# Some Preliminary Remarks on the Recreational Business District in the City of Sassari: A Social Network Approach

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**Abstract[1].** In geographical studies the Central Business District represents the 'central place' of the city, or its core, where the activities typical of a city, and different from those carried on in rural settlements, are carried on and realized. Several studies have been carried on in the past but a general characteristic is given by the concentration of the central activities in the city. Talking about specialized activities, authors, particularly studying tourism, identified the concept of Recreational Business District, as that part of a city mostly dedicated to free time and leisure, both frequented by locals and by pass-byers and tourists. Starting from previous experiences of research on Central Business District Activities, in this paper we present the first results of a research aimed at highlighting the Recreational Business District in urban areas, starting from the city of Sassari (Sardinia, Italy), with the aim of a first spatial delimitation of the district. Also, we analyzed the presence of recreational activities on the world of social networks ad media, in order to observe if and to what extent such 'virtual' connections hold a spatial component in tourist terms. Point pattern analysis is used for the analysis over the recreational activities and particularly a Kernel Density Estimation is performed over the different datasets.

**Keywords:** City, Urban Core, Density Estimation, Sassari, Sardinia, Tourism, Recreational Business District, Central Business District.

[1] The paper derives from the joint reflections of the three authors. Silvia Battino realized paragraphs 1 and 3, while Giuseppe Borruso wrote paragraphs 2 and 4. Carlo Donato wrote paragraph 5.
The geographical visualization and analysis, where not otherwise specified, have been realized using ESRI ArcGIS 10.2.

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## 1 Introduction

The city is the object of geographic research since the Twenties of the Twentieth century, when different authors ([1], [2], [3], [4], [5]) carried on theoretical analyses on the evolution of urban spaces. Such studies led to highlighting an area in cities of a certain dimension known as Central Business District (CBD), characterized, mostly in the US context, by a low population density and other secondary spaces around main road accesses dedicated to shopping and services, or other peripheral areas dedicated to commercial activities.

All of these areas are characterized by the presence of tertiary activities and functions, often different from each other, originating districts different according to the dominant activities being carried out, being them administrative, residential, commercial, industrial and dedicated to free time or entertainment. In this latter kind we find tourism that, particularly from the end of World War II, played an important role in the evolution of the city as a system: a new urban function that in some cases changed radically the economic structure of the city into a mono-functional space, in any case leading to new zoning division [6].

So an area called Recreational Business District (RBD) can be overlaid and added to the functional zoning of the city. Such an area is characterized by the presence of activities that can be enjoyed by tourists as well as locals. The RBD concept is studied initially by Stansfield and Rickert in the Seventies of the Twentieth century [6] and is defined as an area where services and goods used by visitors and tourists are concentrated around natural phenomena or historical, cultural and architectural attractions. As Zanini and Lando recalls [7], in time the willingness to consume of tourists made the RBD focusing also on retail activities, accommodation and leisure, activities highly specialized and often organized so to determine a "mood" with its own attracting capacity ([8]; [9]). Getz [10] stated that in most European cities the Tourism Business District was spatially consistent with the Central Business District, and we can reinforce such statement, saying that a high significance could be found in the overlapping of CBD and a tourist district or RBW. The metropolitan services serving the CBD are in fact dedicated to satisfy also the needs expressed by tourists and locals in their free time.

Here in this paper we tackle a first analysis to highlight the RBD of the city of Sassari (Sardinia Island, Italy) where, in a previous research, was studied in terms of the extension and characters of its CBD [11] [12] [13], highlighted in the historical center and neighboring districts.

The rest of the paper is organized as follows. In Paragraph 2 the methods adopted and the type of analysis carried out is presented, while Paragraph 3 is focused on a short description of the study area and on the data used. Results and discussion are presented in Paragraph 4 and the Conclusions are dedicated to some remarks concerning the recreational and tourist aspects of the city are presented, together with suggestions for future research activities and directions.

## 2 The Methods. Point Pattern Analysis and Social Networks

The research carried on in this paper is based on the analysis of recreational activities considering their geographical location in order to detect areas of clustering and therefore suggest some spatial definition of a recreational business district at urban level. We started with collecting urban activities and classifying them in categories referred to free time and recreation, moving then to georeference them. The starting point was a research carried on recently on the definition of CBD in Sassari ([11] [12] [13]) and from that we moved to the more in depth analysis of its recreational part. The work therefore involved the update of the list of activities at urban level particularly dedicated to recreation. Also we proceeded to enrich such list of features inserting other attributes than the categories as derived from the Yellow Pages and the geographical components as addresses and coordinates, therefore populating the list with the presence of the activities on the Internet and on social networks and media.

