Using locative social media and urban cartographies to identify and locate successful urban *plazas*

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ABSTRACT

Locative social media networks as open sources of data allow researchers and professionals to acknowledge which city places are preferred, used and livable. Following this hypothesis, this paper proposes a methodology to identify successful public spaces – *plazas* – through the location-based social media network Foursquare and to analyze their urban position using morphological and historical cartographies.

The overall methodology comprises three stages. First, the most important cities of the province of Alicante were selected. Second, the most relevant *plaza* of each city was identified using data retrieved from the social network Foursquare. Finally, the location of each *plaza* is analyzed in relation to the historic center and the main axes of the city. Possible correlations between their urban location and their vibrant character were subsequently identified. Two findings have emerged from this study: (a) a strong spatial relationship exists between the most successful *plazas* and the historic city center, which reinforces their traditional social character; and (b) all *plazas* share two similar traits, their location within the urban network and their proximity to the main axes of the city.

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1. Introduction

City spaces have traditionally functioned as places for social interaction and cultural representation. However, with the relatively recent introduction of new technologies, people interact differently with and within urban public spaces. Social networks greatly affect individual's willingness to socialize and take part in public gatherings. This fact along with others such as reduced opportunities for pedestrianism as a form of transport, due to the limited space, noise, pollution, obstacles, etc. (Gehl, 2010), have led to an increasing wave of online socialization. Thus, face-to-face encounters among strangers and friends are highly dependent on online relationships (Gaspar & Glaeser, 1996; Moss, 1998).

This situation urges the recognition of socially accepted public spaces as a crucial matter for urban planners and designers. Why some places are more socially successful than others is a key question whose answer may lead to an understanding of the local population's social dynamics and the reasons behind the preference for some places over others. These preferences have traditionally been explored by means of quantitative and qualitative field studies. However, given that there is ample information available online, it is now possible to identify which spaces are preferred over others and study their characteristics with a view to learning from them. This will aid the assessment

of future decision-making processes related to urban systems (Agryzkov, Martí, Tortosa, & Vicent, 2016; Calabrese, Ferrari, & Blondel, 2014; Ruíz Sánchez, 2012).

The preference of one space over others has to do with many factors – location in relation to the city, proportion of the space, sense of containment, etc. – which have been broadly theorized by authors like Bosselmann (2008), Carmona, Tiesdell, Heath and Oc (2010), Gehl (2010) and Whyte (1980). The identification of the most successful public spaces of a city is an endeavor which may lead to interesting studies about their physical configuration. This could provide important clues as to what a local community appreciates in a public space.

Given that a city's open spaces are varied in terms of size, features and shape, this study adopts the definition of *plaza* as a Mediterranean square, described in the Spanish Glossary of Urbanism as "the urban element par excellence, which from antiquity has supported public activity — religious, commercial, administrative, leisure, etc." (Blasco, Alonso, & Piñón, 1991a,b). Although the origin of this term comes from the Latin language – *platea* – the Spanish word was introduced in the English language in 1683 (Merriam-Webster, 2016). Nowadays one of the four English meanings of the word *plaza* refers to a public square or open area while the other three are related to traffic spaces and shopping centers (Merriam-Webster, 2016). Therefore, in this paper *plaza* appears in italics so as to maintain the original Spanish meaning of the word and distinguish it form the aforementioned English definitions.

However, given the frequent use of the term *plaza* in different contexts, it is necessary to clarify the three ways the term appears: a) in

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italics — *plaza*, when referring to the Spanish concept of public space; b) in normal font — Plaza, when it is part of the official name of a square; and c) in quotations — "plaza", when it refers to one of the standardized subcategories that social network Foursquare establishes for open spaces.

The term "successful" in this paper, when referring to the analyzed public spaces, is in accordance with the meaning attributed to it by scholars such as Jacobs (1995), Gehl, Svarre, Press and Steenhard (2013), Carmona et al. (2010), Mehta (2014), Sircus (2001), Lang (2005), among others. This term is broadly used to refer to livable, sociable, highly frequented public spaces. It is an indicator of the quality of the spaces: attractiveness (Carmona et al., 2010, p. 10); animatedness —the coming and going of people—; accessibility; comfortableness; liveliness; and safety (Lang, 2005, p. 278). A successful place "engages us actively in an emotional experience orchestrated and organised to communicate purpose and story" (Sircus, 2001, p. 126). Specifically, "successful" is used hereafter to refer to a high degree of social relevance and livability of *plazas*: "open to the public, where people are present throughout the day and week, engaged – individually or in groups – in a variety of active or passive social behaviours that are predominantly stationary and sustained in nature" (Mehta, 2014, p. 23).

With the above considerations, this research presents a twofold objective: First, to identify the most successful public *plazas* across the province of Alicante; and second, to analyze their location in relation to the city structure.

In order to obtain a ranking of preferred public spaces in a city, data were retrieved from the location-based social network Foursquare. Once the most relevant urban public *plazas* were identified, we validated this method by studying their historic development and their special relationship to the city structure.

The research is structured as follows: first, a theoretical approach involves a revision of the scholarly literature on the use of user-generated data retrieved from social media as a source of information for urban analysis. Second, a methodology is proposed for identifying successful urban public *plazas* and for studying their location. Finally, the results obtained are followed by a final discussion and conclusion.

2. Social media and the study of public spaces

The technological advances – telephone, television, video and computers – have introduced new models of recreational and social activities that have substituted those that previously occurred spontaneously in the urban public space. Consequently, the physical configuration of contemporary cities has been strongly influenced by emerging information and communication technology (Carmona et al., 2010; Moss, 1998). But apart from this physical consideration, the focus on human encounters and where and how they take place in the urban environment is crucial for the design of cities (Bentley, Cramer, & Müller, 2015).

Much recent qualitative research about urban public spaces addresses the lack of vibrant urban environments that are capable of generating socially active communities (Giampino, Picone, & Schilleci, 2012). Likewise, attractive and livable urban spaces are studied with a rather generalized approach that overlooks the fact that, even when livable, some public spaces are more visited than others, and better accepted for activities such as, citizen gathering, political demonstrations or festivity celebration.

Specifically, *plazas* as urban elements, are spaces contained and framed by buildings where social encounters have traditionally taken place. *Plazas*, in the context of urban studies, are open spaces that provide the opportunity for different kinds of activities. Whether they are designed for civic prestige — grandeur, or to exhibit a particular building, or for informal public life (Carmona et al., 2010) these spaces are of specific interest in this study. Recognizing which public *plazas* are

socially successful and their location within the city structure may shed light on why these spaces are preferred over others.

There is an important debate surrounding the influence of social media over physical interaction. Authors such as Aurigi (2005) have previously acknowledged a strong concern over whether the virtuality of social relationships is replacing the face-to-face social encounters that traditionally occurred in the public space. One of the reasons for this reasoning is that "digital communication provides alternatives to physical travel between locations" and, in some cases, renders it unnecessary (Carmona et al., 2010). The opposite school of thought argues that telecommunications "may be a complement, or at least not a strong substitute for cities and face-to-face interactions" (Catalán, Saurí, & Serra, 2008; Foster, 2013; Gaspar & Glaeser, 1996; Low & Smith, 2006). This paper is inclined towards the second approach, with the understanding that the interaction happening in social networks mirrors that in the physical reality.

