Using Social Media to Characterise Crowds in City Events for Crowd Management

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The research leading to this dissertation has received funding from the European Research Council under the European Union Horizon 2020 Framework Programme for Research and Innovation. It is established by the Scientific Council of the ERC Grant Agreement no. 669792 (Allegro).

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Dissertation

for the purpose of obtaining the degree of doctor
at Delft University of Technology
by the authority of the Rector Magnificus, Prof.dr.ir. T.H.J.J. van den Hagen
chair of the Board for Doctorates
to be defended publicly on
Friday 18th, September 2020 at 12:30 o'clock

by

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ISBN: your-isbn-number

Printed in the Netherlands

I have something to say.

X. Gong

Acknowledgement

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Chapter 1

Introduction

City-scale events are getting more popular and attract a large number of people participating in various activities. For instance, on King's Day, a national holiday in the Netherlands, a huge amount of people pour into the city and gather in the urban area, participating in various activities such as street parties, music festivals and boat parades. Event stakeholders, such as event organisers, police, municipalities, and crowd managers manage the crowd to avoid incidents. Crowd management practice consists of two phases (Martella et al., 2017), i.e. the planning phase and operational phase. In the planning phase, crowd managers require the past event data to infer guidelines, and to perform computer simulations of the crowds in the event.

Chapter 2

Crowd Characterization for Crowd Management using Social Media Data in City Events

In this chapter, we characterise city events in terms of various aspects using social media data. This answers the first research question, i.e. **RQ1. To what extent social media data are able to characterize crowds in city events, in terms of demographic composition, city-role composition, spatio-temporal distribution, Points of Interest preferences and word use?**

To this end, we screen a set of factors (i.e. visitor profile, crowd size, density, mobility, location, and semantics) that characterize crowd behaviour and introduce a set of proxies (i.e. demographics, city-role, crowd temporal distribution, post position, Points of Interests, and word use) derived from social media data. Furthermore, we characterize the crowd in two city-scale events, Sail 2015 and King's Day 2016, in terms of these proxies, and comparing them with information collected from events organizers and programs.

Our findings show that it is possible to characterize crowds in city-scale events using social media data, thus paving the way for new real-time and planning applications on crowd monitoring and management for city-scale events.

This chapter is published as a journal article: Gong, V. X., Daamen, W., Bozzon, A., & Hoogendoorn, S. P. (2020). Crowd characterization for crowd management using social media data in city events. *Travel Behaviour and Society*, 20, 192-212.

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2.1 Introduction

As cities compete for global importance and influence, city-scale public events are becoming an important ingredient to foster tourism and economic growth. Sports events, thematic exhibitions, and national celebrations are examples of city-scale events that take place in vast urban areas, and attract large amounts of participants within short time spans. The scale and intensity of these happenings demand technological solutions supporting stakeholders (e.g. event organizers, public and safety authorities, attendees) to monitor and manage the crowd.

Chapter 3

Conclusions, implications and recommendations

In this chapter, we present our main findings and conclusions for each research question, followed by the overall conclusions and implications for practice. Finally, we provide recommendations for future research.

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Summary

Events are getting more popular and more frequent in cities around the world. In the Netherlands in 2017, the number of festivals grew to almost 1000 [1]. These events take place in large areas of the city, they have a common topic, they include sub-events (activities), and they have start and end times and lasts from one day to several days. Examples of events are the national holidays, Soul Live Festival and trade exhibitions. City events can easily attract a large number of people. Event stakeholders, such as the event organizers, police, municipalities and other authorities, and crowd managers are concerned with guaranteeing the safety, comfort and general well being of the attendees. To this end, they enforce predefined crowd management measures that are adaptive to the current state of the event environment and of the participating crowd. This state is measured through information about the factors influencing event planning (Li, 2019) and pedestrian behaviour (Still, 2000; Tubbs & Meacham, 2007; Abbott & Geddie, 2000; Zomer et al., 2015) for crowd management, such as crowd size, density, mobility, emotion, visitor profile, and location. Conventionally, this information is derived from data provided by stewards (operating on the ground during the event) and sometimes pre-installed sensing infrastructures, such as counting systems, Bluetooth/ Wi-Fi sensors, and video cameras. While effective, these solutions suffer from several issues: they provide little information about sentiments, gender and age distribution, they are expensive, they cannot provide Spatio-temporal information, and they are complex to install and maintain.

[1] https://www.eventbranche.nl/nieuws/aantal-festivals-groeit-tot-bijna-1000-per-jaar-aantal-bezoeken-daalt-miniem-16483.html

Samenvatting

Social media gebruiken om menigte te karakteriseren in stadsevenementen voor crowd management

Een samenvatting in het Nederlands zal hier worden gepresenteerd.

Vincent X. Gong

Summary in Chinese

A summary in Chinese will be presented here.

摘要。

About the author

His research interests include social data analysis, crowd behaviour and crowd management in city events.

Publications

Journal papers

1. **Gong, Vincent X.**, Jie Yang, Winnie Daamen, Alessandro Bozzon, Serge P. Hoogendoorn, and Geert-Jan Houben. ”Using social media for attendees density estimation in city-scale events.” IEEE Access 6 (2018): 36325-36340.

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