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Places Representation on Social Media – A Study to Analyze the Differences between the Virtual Communities and the Offline Environment

Mai Ahmed, Peter Zeile

(MSc. Mai Ahmed, PhD. Candidate, Karlsruhe Institute of Technology, Germany, mai.ahmed@student.kit.edu)
(Dr.-Ing.Peter Zeile, Karlsruhe Institute of Technology, Department of Neighbourhoodpülanning, Germany, peter.zeile@kit.edu)

1 ABSTRACT

We are living in a digitized world with a fast base of changing and adapting. Our ways of communication have been translated to online platforms with high standards (E.g. emails, WhatsApp, Facebook, etc.). According to that, virtual communities have been developed to mimic the "offline" world. Social network platforms are trying to imitate the physical environment around us to offer their users an online experience as real as they can. One will find several technologies to explore new places with embedded data (E.g. others reviews, ratings, suggested activities, price, opening hours, etc.). This type of data has a direct and effective way to raise awareness about certain places and shift interest towards others. This fact is dramatically changing how people interact with their cities and how places have been represented and produced. That's why analyzing online behaviour is one of the key factors for city development.

Platforms are developing technologies to provide a digitized place-making; technologies like geotagging services, geo-reference content, commenting mechanism, reviews, and ratings, along with a big list. These new trends have opened a new dilemma between the offline and online world and how the two affect each other. In this research, literature has been made to identify the meaning of "place" and its component in the "offline" world. Also, the research will examine the different ways in representing places on the "online" world. Then, a framework will be proposed to measure the fulfilment of places' representation in these platforms (Facebook, Twitter, and Google). In the end, the research will suggest further work on how to represent a physical place into a virtual communication platform. This study can be a start point for scholars who seek to retrieve data from social media regarding places.

Keywords: virtual place, real-time data, Data-based solutions, location-based social networks (LBSN), urban computing, digitized place-making

2 INTRODUCTION

Edward Relph (1976) in his book place and placelessness argues that without the full understanding of "place", it would be difficult to identify what is special about a place and it would be impossible to find out how to repair existing places in need of modifications. In light of that, the research has been searching for the meaning and differences between these terms: space, place, public place, location.

People in their daily live interact with different levels of spatial context, which leverage their communication with the environment around them. As people start to affect the environment around them, they are turning it from space to place, in which they are burnishing their culture complexes onto it.

3 PLACE

In this chapter, we will approach the concept and meaning of the word "place" in terms of the research question. We start with some definitions, to differentiate between place, public place, and public space. Then, our focus will be concentrated on the place, regarding (1) "sense of place", which represents the intangible relationship between people and places, the aim of this part is to give us guidance to evaluate the intangible aspects in virtual spaces, and (2) place models, to fully comprehend the components of any place. According to the place models, a place identification matrix was developed, which is the base for the identification and differentiation of virtual places in contrast to "real-life places".

3.1 Definitions

The geographer Yi-Fu Tuan (1977) defines place as a humanized space. Phenomenologists like Manzo (2003) and Alan Gussow (1971, cited in (Relph, 1976)) they supposed that experience is the most important element in perception and in turning any environment to a place. Gussow has a very famous quote regarding experiencing places, he described it as "The catalyst that converts any physical location – any environment if

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you will – into a place, is the process of experiencing deeply. A place is a piece of the whole environment that has been claimed by feelings".

In other hands, Norberg-Schulz (1985) argued that place is the result of space along with the character, also he discussed the importance of architecture in adding an attribute to spaces and playing an important role in effecting the users' mental and physical well being. Norberg-Schulz emphasizes that architecture should not focus only on the meaning but also on the physical attributes. Relph (1976) explained that "places are the significant centers of our immediate experience of the world". In order to study place in a more comprehensive way, a number of scholars have suggested a place model to propose the place components from their point of view.

3.1.1 Public place

This terminology has a legal definition and is used in many laws. A public place is generally an indoor or outdoor place, whether privately or publicly owned, that is accessible for the public under or free of conditions and with or without fees (Nedim, 2015).