The data tracking of these online relationships is publicly available in the form of easily accessible data through social networks and social media APIs (Application Programming Interface). These traces leave evidence of the citizen's preferences and usage patterns over some urban spaces (Serrano-Estrada, Nolasco-Cirugeda, & Martí, 2016). Moreover, data from a variety of social networks such as Foursquare, Twitter and Instagram are georeferenced (Beltrán López, 2012; Noulas, Scellato, Mascolo, & Pontil, 2010), thus the traces of social activity happening in public spaces are, to some extent, measurable and can be analyzed from the urban studies' perspective (Agryzkov et al., 2015; Agryzkov et al., 2016; Cranshaw, Schwartz, Hong, & Sadeh, 2012, Shen & Karimi, 2016). Previous studies have confirmed this and affirmed that Location Based Social Networks are powerful tools to analyze human behavior in space and time (Roick & Heuser, 2013). Some of these studies have their primary focus on the visualization and representation of bulk data in relation to social interaction in city spaces (Agryzkov, Álvarez, Serrano-Estrada, Tortosa, & Vicent, 2015; Fujita, 2013). Other focus on user personality (Chorley, Colombo, Allen, & Whitaker, 2013); perceptual information analysis where user visits and preference patterns are analyzed (Cerrone, 2015; Chorley et al., 2013; Dunkel, 2015); and event detection using geo-referenced photos (Chen & Roy, 2009), among many others.

The approach taken by this study is the use of Foursquare to identify user preferences of city public *plazas* in order to analyze their location within the urban structure.

3. Social media users and Foursquare

The use of social networks by online adults has risen consistently in the last decade. By November 2016, social networking sites are used by: 86% of adults aged 18–29 years; 80% of adults aged 30–49 years; 64% of adults aged 50–64 years; and 34% of those aged over 65 years (Pew Research Center, 2017). In Europe alone, during the period between 2006 and 2016, a 485.2% internet penetration growth rate has been registered (Miniwatts Marketing Group, 2016) and an increasing tendency is foreseen.

Spain has over 75% penetration rate of internet users (IAB Spain Research, 2014; Miniwatts Marketing Group, 2016) and 81% of them use social networks (IAB Spain Research, 2016).

Foursquare is a social networking service based on location sharing. Users check in a venue to broadcast their presence, preference and/or opinion of the place. All physical places that have a reference in Foursquare are called "venues" (Li, Steiner, Wang, Zhang, & Bao, 2013) and each venue has associated information: geographical location, total check-ins, total visitors, user-shared pictures, tips, and likes. In other words, this social network consists of user-generated data comprising georeferenced venues that include business and points of interest in a city (Reed, 2011). The app turns anybody's phone into a scanner that "senses the meaningful bits of urban life" in its surroundings (Townsend, 2013, p. 144).

Throughout its existence, Foursquare has been considered as one of the most popular LBSN — Location-based Social Networks (Agryzkov et al., 2016; Noulas et al., 2010). From its launch date in 2009 until December 2015, there are 55 million monthly active users registered and 7 billion check-ins over more than 65 million Foursquare venues worldwide (Digital Marketing Ramblings, 2016).

Foursquare launched Swarm in 2014 (Expanded Ramblings DMR, 2016; Foursquare, 2009). Swarm is the current location-based check-in app portion of Foursquare that allows users to share their where-abouts easily (Lee, 2014), in a more user-friendly gaming-like app inter-face. Technically, Foursquare and Swarm work as one single provider of open data.

In addition to the fact that Foursquare is a globally used platform, there are also five reasons behind the use of Foursquare as an informa-tion source for this research.

Firstly, it is a social network from which it is easy to obtain a ranking of places by popularity through different systems, one of them being the cumulative number of check-ins and visitors (Milne, Thomas, & Paris, 2012; Serrano-Estrada, Serrano, & Álvarez, 2014). It provides informa-tion about points of interest in a city rather than in larger regions (Murdock, 2011).

Secondly, since Foursquare is a competitive social network where people get rewarded by the number of check-ins per venue, it has a cheat-proof system where it allows checking in venues only under spe-cific circumstances. For instance, a person cannot check-in in a Four-square venue unless he/she is physically there for a certain amount of time, or at least, it is not possible to check-in outside the venue's sur-roundings (Foursquare, 2015b). This fact is important since other social networks allow people to check-in – Facebook – or tweet – Twitter – from somewhere different than where they physically are. A check-in can be made anywhere from any venue but it will only be counted if it is made in close proximity to the actual venue location (via phone's GPS). Foursquare is about actually being in places. Check-ins can only be made once per Foursquare day — from 7 am EST to the following 7 am. The "rapid fire" message shown in Foursquare when one is trying to check-in, means that a person is checking in more often than what may be estimated as reasonable by the Foursquare platform. Supposed-ly, no drive-by or walk-by check-ins are allowed (Foursquare, 2015a). A check-in is not considered genuine if the user is driving by or if the stay in a venue is less than 10 min. For places of interest and landmarks there are certain rules. For instance, being at an observation point to view a mountain or canyon would count as a check-in even if it is quite far from the actual landmark being viewed (Sharif, 2012).

Thirdly, it offers quantitative and cumulative data about people's presence in the venue. This could be compared to traditional people-counting methodologies that involve people counting, interviews, observation, etc. (Bosselmann, 2008; Gehl, Svarre, Press, & Steenhard, 2013; Whyte, 1980, 1988).

Fourthly, while Foursquare's user profile may not be equivalent to a full cross-section of the entire society, this social network provides an opportunity to study voluntarily contributed human data (Roick & Heuser, 2013). Moreover, this information is created and shared by a growing and representative sample of the population.

Lastly, previous studies have proven that Foursquare's data can be quite representative of citizen preferences over city spaces (Agryzkov et al., 2015; Agryzkov et al., 2016; Serrano-Estrada, 2014). Moreover, the venues registered in this social network are classified into categories and sub-categories, being "plaza" one of the sub-categories found within the "outdoors and recreation" category. This last consideration allows a straightforward identification of open spaces as *plazas*.

Bearing in mind the aforementioned considerations, to the authors' knowledge, there is no other existing social network able to offer the five previously stated conditions. Thus, Foursquare is considered to be a valid source of information for the purpose of this study.

Previous research recognizes two main limitations of using geo-tagged data from location-based social networks related to the assumption of consistency in people's activities (Murdock, 2011). First-ly, when users check-in, they can select from pre-existing venues in Foursquare which are close to their actual location or they can create a new venue to broadcast their actual position. This choice could affect the check-in figure of unlisted locations because small local businesses have less chance to be recognized as places of interest. Discouraging users to "name places their own way" reduces the number of possible places of interest in a city (Murdock, 2011).

However, the advantage of suggesting predefined areas of interest is also a benefit for the purposes of this study. Foursquare's data related to venue identification can be considered reliable since most places have a unique identifier name where data are associated to. This is different to Twitter where users may refer to the same place using different names or terms.

Foursquare's second limitation is that this social network may not be used by and is not accessible to an entire age range for the following rea-sons: the use of this location-based social network requires a mobile phone with specific technical characteristics – GPS, for example – and sufficient technical skills to use the app appropriately; and Foursquare's user demographics are distinct from those of other social networks whose user activity is basically social interaction (Lindqvist, Cranshaw, Wiese, Hong & Zimmerman, 2011). This could be regarded as a conse-quence of Foursquare's "gamification" and consumption engagement basis (Cramer, Rost, & Holmquist, 2011; Rost, Barkhuus, Cramer, & Brown, 2013; Scellato, Noulas, Lambiotte, & Mascolo, 2011). "Every check-in counts" towards getting discounts, deals, badges and loyalty rewards at a given venue, strengthening the consumer-merchant expe-rience (Reed, 2011). This kind of business model encourages consump-tion to a certain extent, which is probably one of the reasons why the predominant Foursquare user profile consists of young professionals aged from 25 to 35 years (Cranshaw et al., 2012), followed by users aged up to 54 years (Ignite Social Media, 2012).

Despite the above described limitations, user-generated data from Foursquare has the potential to indicate the nature of human activity in a city. Fine-grained readily available data (Sun, 2016) provide an indication of places where people like dining, shopping and visiting.