The analysis was done over the point pattern represented by the recreational activities at urban level. In particular a *Kernel Density Estimation* (KDE) was used to transform point events in space in a continuous density function over the study region, in order to visualize the phenomenon as a kind of 'heat map' or a pseudo - 3D surface that shows area of concentration of point features in a given area. The method is quite used in spatial statistics and analysis and widely used in several research areas, in case in which geographical elements can be presented by means of point patterns and we are interested in grouping them to highlight 'hot spots' or areas of major concentration of point events ([11] [12] [13] [14] [15] [16] [17] [18] [19] [20] [21])

Briefly recalling the formula, the kernel functions are three dimensional, characterized by a moving window visiting all events in a point pattern and weighting other events within a certain range according the their distance from the point where density is being estimated [22].

$$\hat{\lambda}(s) = \sum_{i=1}^{n} \frac{1}{\tau^2} k\left(\frac{s - s_i}{\tau}\right) \tag{1}$$

$\hat{\lambda}(s)$ is the density estimation of the point pattern measured at location $s$, while $s_i$ represents the observed $i^{th}$ event. $k(\ )$ is the kernel weighting function and the parameter $\tau$ is the radius of research of the function, or bandwidth, to be centered in location $s$, and searching for events $s_i$ to be computed into the density function. The searching radius $\tau$ is the main arbitrary variable and a wider distance will produce a smoothed surface, good for visualizing hot spots over a wider area, while a shorter distance will produce mainly local peaks in the density distribution while wider values tend to dilute the phenomenon and over smooth the observed phenomenon [23]. The continuous density function is represented, in a GIS environment, by means of grid cells whose values represent either a density or a probability function. The variation of values between neighboring cells is smooth so that their distribution approximates a 3D distribution.

The KDE can be performed over the pure distribution of events, therefore considering just the geographical location of events. The function can also consider

weights attributed to events belonging to the point pattern. In doing so, not only geographical proximity to the estimation point will provide denser values but also the presence of weights could change the shape of the density function over the study region. In this analysis we considered a weighted density function in which the presence of recreational activities on social networks and media was taken into consideration.

## 3 The Case Study. The Study Area and the Data Used

The city of Sassari is the capital of the homonymous Province and is the second city of Sardinia, after the regional capital Cagliari, in terms of inhabitants. It is located in North-Western Sardinia and counts to-date around 126,000 inhabitants [24]. The city hosts an old University dating back at 1617 although it does not seem holding the characteristics of national and international historical cities having an attractiveness as tourist centers.

After a period of prevalence of industrial activities the city gained a role in the tertiary functions, partly dedicated to free time both for resident and non-residents. The 'touristic' function has therefore widely grown and assumed stable characters thanks to the increase in cultural tourism that altered the urban framework and its economic structure.

From the tourism point of view in 2012 nearly 68,000 tourists visited Sassari in 2012 and 70 % of them were Italians, with an average presence of 1.9 days. It can be defined as a not proper and tourism, only partially increasing in the summer period when the city is visited by people spending their holidays in the neighboring and most renown coast locations.

The Yellow Pages service was used ([25] accessed February 2014) to collect the recreational activities of the Recreational Business District of the City of Sassari. These represent a subset of those used for the definition of the Central Business District, although updated at more recent times, as several recreational activities changed in their denomination and position in the years separating the two researches. Data were georeferenced at address point level using the GIS data provided by the Municipality of Sassari [26] and checked via on-line geocoding services [27].

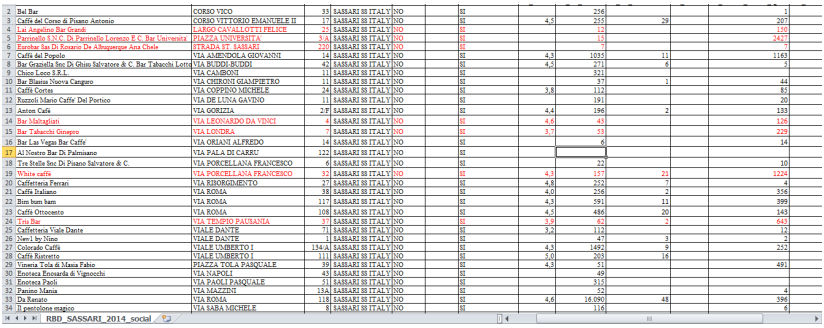
The activities selected are those dedicated to recreation as "Art and Culture", "Retail", and "Free time". Nine sub-categories were also highlighted for a total of 321 activities as reported in Table 1.