3.1.2 Public space

Public space is any space that is generally open and accessible for people (E.g. roads, public squares, parks, beaches, public libraries). Public spaces definition has been varying according to the differentiation between access and ownership. Public space is one that shows the diversity and encourages people to do activities together effortlessly, it is where social and economic exchanges occur (Project for Public Spaces, 2019; Pacheco, 2017; Karaçor, 2016)

3.2 Sense of place

Users experiences with places would generate a phenomenon called "sense of places". Relph (1976) argued that the concept of sense of place is not very clear to describe, but he described it as the ability to create and develop places' identities through a long-time connection between users and places. Sense of place is an important element which can strengthen the relationship between users and places. It can be influenced by personal values, beliefs and behaviours (Naiafi & Shariff, 2011). Sense of place is that feeling of belonging, identity and attachment that the individual or group of people hold about a particular place as a result of their cultural interactions with it (Tuan, 1977). Phenomenologists describe the sense of place as the emotional connection between users and places via understanding its symbols and meanings.

Your relationship with a place develops in three stages as Relph (1976) explained, the first level of sense of place is familiarity with the place, which represent being in a place without realizing its meanings and having no feeling of belonging towards it. The second level is an ordinary familiarity with the place, it is more cultural than personal, where people have deep and strong participation with the place. They will contribute to social activities by paying attention to the place's symbols. This level is most experienced in familiar and sacred places. The third level is profound familiarity with the place. It involves the 'existential insideness' of a person. In this level, a person is integrated with the place. In addition to that definition, Shamai also discussed that sense of place is comprising of three stages (1) belonging to a place, (2) attachment to a place, and (3) commitment to a place (Shamai, 1991).

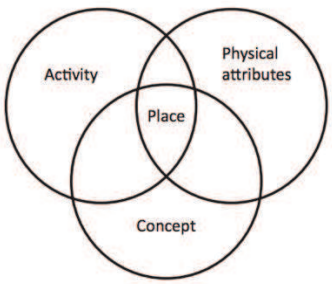

Figure 1: Canter's model of place (Canter, 1977)

3.3 Place model

Relph (1976) suggested that place is an interaction of three items, which are "physical setting", "activity", and "meaning". Canter's model (1977) offered a balanced view between the tangible and intangible attributes of a place. He showed that a place is a relationship between "action", "conception", and "physical attributes", as shown in figure 1.

Punter (1991) suggested another diagram with the aim of enhancing the identity of place as shown in figure 2. His model showed a relationship between "activity", "physical setting", and "meaning", to form a "sense of place".

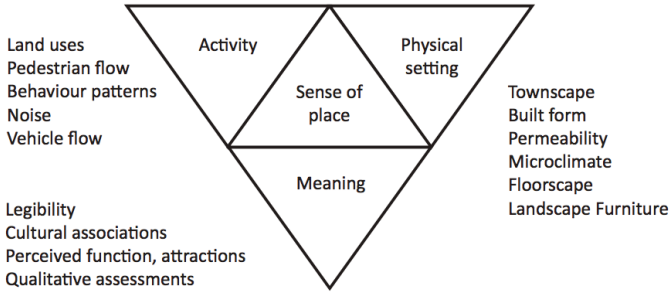

Figure 2: Components of the sense of place (Punter, 1991) (Montgomery, 1998)

Later, Montgomery (1998) reworked the diagram of Punter to add more elements above Punter's model as shown in figure 3. On the other hand, Steele mentioned several elements that contribute in sensing the place, these elements are: "the size of setting, scale, proportions, diversity, distance, texture, ornaments, colour, smell, sound, temperature and visual variety" (Steele, 1981).