In essence, this research has two objectives: (1) identify the most socially relevant *plazas* in the province of Alicante and (2) evaluate their position within the city's urban structure, namely, the historic city center area and the main urban axes.

In order to address the scope of this work, a methodology is pro-posed. It uses Foursquare for establishing which social spaces are pres-ently active and other traditional sources such as urban history bibliography and the cartography provided by the Land Cover and Use Information System of Spain (SIOSE). The traditional sources are used to identify the spatial relationship between the selected square and both the historic city center area and the main urban axes.

4. Materials, methodology and data collection

The research methodology consisted of three main stages: the first one being to select cities considered for an in-depth case study, identi-fied as historic in the province of Alicante; the second stage involved the identification of preferred public spaces – *plazas* – within each selected city through the use of data retrieved from the social network Foursquare; and, finally, each of the selected *plaza* locations are ana-lyzed and compared in relation to the rest of the city structure.

4.1. Case study selection criteria

A criterion based on population growth was adopted to determine which of the 141 municipalities in the province of Alicante could be con-sidered both presently significant in size and historically relevant.

Comparing the registered population figure available from the oldest and most recent census of each municipality in Alicante province is a good indicator of population growth over time - Figs. 1 & 2. Considering
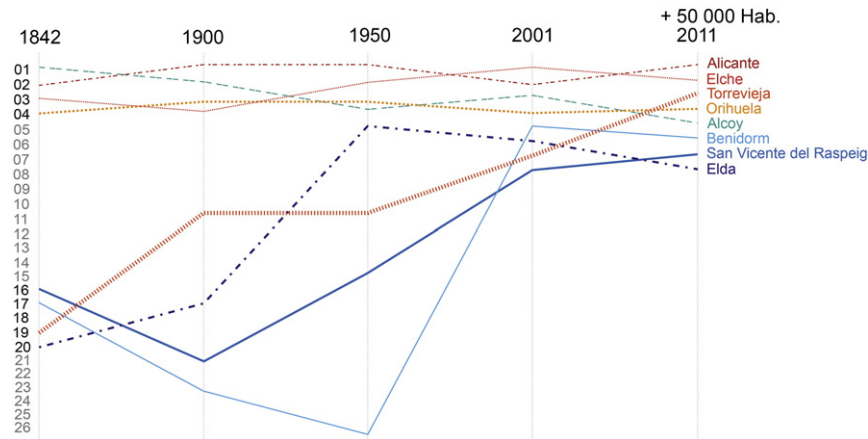
Fig. 1. Population evolution from the oldest to the latest publicly available records.
Source: Authors' own figure based on the Spanish municipal population records 1842–2011 (INE, 2015).

the municipality rather than the urban nucleus gives rise to diverse casuistry. For example, some cities accommodate most of the municipality's population but others have a more disperse population distribution across the municipality. However, when it comes to the use of popular public spaces, it is not limited to the population of the urban nucleus but includes also the broader area of influence - Fig. 3.

Two conditions had to be met for cities to be selected as case studies: (1) cities with over 50,000 registered inhabitants in the latest census – 2011 – and (2) cities whose relevance in population terms goes back to the oldest census records available – 1842 – when 35 municipalities were in the top 25% of the 141 municipalities that comprise the province of Alicante. While the latter condition would guarantee, to some extent, the historical character of the city, the former condition covers the fact that Foursquare's impact is clearly greater in what are considered to be large cities — Fig. 1.

The population size threshold of over 50,000 was defined following the criteria set by numerous studies which have considered "large

cities" or "main cities" to be those with a population of over 50,000 inhabitants (Gallo & Chasco, 2008). Furthermore, the population threshold of 50,000 (Urban Ecology Agency of Barcelona, 2012) has been broadly used to define if, for example, a populated area can be considered urban or rural.

To the authors' understanding, a significant amount of representative Foursquare data were found in cities with over 50,000 inhabitants in Alicante province. Foursquare's penetration above the 50,000 population threshold may be due to the marketing strategies, such as discounts and incentives, used by establishments to attract and retain customers. Predictably, there is more competition in larger cities than in smaller ones: "the bigger the city, the more the average citizen owns, produces and consumes, whether goods, resources or ideas" (L. Bettencourt & West, 2010) and thus, "the pace of social life in the city increases with population size" (Bettencourt, Lobo, Helbing, Kühnert, & West, 2007).
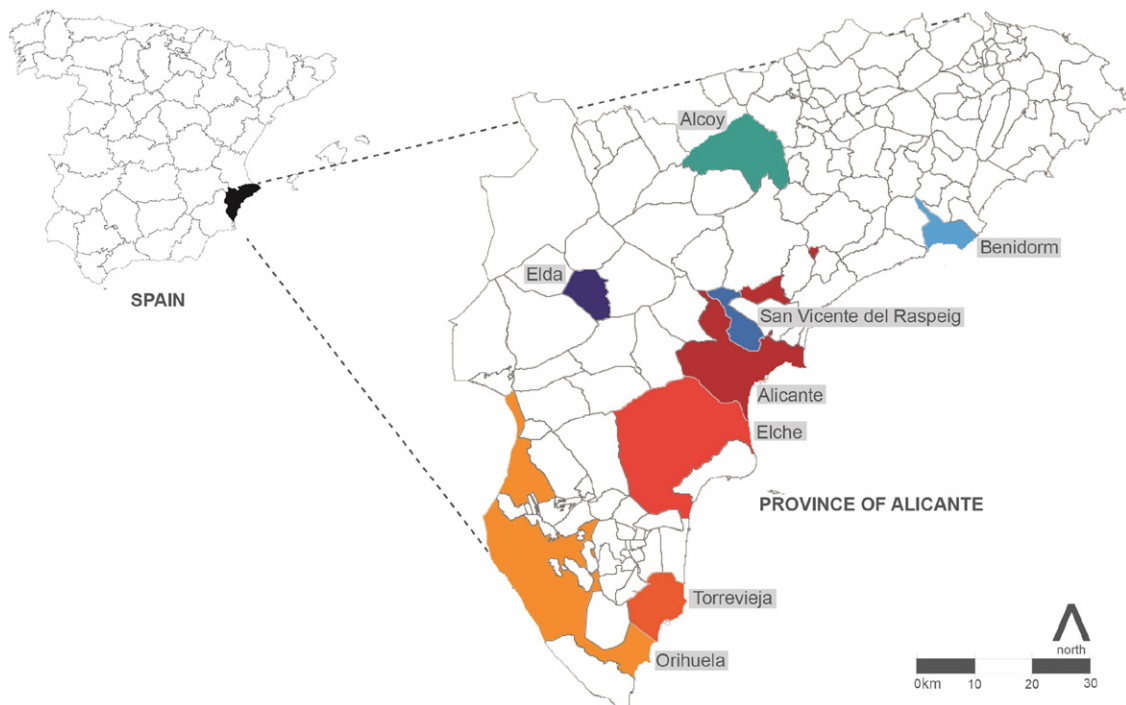

