of time, it is said to have created 'buzz'. Despite the fact that most content does not create buzz, much content succeeds in generating engagement from many users. Brands are constantly looking to generate engagement online due to the many outcomes that social capital can produce. The first part of the special session takes a deeper look at Instagram, which is a large picture-sharing social-media platform that has not yet received much scientific focus despite both its high quantity of users and marketing interest from brands [3]. Instagram has more than 600 million daily active users. The analysis of posts characteristics for measuring its success or impact on social-media users is a research question that is addressed by Sokolova and Germon in the context of travel agencies. They have analysed the impact of seven variables on the engagement generated by Instagram photos: image family - landscape, person/selfie, or activity (such as hotel, cooking, sport, and attractions); image source - an image created by an agency, an image created by another Instagram user, or an image found outside Instagram; description type - commercial message, citation, image description, or call for an action; number of hashtags used in the description; hashtag types - related to the image description or related to the call for an action; geolocation type - the place name or an exact location; comment types - general-interest expression, information request, friendship request, answer to a question, or negative feedback. They have shown that voyageprive.com, verychic.com and airbnb.com have different posting strategies with varying degrees of success amongst users. Even if there is no recipe for online engagement, Sokolova and Germons' work is a first step towards better understanding the factors that users appreciate and that succeed in engaging users. This would contribute to identifying both the best and poorest practices of brands on Instagram.

Another aspect of social media is its potential use in better understanding people's online and offline activity. The

second part of the special session provides an example of geolocated-data usage applied to human migration from one region of interest (ROI) to another [4]. The authors rely on geolocated tweets for this purpose, which is a challenging task for multiple reasons. First, users do not send tweets regularly, which means that patterns are difficult to detect. Second, there are still limited numbers of geolocated tweets. Third, there is a challenge in modelling migration and capturing such migrations. The author addresses those issues at the scale of the San Francisco Bay area to detect ROI. The proposed methodology relies on the identification of meetings between Twitter users; these meetings are recorded whenever two users send tweets in the same spatio-temporal frames. The meetings that capture a high density of active people in the same location are identified as regions of interest. Connections (migrations) from geographical spaces are captured on a graph where edges are created whenever people have observed meetings at both locations. Authors have discussed the possible applications and interpretations of social-network-analysis metrics on this graph. Based on the discussion provided, these metrics could allow to capture the size, importance, and diversity of the events' audience.

### III. CONCLUSION

Patterns in social network analysis have been studied for several decades. While traditionally, sociologists performed this task manually, the rise of information technology has allowed scientists to perform this analysis on a much larger scale. This has caused social-network analysis to not only become a sociological challenge, but also a computational

challenge [5]. With recent technologies and the spread of information, a new understanding of human patterns is made possible. Online social networks are one of the key platforms that allow for the capturing of human online behaviour. A recent example of the power of cellular data to predict people's locations demonstrates how useful new sources of data can be [6]. It is likely that many social-network-based models and real-world properties have not yet been found and are still beyond us. In this track, the two papers have highlighted two modest applications of social-data investigation to management and marketing.

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