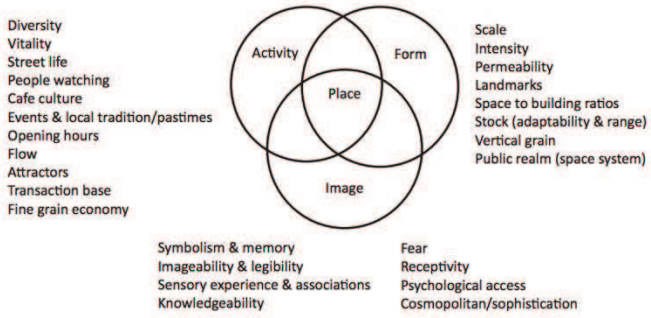

Figure 3: policy direction to foster placemaking (Montgomery, 1998)

3.4 Place identification matrix

According to the suggested place models by the above scientists, the components of a place can be organized as follows: (1) cognitive: which represent the emotional connection with place via understanding its symbols and meanings. This connection is forming from a long-term relationship between place and people among different generations to assist in reinforcing the cognitive elements (E.g. meaning, concepts, identity, traditions, myths, symbols, ritual); (2) physical characteristics: it represents the physical attribute which people experience with their five senses (sight, hearing, smell, taste, touch) to form a sensual experience with a certain place. The physical attributes are playing a very important role in improving the mental and physical well being of their users; and (3) activity: Places are associated with people's works, actions or leisure activities. Therefore, activities connect human to places (Naiafi & Shariff, 2011).

Accordingly, a place identification matrix (Figure 4) was made with an attempt to list the place components to help in assessing the fulfilment of place representation in the online platforms.

The matrix was divided into three categories: (1) cognitive: which represent the intangible elements, (2) physical characteristics: which can be divided into two groups, (2.1) form characteristics and (2.2) landscape, and (3) activity: which represent the relationship between people and places.

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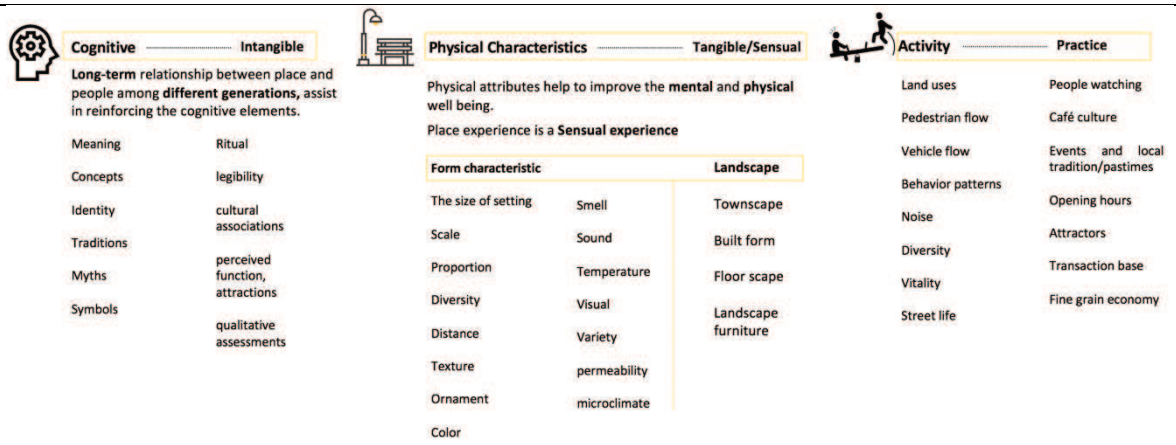

Figure 4: Place identification matrix (Relph, 1976; Canter, 1977; Punter, 1991; Montgomery, 1998; Steele, 1981)

4 THE ONLINE WORLD

Computer developers have been trying to mimic the real world over the internet, to imitate emotions, feeling and sense of place, to an extent that the online behaviour is no longer distinct from the offline behaviour. Developers have invented technologies that allow people to attach their thoughts, ideas, information, suggestions, ratings and reviews to a certain place, to give the virtual places a human dimension and presentation's depth. Technologies like geotagging, location-based applications and hashtags etc. These technologies enable people to keep memories of a place and document their experiences for themselves or others. These online metadata-sets can change people's spatial practice. This kind of representing thoughts has been playing a very important role in raising awareness about certain places or shift the attitude toward others. These capabilities are very critical for improving the built environment, but furthermore to forecast people's needs (Humphreys & Liao, 2011).