Fig. 2. Location of the selected municipalities within the province of Alicante.
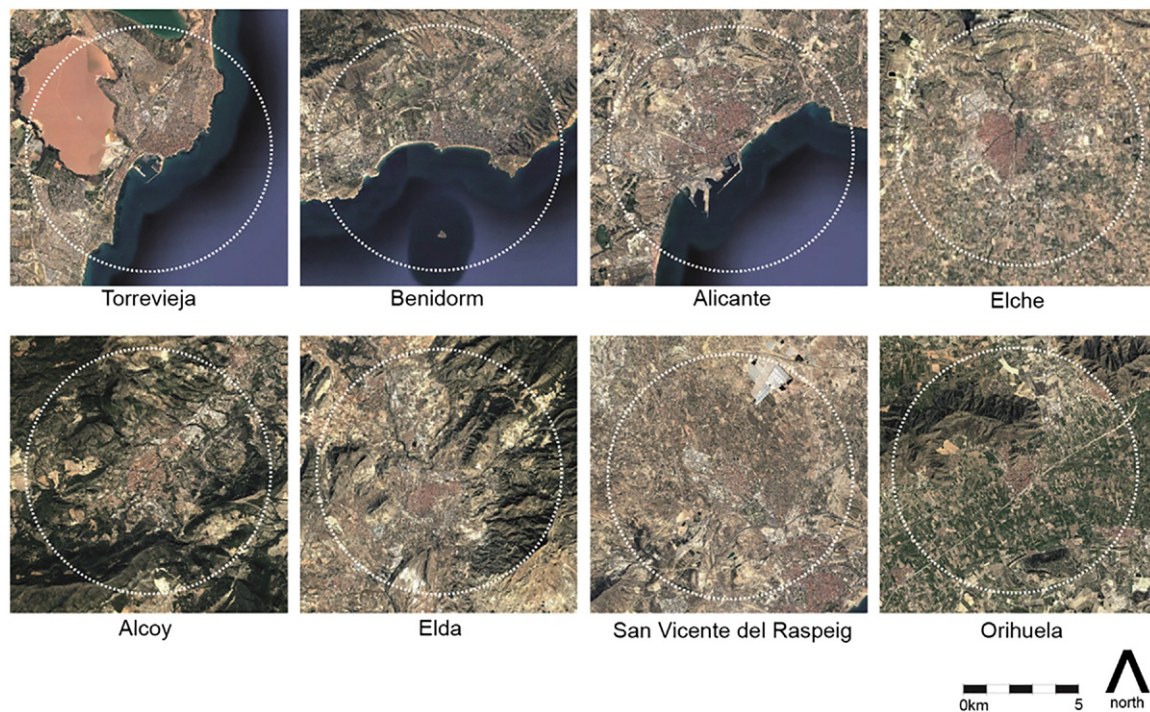Source: Authors' own figure.

Fig. 3. Foursquare data search area.
Source: Adapted from Google Earth imagery.

Therefore, eight cities in the province of Alicante, namely: Alicante, Elche, Torrevieja, Orihuela, Alcoy, Benidorm, San Vicente del Raspeig and Elda, met the aforementioned selection criteria.

4.2. Data collection from Foursquare

In previous studies, data from Foursquare are extracted via Twitter as an alternative source (Cheng, Caverlee, Lee, & Sui, 2011; Noulas, 2013; Noulas et al., 2010). However, for the purpose of this research, geo-located data were retrieved directly from Foursquare's API through a desktop application developed by our research group.

This app allows single or recursive searches depending on the amount of information required. The single search consists of one georeferenced point and a search can be performed from that point at any given radius. In this study, Foursquare data from the single search option were retrieved taking the geographical coordinates of each city (latitude and longitude) as given by GeoHack (Wikimedia Tool Labs, 2016), as the center point — Table 1, and a radius of 5 km from the designated point was used.

The reason why a single search was carried out rather than a recursive search is because Foursquare already provides a ranking of the 50 most checked-in – visited – venues. A recursive search would have only generated more data, which would have contributed negligibly to the main objective of this study which is to find the most popular

plaza. In cases where more than 50 data points are required per search, a recursive search is found to be more convenient (Serrano-Estrada, Martí, Nolasco-Cirugeda, & Agryzkov, 2016).

Foursquare establishes a hierarchy of categories for classifying the venues. The main categories are: "arts & entertainment"; "college & university"; "events"; "food"; "nightlife spot"; "outdoors & recreation"; "professional & other places"; "residence"; "shop & service"; and "travel & transport" (Foursquare, 2014). Following a hierarchical order, sub-categories and, in some cases, sub-sub-categories are assigned to each venue. Data were retrieved performing a search specifically of the "outdoors & recreation" category because it includes the majority of open public spaces. There are 55 sub-categories within the "outdoors & recreation" category which include: "city", "plaza", "pedestrian plaza", "park", and "garden", to name a few. Special attention was paid to the sub-category "plaza".

Each venue has information associated which includes: category and sub-category, venue name, geographical location — latitude and longitude, total check-ins, total visitors, user-shared pictures, tips and pictures, etc.

It is important to distinguish between two concepts: check-ins and visitors. Both numbers correspond to the cumulative figure from the date the venue was created on Foursquare's platform until the date data were retrieved (Cramer et al., 2011; Long, Jin, & Joshi, 2013).

Special attention was given to the number of visitors rather than the check-in figure. The number of visitors is considered to be a better indicator of the popularity of venues among Foursquare users given that popularity is a function of the number of individuals visiting and not the cumulative number of times each place has been visited. In this sense, one could suggest that the visitors figure may be a kind of people-counting method suggesting physical presence in a space. Thus, this research takes the number of visitors as a preference indicator, even though most of the reviewed research corpus uses the number of check-ins (Li et al., 2013; Long et al., 2013; Noulas et al., 2010).

A total of eight datasets were retrieved on 2 February 2016 comprising a ranking of the top "outdoors & recreation" venues of each selected city. Data were analyzed in order to identify the most popular plaza of each city until the retrieval date.

Table 1
Geographic coordinates of the center point of the data search.
Source: GeoHack.

Cities	Geographic coordinates
Alicante	38.345278, − 0.483056
Elche	38.266944, − 0.698333
Benidorm	38.534167, − 0.131389
Torrevieja	37.977778, − 0.683333
Alcoy	38.698333, − 0.473611
Orihuela	38.085556, − 0.946944
Elda	38.478889, − 0.796667
San Vicente del Raspeig	38.396389, − 0.525278

Table 2
The top ranked urban public spaces per city considering the number of Foursquare visitors.
Source: Authors' own table.

Venue name	Check-ins	Visitors	Pictures	Tips	Likes	Latitude	Longitude	Category	Sub-category
Alicante									
Plaza de Los Luceros	6375	1590	379	38	120	383459813	−049069405	Outdoors & recreation	Plaza
Plaza del Ayuntamiento	1471	714	240	17	28	383450058	−048112878	Outdoors & recreation	Plaza
Alcoy									
Plaza de Dins	1013	341	56	12	14	38697963	−04737763	Outdoors & recreation	Plaza
Plaza España	1170	292	88	9	24	386977694	−047318459	Outdoors & recreation	Plaza
Parque La Rosaleda	1731	158	12	4	5	387024249	−0477283	Outdoors & recreation	Plaza
Plaza Al-Azraq	453	56	3	2	0	387084696	−046782617	Outdoors & recreation	Plaza
Benidorm									
Plaza Triangular	816	362	49	6	14	385372691	−012707233	Outdoors & recreation	Plaza
Santa Margarita	19	2	0	0	0	385363	−011506	Outdoors & recreation	Plaza
Elda									
Plaza Mayor	505	183	27	4	12	384783618	−079401514	Outdoors & recreation	Plaza
Plaza Castelar	127	49	10	0	5	384787316	−079014034	Outdoors & recreation	Plaza
Plaza Del Zapatero	105	45	1	3	2	384761255	−079417776	Outdoors & recreation	Plaza
Elche									
Plaza Glorieta	1983	627	127	10	32	382657225	−069651604	Outdoors & recreation	Plaza
Plaza de Baix	537	185	63	1	3	38265272	−06987172	Outdoors & recreation	Plaza
Orihuela									
Glorieta Gabriel Miró	411	109	12	1	2	380822773	−094504759	Outdoors & recreation	Plaza
Placeta de Europa	239	26	5	0	1	380846773	−094358794	Outdoors & recreation	Plaza
San Vicente									
Sant Vicent del Raspeig	3303	619	273	21	46	38396366	−052496195	Outdoors & recreation	City
Parque Lo Torrent	815	256	85	8	20	383937489	−051302068	Outdoors & recreation	Park
Torrevieja									
Plaza de la Constitución	738	212	98	4	20	37977618	−068269997	Outdoors & recreation	Garden
Plaza Maria Asunción	14	11	1	0	2	379807704	−06699553	Outdoors & recreation	Plaza

Once all venues from the "outdoors & recreation" category were obtained, they were closely analyzed taking two considerations into account: whether they were associated to the "plaza" sub-category and whether the venues' urban character was that of a *plaza*. The resulting venues were selected and ranked by the amount of visitors in descending order. Finally, the *plaza* with highest number of visitors was considered as the most relevant public space.

4.3. Comparison criteria

The final stage of the study analyzes the relationship between the most successful *plazas* and two main components of the city structure: the historic center and the main axes of the urban structure.

Defining the limits of the historic center of each city involved considering two sources of information. The sources are different but supplementary: a) the cartography of the Land Cover and Use Information System of Spain – SIOSE – and b) the studies on urban evolution found in the specialized bibliography. The first source offers a strict morphological approach while the second one takes into account the city's cultural and historical features.

SIOSE, developed by the National Geographic Institute of Spain (ING) (Valcarcel et al., 2008), establishes various land-use classes as thematic legends. For this study, we considered two of these land-use classes: *casco histórico* and *ensanche*. The one referred to the historic center area: *casco histórico* (Hermosilla, Ruiz, Recio, & Cambra-López, 2012) is defined by SIOSE as the land cover of consolidated and mixed urban areas, characterized by irregular urban patterns with narrow and deep parcels, narrow roads and limited amount of green areas; whilst the *ensanche* is the urban land-cover area characterized by regular urban patterns with wide streets and avenues and larger amount of green areas than in the historic center (Equipo Técnico Nacional SIOSE, 2012).

The scholarly literature related to the urban growth of the city contributes to the definition of the area that is understood to be the historic center. The studies on the urban evolution of the city offer additional information about the boundaries of the historic center and allow identification of the main urban axes.

Once the historic center area and the main axes are recognized, the location of each *plaza* is analyzed with respect to these and then discussed.

5. Results

The retrieved data from the Foursquare search consisted of public space related to venues that could be easily ranked by social relevance using the cumulative visitors' figures - Table 2 -.

In all cases, except in the case of Alcoy, the results showed an important difference between the *plazas* ranked #1 and #2. The most relevant *plaza* in Foursquare of each city tends to have at least twice the number of visitors than the subsequent one in the ranking. Benidorm is the extreme example since its Plaza Triangular, ranked #1 in the amount of visitors, has registered 181 times more visitors than the *plaza* ranked #2: Plaza Santa Margarita. The opposite case was found in Alcoy, where there were only 1,17 times more visitors registered in *plaza* ranked #1: Plaza de Dins, than in *plaza* ranked #2: Plaza de España. These results are further discussed in Section 5.

Table 3
The selected cities of the province of Alicante and their most successful plaza according to Foursquare.
Source: Author's own table.

| Historic cities of the province of Alicante	Municipal term population 2011 (IVE)	Most socially relevant *plaza* according to *Foursquare*	Cumulative *Foursquare* visitors up to 2 Feb 2016
Alicante	329.325	Plaza Luceros	1590
Elche	227.417	Plaza Glorieta	627
San Vicente del Raspeig	54.781	Plaza de España	619
Benidorm	68.045	Plaza Triangular	362
Alcoy	60.716	Plaza de Dins	341
Torrevieja	90.097	Plaza de la Constitución	212
Elda	54.357	Plaza Mayor	183
Orihuela	79.889	Plaza Glorieta Gabriel Miró	109
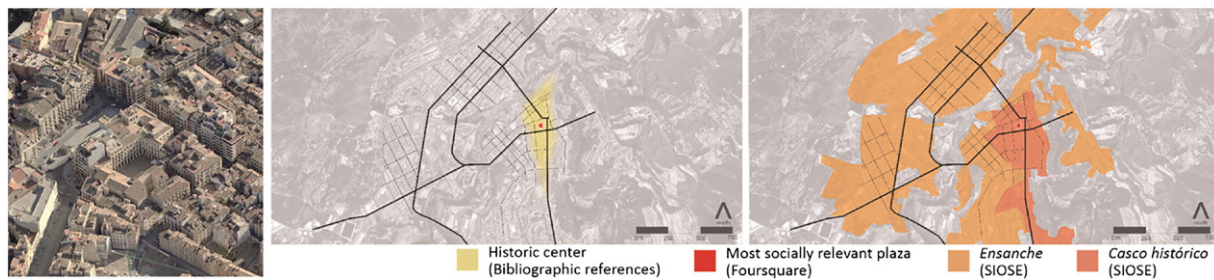
Fig. 5. Plaza de Dins, Alcoy.
Source: Adapted from: Bing — left; PNOA-IGN — center; PNOA-IGN and SIOSE — right.

The *plazas* with the highest figure for cumulative number of visitors from Foursquare's data and thus the best ranked public spaces of the province of Alicante are presented in Table 3.

The next step consisted of identifying the position of each *plaza* within the city structure, considering its spatial relationship to the historic center and the main structural axes.

As two sources were used in order to define the historic city center's morphological – SIOSE – and, historical and cultural approach – bibliographic references (BR), three groupings were identified in terms of the *plaza* location: a) *plazas* within the historic city center according to both sources, b) *plazas* within the historic city center according to one of the sources and c) *plazas* located outside the historic city center according to both sources.

5.1. Case a. Plazas within the historic center according to both sources SIOSE and BR

Case a indicates that the most relevant open spaces in Elche, Alcoy and Sant Vicent del Rapeig are without any doubt located in the city center. Originally these three *plazas* are associated to the existence of a religious building. In the first two cities, Elche and Alcoy, the *plazas*' space currently occupies ancient religious complexes. The site of La Glorieta in Elche – as referred to by the citizens – had previously been occupied by a Clarissa Convent founded in the sixteenth century and demolished at the end of the nineteenth century to become a new urban public space (Jaén i Urban, 1991, p. 3; Ramos Fernández, 1989, pp. 191, 211, 212). Since then, the character of the site as a public space has remained although it has undergone major refurbishments.

La Glorieta is located in the north-eastern part of the historic center of the city in close proximity to the most important political, religious and commercial nodal points: the town hall, the Santa María church, and the municipal market. It is adjacent to the first century ancient walled city – villa – (Ramos Fernández, 1989, p. 211) and its proximity to the intersection of the main axes and the most important eighteenth century nodal points distinguishes this open space from other *plazas* of the city.

Plaza de Dins in Alcoy also occupies the former San Agustín convent cloister, confiscated in 1837 and later destroyed (Dávila Linares, 1990,

pp. 218, 223, 228). Currently, the *plaza* is a confined interior porticated space, accessed via walkways through surrounding buildings. The central image of Fig. 5 shows in yellow the area defined as the historic center dating back to the middle of the nineteenth century, according to the bibliographic references. This area included both the old district and the outlying areas beyond the historic city walls (Dávila Linares, 1989, 1990).

Plaza de España in San Vicente del Raspeig — Fig. 6, has an origin that persists. It was, and continues to be, an open space in front of the church San Vicente Ferrer. Since the mid-sixteenth century, when the church was only a little chapel built over a higher topographic elevation area, this space has represented the religious and political life of the city (Canals Bevià, 2010). By 1774, the church site was taken as a reference point from which the future urban layout would be developed (Canals Bevià, 2010, pp. 30, 39, 136). Thus, the Plaza de España is still today the nucleus of the city.