By using wireless networks, users leave traces behind them called "digital footprints" or "tracks". These tracks reveal users' interaction with infrastructure such as a mobile phone network or by uploading an image to one of the social media platforms (Girardin, Calabrese, Dal Fiore, Ratti, & Blat, 2008). These user-generated content has been given several names, the most known ones are Crowd Sourcing (Surowiecki, 2004), Citizens as Sensors, and Volunteered Geographic Information (VGI) (Goodchild, 2007), User Generated Context (Elwood, 2009).

The user-generated spectrum varies from active user actions "volunteered" to passive actions "Citizens as Sensors". Volunteered User Generated Content (UGC) happens when the user contributes content in data sets, such action as Wikipedia the Open Encyclopedia or OpenStreetMap, an open topography dataset which enables users to contribute in the area of spatial infrastructure. Also reporting platforms (e.g. www.fixmystreet.com), participation platforms, as well as own Weblogs, are UGC. In contrast to this explicit and active contribution, a passive contribution happens when a fruitful meaning is extracted from raw data, for example when researchers identify cities' landmarks from Flickr photo collections or when using mobile signals to estimate traffic flow and enable real-time route planning (Richter & Winter, 2011; Crooks, Croitoru, Jenkins, Mahabir, Agouris, & Stefanidis, 2016). Today's advanced analytics technologies and techniques enable organizations to extract insights from data with previously unachievable levels of sophistication, speed and accuracy. Data itself has become an important strategic and competitive asset (Hinssen, 2012; IBM Big Data and Analytics, 2014).

5 REPRESENTATION OF PLACES ON SOCIAL MEDIA

The term social media is typically used to express the several forms of electronic communication between members of the public to share information, ideas, personal messages and other content (images, videos, etc.). Social media platforms, such as Facebook, Twitter and Instagram have elevated and fostered social interactions in cyberspace, making a revolution in spreading information and offering an alternative for community formation (Merriam-Webster, 2011; Crooks, Croitoru, Jenkins, Mahabir, Agouris, & Stefanidis, 2016). Social Media is a group of "Internet-based applications" which are using Web 2.0 technologies as

their foundation. Also, these applications play a role in creating an environment for User Generated Content (UGC) to be created and exchanged (M. Kaplan & Haenlein, 2010).

5.1 Facebook

Facebook is an American company, which is offering an online social networking service. Facebook was founded in 2004 by Mark Zuckerberg, Eduardo Saverin, Dustin Moskovitz, and Chris Hughes, all of them were students at Harvard University (Hall, 2019). In the third quarter of 2012, the number of Facebook active users has exceeds one billion users, which made Facebook the first social network to do it. In September 2019, Facebook announced that they have over 2.45 billion monthly active users (Noyes, 2020; Clement, 2019).

Facebook has a "Facebook for developers" platform, which is a set of services, tools, and products provided by Facebook for third-party developers, in order to enable developers to create their own applications and services that access data from Facebook. This action is made using Facebook Graph API, which is a way to get data into and out of Facebook. It's an HTTP-based API that applications can use to programmatically query data, post new stories, manage ads, upload photos, and perform a wide variety of other tasks (Facebook).

5.1.1 Places' representation in Facebook

Inside the Graph API, there is the place information page, which represents the way Facebook understand and save places. Facebook represents places using several fields, which will be listed in the table below (Facebook, Place Information). For further information https://developers.facebook.com/.