Considering the spatial relationship between the *plaza* and the structuring urban axes of the city, there are two instances in which the selected open spaces are defined by primary roads. The first and most representative case is San Vicente del Raspeig, characterized by being a pre-urban landmark, thus a precedent for the urban structure of the city. There are three important urban axes adjacent to this *plaza*: two running in an east-west direction and one that crosses the entire city from the north to the University of Alicante's campus in the south. The central image of Fig. 6 shows the urban area extension up to the mid-nineteenth century (Canals Bevià, 2010, p. 19), which remains today's city center.

Elche is the second example in which the most relevant *plaza* is delimited by a primary axis of the street network. The location of Plaza La Glorieta, in the geometric center of the city, is represented in Fig. 4 – left image – with respect to two principal axes of the city and the boundaries of the urban network up to 1849 (Sevilla Jiménez, 1985, p. 151). The Corredora Street, which runs along the northern side of the *plaza*, is an important road that crosses the historic city centre from east to west. At its eastern end, this axis becomes the N-340 national road towards the city of Alicante; the capital of the province. Filet de Fora Street is a structural axis that crosses the city in a north-south direction. In the same Fig. 4, the area defined by SIOSE as *casco*

Fig. 6. Plaza de España, San Vicente del Raspeig.
Source: Adapted from: Bing — left; PNOA-IGN — center; PNOA-IGN and SIOSE — right.
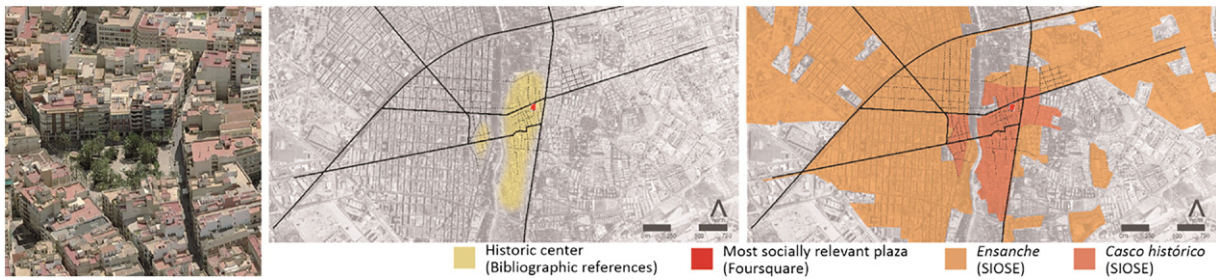
Fig. 4. Plaza Glorieta, Elche.
Source: Adapted from: Bing — left; PNOA-IGN — center; PNOA-IGN and SIOSE — right.

histórico is represented in relation to the location of the *plaza* and the *ensanche* area.

By contrast, the Plaza de Dins in Alcoy is situated inside a block of buildings. The roads nearby, running in a north-south and east-west direction, connect the historic center to the rest of the city; specifically, to the *ensanche* area accessed through the San Jorge and Maria Cristina bridges respectively.

5.2. Case b. Plazas within the historic center according to one of the sources — SIOSE or BR

Whether the *plazas* are located in the historic center according to one source or the other is a matter of the definition and the defined spatial boundaries of the historic city center area. Two *plazas* fall within this grouping, Plaza Constitución in Torrevieja and Plaza Mayor in Elda, depending on which criteria they fulfil: morphological or historical.

Both examples are rather different. In the case of Torrevieja, due to the regular grid on which the Plaza Constitución is located, the area is not recognized by SIOSE as an historic center. However, the plaza occupies a central location within the city center as defined by the bibliographic references. In the case of Elda, the Plaza Mayor falls inside the area defined as historic city center by SIOSE but outside the area defined as historic center by the bibliographic references.

Torrevieja is a singular case since it was rebuilt after the 1829 earthquake (Canales Martínez & Crespo Rodríguez, 1997, p.74). As in the case of other cities of the Vega Baja del Segura region, José Agustín de Larramendi designed a new city in which the urban pattern was the Hippodamian grid. The project included the provision of three main public spaces: a large central area and two smaller nearby public spaces on either side of the central one (Calvo García-Tornel & Canales Martínez, 2009). In this respect, the results indicate that the central *plaza* continues to be the most socially relevant one in Torrevieja. Its location falls within the area originally considered as the city center in the nineteenth century and, despite the SIOSE database not acknowledging the existence of a historic center, because of its different morphology, this area of the city is where the urban structure originated. The central image on Fig. 7 indicates — in red — where the *plaza* is

located in relation to the nineteenth century city center area according to the bibliographic references. The right-hand image of the same figure indicates the *ensanche* area of the city according to SIOSE's database.

In line with A. Larramendi's project, the *plaza* is located at the intersection of two main axes running perpendicular from a north-south and east-west direction. Additionally, these urban axes, defined by the original project, support Torrevieja's subsequent urban network extensions (Domínguez, Martí & Nolasco-Cirugeda, 2016), with the *plaza* always maintaining its central position.

By contrast, Elda's Plaza Mayor falls within the irregular grid pattern of the historic center area as defined by SIOSE. However, according to the revised bibliography the origin of this area is not considered as the historic urban nucleus.

In fact, the historic city center of Elda is situated around the castle and its surroundings (Poveda Navarro, 1986, p. 81). The most renowned *plaza* in Elda by Foursquare users is located at the outer edge of the historic city center. The space occupies the first blocks of the regular grid towards the southern and eastern city extension (Ponce Herrero, 2006), developed in the mid-twentieth century — Fig. 8.

Although the urban fabric in which the *plaza* is located was developed between the nineteenth and twentieth century (Ponce Herrero, 2006, p. 248), this open space is rather new. It was in 1994, after the demolition of the two old cinemas that were occupying this space — Coliseo y Alcázar, when Plaza Mayor opened and became the relevant open space that it is today (Elda, 2013). The *plaza* was initially conceived as a mixed-use project, introducing residential, leisure and commercial activities (Cutillas Orguilés, 2006, p. 263). Undoubtedly, data from Foursquare corroborate the success of the project.

With respect to the spatial relationship between the location of the two above described *plazas* and the structural urban axes of the city, they present the same conditions found and explained in the previous section — Case a. In Torrevieja, Plaza Constitución is located at the junction of two relevant roads of the orthogonal grid that define the entire city layout; whereas Plaza Mayor of Elda, immersed in the interior of a building block, presents a similar situation as the example of Alcoy: a structural axis surrounds the block in which the *plaza* is situated.
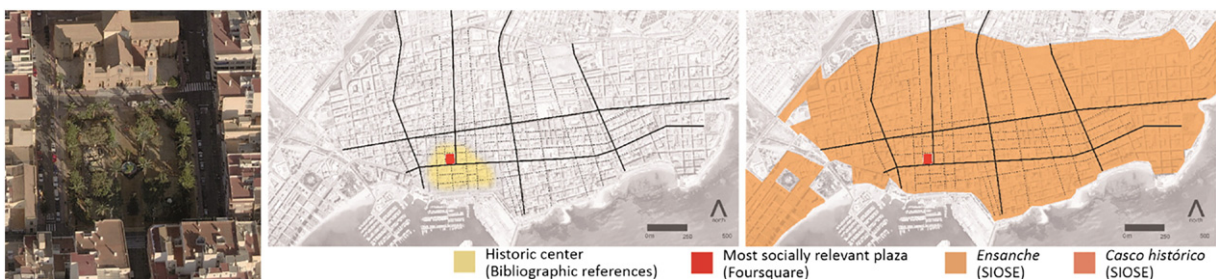

Fig. 7. Plaza de la Constitución, Torrevieja.
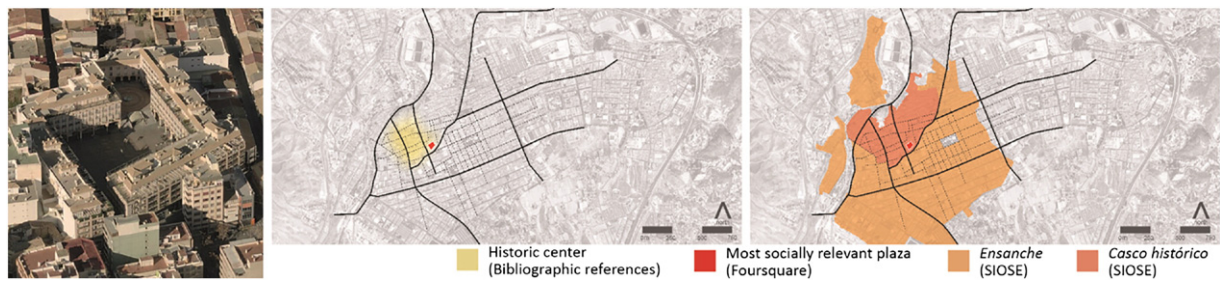Source: Adapted from: Bing — left; PNOA-IGN — center; PNOA-IGN and SIOSE — right.

Fig. 8. Plaza Mayor, Elda.
Source: Adapted from: Bing — left; PNOA-IGN — center; PNOA-IGN and SIOSE — right.

5.3. Case c. Plazas outside the historic center according to both sources SIOSE and BR

The last group includes those cities where the selected *plaza* falls outside the historic center as per both sources of information, namely SIOSE and BR. The three *plazas* identified in this group are: Plaza Luceros in Alicante, Plaza Glorieta Gabriel Miró in Orihuela and Plaza Triangular – officially named as Plaza de la Hispanidad – in Benidorm.

The center image of Fig. 9 shows the location of Plaza Luceros – in red – in relation to the compact urban fabric of the historic walled city – in yellow, as from 1808 to 1820 (Ramos Hidalgo, 1983: 542). The image on the right of the same figure indicates the SIOSE definition of *casco histórico* and *ensanche* in dark and light orange respectively.

In the three examples, both morphological and historical studies clearly situate the selected *plaza* outside the historic city center. However, the role that the *plaza* plays in the urban ensemble is determined by its connection to the historic center. In the case of Plaza Luceros, the square belongs to the organizing structure of the new urban extension, at some distance from the historic center. By contrast, Plaza Glorieta Garbriel Miró and Plaza Triangular are located between the historic center and the urban extension, thereby becoming an urban link between both parts.

The urban role of Plaza Luceros stems from the fact that it has been considered the focal point of Alicante's urban transformations. This public space was designed by the end of the nineteenth century, following the extension project — *ensanche*. Plaza Luceros is a singular open space located at the intersection of the two most important axes of Alicante that run parallel and perpendicular to the coast line respectively, with an approximate north-south and east-west direction. Moreover, these structural roads were crucial in the urban evolution of the city since, in line with the *ensanche* project, the *plaza* occupies the central area from which the future radial urban expansion took place (Ramos Hidalgo, 1983, p. 617–623).

The center image of Fig. 9 shows the location of Plaza Luceros – in red – in relation to the compact urban fabric of the historic walled city

in 1820 – in yellow (Ramos Hidalgo, 1983: 542). The image on the right of Fig. 9 indicates the SIOSE definition of *casco* and *ensanche* in dark and light orange respectively.

The two remaining examples, Plaza Glorieta Gabriel Miró in Orihuela and Plaza Triangular in Benidorm are situated outside and next to the historic city center limits, in the first block of the *ensanche* area towards the city extension.

Orihuela is well known as the monumental city of Alicante province. La Plaza Glorieta Gabriel Miró is the largest and greenest of all *plazas* studied. It was built at the end of nineteenth century and is positioned between the historic city center and the grid-like patterned extension. The urban reforms developed at the time were designed to connect the railway to the city and, by doing so, la Plaza Glorieta Gabriel Miró became an important link between the historic center and the newly developed city area – *ensanche* (Canales Martínez, Crespo Rodríguez, & Salazar Vives, 1991; Canales Martínez, Salazar Vives, & Crespo Rodríguez, 1992; PATECO, 2009) – Fig. 10.

Benidorm is the city in Alicante province whose growth is due to the evolution of its touristic importance. Two *ensanche* projects were developed in the General Urban Plan – P.G.O.U. in Spanish – of 1956 and in its subsequent amendments, the General Urban Plan of 1974 (Benidorm, 2007, p. 95), in which Benidorm's city center extends from the historic area up to the Plaza Triangular (Soldevila, 1996, p. 6, 8). This urban transformation meant that the *plaza* would become located between the historic center and the Levante *ensanche* — Fig. 11.

In relation to the *plaza*'s role within the main urban axes, all *plazas* in this group are characterized by being situated either along or demarcated by the main city axes and, in the case of Alicante, the *plaza* is situated on a landmark road intersection. Plaza Luceros is the space at the junction of the two mayor axis of the *ensanche*. While the *plazas* Glorieta Gabriel Miró and Triangular are both flanked by two urban axes along which the *ensanche* project was developed.

In addition to the location of the selected *plazas* in relation to the historic center and the structural urban axes, a summary of other characteristics found are presented in Table 4.
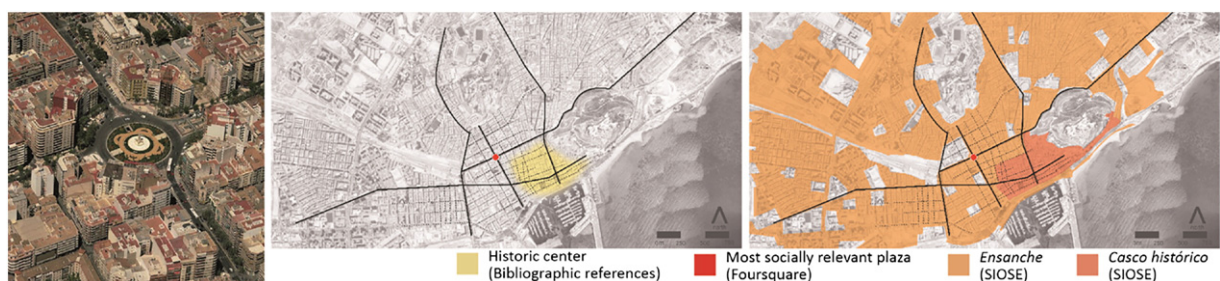

Fig. 9. Plaza Luceros, Alicante.
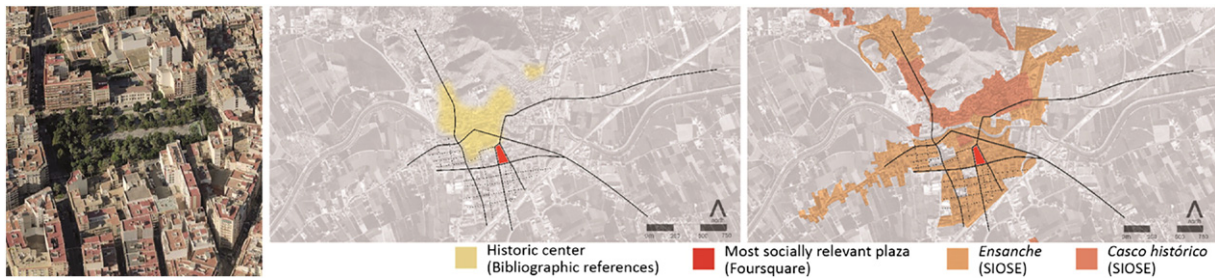Source: Adapted from: Bing — left; PNOA-IGN — center; PNOA-IGN and SIOSE — right.