Field	Type	Description
ID	numeric string	The Place's ID
about	String	Information about the Place
app_links	AppLinks	AppLinks data associated with the Place's URL
category_list	list<PageCategory>	The Place's sub-categories
chekins	unsigned int32	Number of checkins at the Place
cover	CoverPhoto	Information about the CoverPhoto associated with the Place
description	string	The Place's description
engagement	Engagement	The Engagement associated with the Place. Default Engagement fields are count (like count) and social sentence
hours	list<KeyValue:string,string>	A list of objects that indicate daily operating hours.
is_always_open	bool	Indicates if the Place is always open
is_permanently_closed	bool	Indicates if the Place is permanently closed
is_verified	bool	Indicates if the Place has been verified by Facebook
link	string	The Place's Facebook URL
location	Location	The location associated with the Place
name	string	The Place's name
overall_star_rating	float	The Place's overall star rating, based on a rating survey from Users on a scale of 1-5. Value is normalized and not guaranteed to be a strict average of User ratings
page	Page	The Page node associated with the Place
parking	PageParking	The ParkingPage associated with the Place, indicating parking information
payment_options	PagePaymentOptions	The PagePaymentOptions associated with the Place, indicating payment methods accepted by the Place
phone	string	The Place's phone number
price_range	string	The Place's price range. Can be $, $$, $$$, $$$$ or Unspecified
rating_count	unsigned int32	The Place's rating count, which is the number of publicly accessible ratings on the Page associated with the Place
restaurant_services	PageRestaurantServices	Services the Place provides
restaurant_specialties	PageRestaurantServices	The Place's restaurant specialties
single_line_address	string	The Place's address in a single-line format
website	string	The URL of the Place's website

Table 1: Places Information on Facebook (Facebook, Place Information)

5.1.2 Using the place identification matrix

The research started to classify Facebook places' elements using the place identification matrix. A new column will be appeared in the matrix to contain the place information, which cannot be inserted below the

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three main columns of the matrix. The cognitive column will be containing: (1) the overall star rating, (2) engagement, and (3) rating count. These elements represent the public thoughts depending on the personal experience. If we calculated the ration that the cognitive elements represent, it will be 11.5% of the total elements. The physical characteristics column will contain (1) location, (2) parking, and (3) cover photo, which can give a sense of the visuals and colours of the place. The physical characteristics will represent 11.5% of the total elements. The activity column will contain: (1) hours, (2) is always open, (3) is permanently closed, (4) payment options, (5) price range, (6) restaurant services, (7) restaurant specialities, and (8) check-ins. The activity ration is 30.8% of the total elements. The new appeared column „place information“ will contains: (1) ID, (2) about, (3) description, (4) name, (5) page, (6) phone, (7) website, (8) app links, (9) category list, (10) single-line address, (11) is verified, and (12) link. This column's ratio is 46.2% of the total elements.

Cognitive	Physical Characteristics	Activity	Place Information
engagement	location	hours	ID
overall_star_rating	parking	is_always_open	about
rating_count	cover photo	is_permanently_closed	description
		payment_options	name
		price_range	page
		restaurant_services	phone
		restaurant_specialties	website
		chekins	App_links
			category_list
			single_line_address
			is_verified
			link

Table 2:Facebook Places' classification (own figure, using (Facebook, Place Information))

The columns ratio (Figure 5) revealed that the most important elements are the informative ones, then the activity elements. The cognitive and physical elements have the lowest ratio.

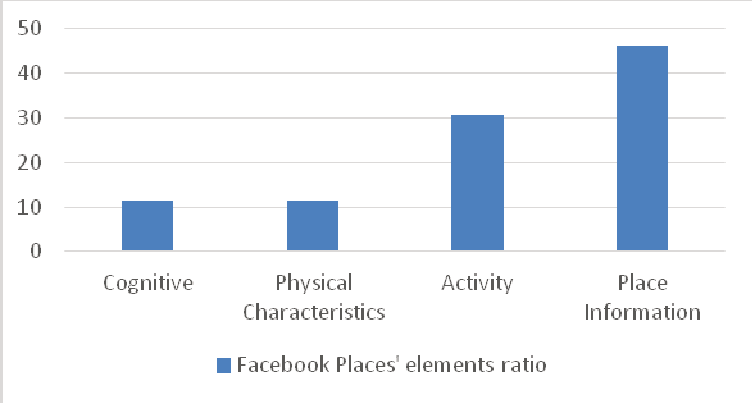

Figure 5: Facebook place's elements ratio (own figure, using (Facebook, Place Information))

5.2 Twitter

Twitter is an American microblogging and social networking service on which users post and interact with messages known as "tweets" (Wikipedia, 2020). It was founded by Jack Dorsey, Noah Glass, Evan Williams, and Biz Stone, on 21 March 2006. Twitter in the first quarter of 2019 has reached 330 million monthly active users (Clement, 2019). Twitter has a developer platform[1] with its API, like Facebook. Developers can use the available data on twitter to publish and analyze tweets, create unique customer experiences and build applications above these data. When working with geographical metadata, twitter classifies the location-based content into two classes (Twitter, 2020):

- Tweet location: when the user enables sharing location feature while posting a tweet
- Profile Location: it represents the user "home" which he provides when creating his profile

[1] https://developer.twitter.com/en.html

5.2.1 Tweet location

Twitter enables users to specify a location for individual Tweets. Tweets with a specific location can be classified into two general categories (Twitter, 2020):

(1) Tweets with a specific latitude/longitude "Point" coordinate: which comes from a GPS enabled devices. This location doesn't contain any contextual information about the referred location (E.g. associated city, country, etc.) unless the referred location can be associated with a twitter place

(2) Tweets with a Twitter "Place": this represents the general area (the "Place") from which the user is posting his tweet. After choosing a twitter place, the place will have a display name, type (E.g. city, neighbourhood), and country code

5.2.2 Twitter place

When a user started to assign a location to his tweets, he will encounter a list of candidate twitter places to choose from. These places are specific and named locations with geo coordinates. It is important to note that, tweets associated with a location does not necessarily be written in that location, but could be also about that location. Twitter uses different fields to represent a place, which will be described in the table below (Twitter, 2020).

Field	Type	Description
id	String	ID representing this place. Note that this is represented as a string, not an integer. Example: "id":"01a9a39529b27f36"
url	String	URL representing the location of additional place metadata for this place. Example: "url":"https://api.twitter.com/1.1/geo/id/01a9a39529b27f36.json"
place_type	String	The type of location represented by this place. Example: "place_type":"city"
name	String	Short human-readable representation of the place's name. Example: "name":"Manhattan"
full_name	String	Full human-readable representation of the place's name. Example: "full_name":"Manhattan, NY"
country_code	String	Shortened country code representing the country containing this place. Example: "country_code":"US"
country	String	Name of the country containing this place. Example: "country":"United States"
bounding_box	Object	A bounding box of coordinates which encloses this place.
attributes	Object	When using PowerTrack, 30-Day and Full-Archive Search APIs, and Volume Streams this hash is null. Example: "attributes": {}

Table 3: Twitter places (Twitter, 2020)

5.2.3 Using the place identification matrix

When reclassifying the twitter place's fields according to the place identification matrix, the table below (Table 4) will be the output. Also, the place information column will appear, to contain data that cannot be inserted under the other three main columns.

Cognitive	Physical Characteristics	Activity	Place Information
	bounding_box		id
			url
			place_type
			name
			full_name
			country_code
			country
			attributes

Table 4: Twitter place using place identification matrix (own figure, using (Twitter, 2020))

It is clear now, that twitter places are considered as check-in or geo-reference, and it doesn't give any insights about that place regarding (cognitive data, activity). It is only geo-data associated with the tweets. Figure 6 shows that the cognitive and activity data has 0% of the total elements that Twitter provides, while the physical characteristics represent 11.11%, and place information represents 88.88%.