Fig. 10. Plaza Glorieta Gabriel Miró, Orihuela.
Source: Adapted from: Bing — left; PNOA-IGN — center; PNOA-IGN and SIOSE — right.

6. Discussion

The most successful public *plazas* across the province of Alicante were identified through the use of Foursquare data. The results indicated – to some extent – the users' perception of these *plazas* from which the ranking was derived. Furthermore, their location was analyzed in relation to the city structure using BR and SIOSE sources.

In line with the first objective of the research, establishing a ranking for the most successful *plazas* in the province of Alicante, there are several issues that must be highlighted considering that Foursquare data shed light on users' perception.

Firstly, the proposed method to identify the most successful *plazas* worked effectively for six out of the eight cities since the *plazas* were included in Foursquare's specific sub-category "plaza", within the general category "outdoors and recreation". Therefore, the two exceptions (San Vicente and Torrevieja) required further study.

In the case of San Vicente del Raspeig, where no *plazas* were found in the sub-category "plaza", it was necessary to carefully revise each of the other venues from the category "outdoors and recreation". Only four of them could be considered as urban public *plazas:* two subcategorized as "city" and two as "garden". These venues were considered *plazas*, ranked according to the criteria established in Section 4.2.

In the case of Torrevieja, only one *plaza* was found in the Foursquare sub-category "plaza". However, another urban space with the characteristics of an urban *plaza* was found in the category "outdoors and recreation": Plaza de la Constitución — garden sub-category.

Secondly, once the most successful *plazas* were selected, they were ranked adopting the visitors' figure rather than the check-ins figure. This classification has provided clarification on the amount of people that have visited each venue, at least once. In seven out of the eight selected *plazas*, the Foursquare visitors' figure could be considered a reliable indication for the selection of the most successful *plaza*. The difference in terms of the number of visitors between those *plazas* ranked #1 and #2 was significant enough to make the *plaza* selection unambiguous.

The exception is the city of Alcoy where the difference in terms of the number of visitors between the *plazas* ranked #1 and #2 was not significant. Furthermore, even though there were slightly more visitors

registered in Plaza de Dins, there were also slightly more check-ins in Plaza de España. It is important to note that both *plazas* are adjacent to each other but separated by a building block with an archway connecting them. Therefore, arguably, even though the *plazas* are separately named, in essence they occupy the same public urban space.

The eight selected *plazas* are also relevant and significant public spaces according to the specific bibliographical references that have cited them as a key urban landmark in their city's urban development.

In line with the second objective, analyzing the selected *plaza's* position within the city's urban structure, the results initiate the following threefold discussion: the use of different sources to approach city structure; the present relevance of the historic city center in Mediterranean cities; and the spatial relationship between socially relevant open spaces and the city's main urban axes.

The use of different sources favors a broader understanding of certain areas in the city and several advantages have been recognized when using the adopted approach to identify each historic center. To define the limits of the historic center, the analysis of both sources of information – the SIOSE cartographic information and the bibliographic references – is crucial since the use of only one source would have compromised the results. Moreover, the strict morphological approach of the SIOSE database proved to be unreliable for the identification of the historic center. For instance, Torrevieja's historic city center was not recognized as such because its pattern does not conform to SIOSE's *casco* definition. According to SIOSE there is no historic center in Torrevieja because the urban pattern responds to the regular grid planned for reconstruction of the entire city after the 1829 earthquake.

Concerning the *plaza* location, seven out of eight *plazas* are strongly connected to the historic center, either because they are inside or adjacent and connected to this area. The four *plazas* located within the historic center include Elche, Alcoy, San Vicente del Raspeig and the singular case of Torrevieja. The other three *plazas* are located within close proximity of either side of the boundaries of the historic center: Elda — inside; Orihuela — just outside; and Benidorm — outside at a short distance.

The only *plaza* that is not directly connected to the historic center is Plaza Luceros in Alicante which is a circular square designed around the intersection of two crossing avenues that structure the

Fig. 11. Plaza Triangular, Benidorm.
Source: Adapted from: Bing — left; PNOA-IGN — center; PNOA-IGN and SIOSE — right.

Table 4
Common characteristics found among the eight studied plazas.

	Characteristic buildings (religious, administrative, etc.)	Commercial uses and restaurant services	Green isles and/or flowerbeds	Monuments and/or sculptural elements
Plaza Glorieta, Elche	•	•	•	•
Plaza de Dins, Alcoy	•	•	–	–
Plaza España, San Vicente del Raspeig	•	•	–	•
Plaza Constitución, Torrevieja	•	•	•	•
Plaza Triangular, Benidorm	–	•	•	•
Plaza Mayor, Elda	•	•	–	•
Plaza Luceros, Alicante	–	•	•	•
Plaza Glorieta Gabriel Miró, Orihuela	•	•	•	•

nineteenth-century extension of Alicante, namely *ensanche*. However, it is interesting to note that the second *plaza* in the Alicante ranking is Plaza del Ayuntamiento, an urban space in the middle of the historic center of the city and flanked by the old town hall.

Thus, the central location of the studied cases reinforces the fact that, nowadays, the historic center of cities remains significant and socially active.

Furthermore, the spatial relationship between the selected *plazas* and the urban axes that structure the city has been demonstrated in this study. All *plazas* are situated within or right next to the intersection of the main axes of the city. These urban axes define, cross or surround the selected *plazas* in all cases regardless of whether the *plazas* are located within, near or outside the historic center. Therefore, it can be concluded that the success of public spaces in the context of the Province of Alicante has a lot to do with the accessibility offered by their location.

7. Conclusions

The conclusions drawn from this study can be expressed in terms of the methodological insights as well as the actual results derived from this comprehensive approach.

The methodology consisted of using and combining three sources of information: social media networks; specific cartographies; and specialized bibliographic references.

The use of Foursquare social media provided a useful method to identify user preferences for public spaces. Even though data retrieved from Foursquare had to be analyzed and interpreted carefully, the proposed method was rather straightforward and avoided the time consuming task of developing a ranking of successful public spaces by means of traditional field studies. Moreover, these data are currently open and available to urban scholars and professionals as a virtual layer of information about a physical space.

The identification of the boundaries of each city's historic center by combining and integrating two approaches – morphological and historical – offered a more accurate picture. This twofold methodology was fundamental because the multiple transformations of the mature urban fabric may have blurred the boundaries of the historic center, thereby complicating its demarcation when relying exclusively on one source. Indeed, the original urban pattern has evolved to adapt to new social, economic, and mobility-related needs or urban policies.

The results present three relevant findings. Firstly, social networks are capable of mirroring the social interaction happening in urban public spaces and establishing user preferences for some public spaces over others in a city. Specifically, an identification of *plazas* and their ranking according to user preferences is not only possible but was found to be quite reliable. This was evidenced by the fact that the selected *plazas* were relevant in terms of their specific bibliographical references as well as their urban location.

Secondly, the most successful *plazas* were delimited by or connected to one of the main city-center axes. Also, the *plazas* were found to be strongly linked to the historic center of each city despite the recent growth in the peripheral areas of Spanish Mediterranean cities. This

confirms that the mature urban patterns in these cities remain relevant and as socially active as ever.

And thirdly, all selected *plazas* have a commercial, administrative, religious or recreational role which is the core characteristic of these Mediterranean public spaces, as cited in the introductory definition. In fact, the respective *plazas*' surrounding buildings are relevant landmarks, such as churches, administrative offices, town halls, retailers and restaurants.

Finally, these findings indicate that new areas related to urban research could be developed from the retrieved data which also provide information associated to social network users' preferences — such as tips, pictures and likes. Therefore, future research could involve the processing and analyzing of these data to investigate citizen perception of urban spaces.

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