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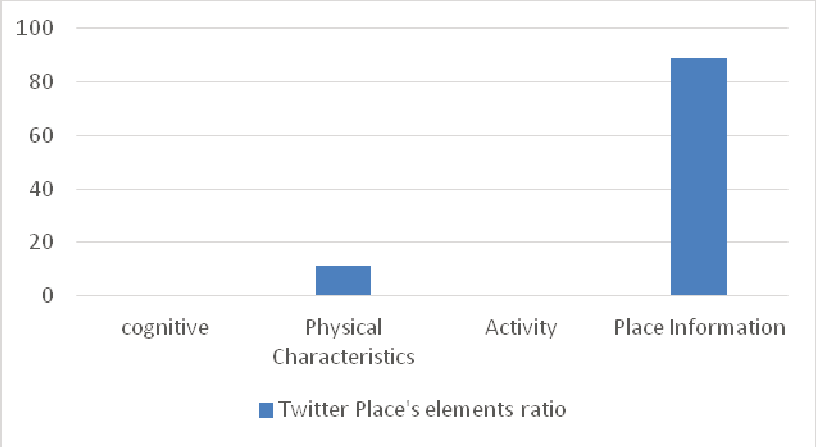

Figure 6: Twitter place's elements ratio (own figure, using (Twitter, 2020))

5.3 Google

Google LLC is an American multinational technology company, which offers internet-based services and technologies (E.g. search engine, online advertising, cloud computing, etc.). It was founded in September 1998 by Larry Page and Sergey Brin while they were PhD students at Stanford University in California (Google; Wikipedia, 2020). Google has a developer platform[2], to offer developers plenty of tools and services to use in building new applications. Google maps platform, is the platform responsible for representing places and demonstrate all its fields and how to use the API. Google API is not free of charge, so, they have divided the place results into three billing categories, with different price ranges according to which field the developer requests. The three categories are: (1) the basic category, (2) contact, and (3) Atmosphere (Google, 2020; Google Cloud, 2020).

5.3.1 Google Places

Every category of the three categories has its own fields, which can be listed as follows: (1) basic: address_component, adr_address, formatted_address, geometry, icon, name, permanently_closed, photo, place ID, plus code, type, url, utc_offset, vicinity; (2) contact: formatted_phone_number, international_phone_number, opening_hours, website; and (3) atmosphere: price_level, rating, review, user_ratings_total. Table 5 is listing part of the fileds in details (Google Maps Platform, 2020; Google Maps Platform, 2020).

Basic		
Field	Type	Description
address_component	array	an array containing the separate components applicable to this address
adr_address	string	a string containing the human-readable address of this place
geometry	PlaceGeometry	contains the following information: location: contains the geocoded latitude, longitude value for this place Viewport: contains the preferred viewport when displaying this place on a map, as a LatLngBounds if it is known
[…]		
Contact		
Field	Type	Description
opening_hours	PlaceOpeningHours	contains the following information: open now is a boolean value indicating if the place is open at the current time. Periods are an array of opening periods covering seven days, starting from Sunday, in chronological order. Each period contains: open contains a pair of day and time objects describing when the place opens

[2] https://developers.google.com/

		day a number from 0–6 time may contain a time of day in 24-hour hhmm format close may contain a pair of day and time objects describing when the place closes.
website	string	lists the authoritative website for this place, such as a business' homepage
[…]		
Atmosphere		
Field	Type	Description
price_level	number	on a scale of 0 to 4: 0 — Free 1 — Inexpensive 2 — Moderate 3 — Expensive 4 — Very Expensive
rating	number	contains the place's rating, from 1.0 to 5.0, based on aggregated user reviews
user_ratings_total	number	The number of user ratings which contributed to this Place's
[…]		

Table 5: Google places (Google Maps Platform, 2020; Google Maps Platform, 2020)

5.3.2 Using the place identification matrix

When reclassifying the Google place's fields according to the place identification matrix, Table 6 below will be the output. Also, the place information column will appear, to contain data that cannot be inserted under the other three main columns.

Cognitive	Physical Characteristics	Activity	Place Information
rating	address_component	Price_level	icon
reviews	adr_address	opening_hours	name
user_ratings_total	formatted_address	permanently_closed	place ID
	geometry		url
	photo		utc_offset
	plus code		formatted_phone_number
	vicinity		international_phone_number
	type		website

Table 6: Google place using place identification matrix (own figure, using (Google Maps Platform, 2020))

Google offers a lot of information about a certain place. Figure 7 shows that the cognitive fields represent 13.6% of the total elements. Also, activity has the same ration as cognitive 13.6%. The physical characteristics and place information are equal in their ratio, which represent 36.3% for each.

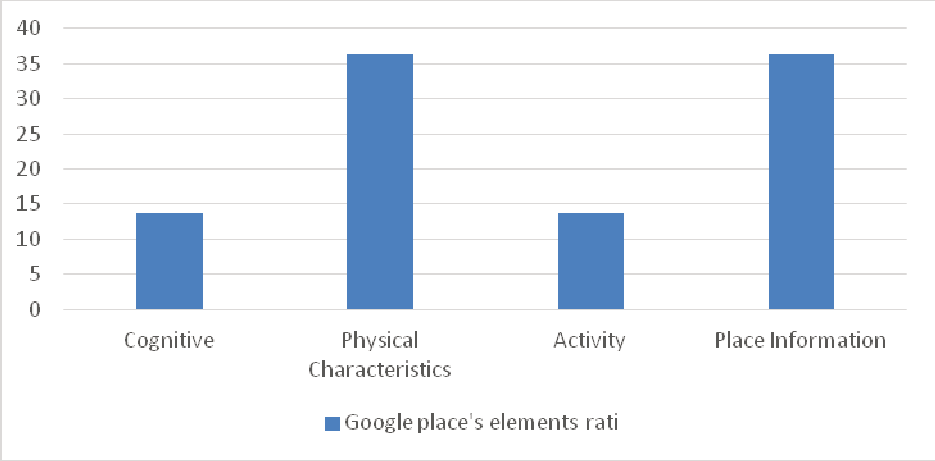

Figure 7: Google place elements ratio (own figure, using (Google Maps Platform, 2020))

6 CONCLUSION

This research was developed to tackle the first stage of using social media while building data-based applications in several domains (E.g. urban development, city management, city branding, etc.). Scholars who seek to retrieve data from social media to do further analysis and research should pay attention to how

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these platforms represent places, and what kind of data they use to identify places. It is shown from the research that Google is the most organized platform regarding places and it has a clear classification for place's fields, but it is not free of charge and you pay according to the number of requests and the category you are targeting. Facebook is concentrating on representing the place information and activity more than the cognitive and physical characteristics. Twitter is considered as a geo-referenced platform for the published content on it. It doesn't have any data for the cognitive and activity fields.

Besides all the euphoria, the negative aspects of using UGC must also be pointed out. Like Georgadiou et al. (2018) correctly and critically noted and describe the now higher difficulties „The Snowden revelations and the Cambridge Analytica scandal were probably the biggest contributors to citizens' changing perceptions of privacy". Whether researchers can still use personal data in the future is an open question. It is true, however, that the "data treasure" that many users often unknowingly make available through the uncritical acceptance of EULA (end-user license agreement) regulations must be better protected.

7 FUTURE WORK

The next steps in the research would highlight the linking between the perception of places in the real-world and the representation of these places in social media. This link will present the translation language between the offline world and the online world. The research will also examine this question: how could cities make benefit from this link?

Also, the research will work on suggesting a prototype for a platform that gathers data from different data sources. Several projects represent places in an advanced way in one field. If a platform gathered different data from different platforms to present places as layers (E.g. cognitive layer, physical characteristics layer, activity layer, place information layer), then places will be presented in a more complex and comprehensive way in the virtual environment. Part of these projects can be listed as follows:

- Smart citizens project[3] give a detailed insight about the environment, it is a piece of hardware comprised of sensors to measure: carbon monoxide (CO), nitrogen oxide (NO2), temperature, humidity, light, and sound
- what3words[4] is a project to identify any place with three words. They assigned each 3m square in the world a unique 3 word address that will never change. For example ///filled.count.soap marks the exact entrance to what3words' London headquarters

Smart citizens can be associated with the physical characteristics layer to give measured details about the environment. What3words can be associated with the cognitive layer to represent how people identify places.

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[3] https://smartcitizen.me/

[4] https://what3words.com

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