**Table 1.** The activities determining the RBD in the city of Sassari.
Source: Our elaboration from Yellow Pages [25] (2014)

| **Sub Category** | Hotels and B&B | Bars and Coffee shops | Wineries | Take away food | Museums | Ice cream - cakes | Restaurants | Theaters | Other restaurants | Total |
|---|---|---|---|---|---|---|---|---|---|---|
| **N.** | 16 | 91 | 15 | 3 | 5 | 37 | 134 | 10 | 10 | 321 |

After this reclassification of recreational activities we georeferenced and visualized them on top of a digital map of the Municipality of Sassari in order to understand how they distribute over the urban territory.

Over than analyzing the spatial distribution of the recreational activities our aim was also analyzing how they participate actively to the world of social networks and media. Such participation generally is represented by the presence of a website – although many activities do not hold a webpage – and by a profile on popular social networks or media, as Facebook, Twitter, Google+ or Instagram, just to cite a few among the most popular ones (Figure 1).



| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2 | Bal Bar | CORSO VICO | 33 | SASSARI SS ITALY | NO | | SI | | 256 | | | 1 |
| 3 | Caffè del Corso di Pisano Antonio | CORSO VITTORIO EMANUELE II | 17 | SASSARI SS ITALY | NO | | SI | 4,5 | 255 | 29 | | 207 |
| 4 | Lai Angelino Bar Grandi | LARGO CAVALLOTTI FELICE | 23 | SASSARI SS ITALY | NO | | SI | | 12 | | | 150 |
| 5 | Parrinello S.N.C. Di Parrinello Lorenzo E C. Bar Universita' | PIAZZA UNIVERSITA' | 33 | SASSARI SS ITALY | NO | | SI | | 32 | | | 2427 |
| 6 | Eurobar Isa Di Rosario De Albuquerque Ana Chele | STRADA ST. SASSARI | 220 | SASSARI SS ITALY | NO | | SI | | 7 | | | 7 |
| 7 | Caffè del Popolo | VIA AMENDOLA GIOVANNI | 14 | SASSARI SS ITALY | NO | | SI | 4,3 | 1035 | 11 | | 1163 |
| 8 | Bar Graziella Snc Di Ghisu Salvatore & C. Bar Tabacchi Lotto | VIA SUDDI SUDDI | 42 | SASSARI SS ITALY | NO | | SI | 4,5 | 271 | 6 | | 5 |
| 9 | Chico Loco S.R.L. | VIA CAMBONI | 11 | SASSARI SS ITALY | NO | | SI | | 321 | | | |
| 10 | Bar Blasina Nuova Cangaro | VIA CHERONI GIAMPIETRO | 11 | SASSARI SS ITALY | NO | | SI | | 37 | 1 | | 44 |
| 11 | Caffè Cortes | VIA COPPINO MICHELE | 24 | SASSARI SS ITALY | NO | | SI | 3,8 | 112 | | | 83 |
| 12 | Ruzzoli Mario Caffe' Del Portico | VIA DE LUNA GAVINO | 11 | SASSARI SS ITALY | NO | | SI | | 191 | | | 20 |
| 13 | Amion Cafè | VIA GORIZIA | 27 | SASSARI SS ITALY | NO | | SI | 4,4 | 196 | 2 | | 133 |
| 14 | Bar Maltaglati | VIA LEONARDO DA VINCI | 4 | SASSARI SS ITALY | NO | | SI | 4,6 | 43 | | | 128 |
| 15 | Bar Tabacchi Giuspro | VIA LONDRA | 7 | SASSARI SS ITALY | NO | | SI | 3,7 | 53 | | | 229 |
| 16 | Bar Las Vegas Bar Caffè | VIA ORIANI ALFREDO | 14 | SASSARI SS ITALY | NO | | SI | | 6 | | | 14 |
| 17 | Al Nostro Bar Di Palmiano | VIA PALA DE CARRU | 122 | SASSARI SS ITALY | NO | | SI | | | | | |
| 18 | Tre Stelle Snc Di Pisano Salvatore & C. | VIA PORCELLANA FRANCESCO | 6 | SASSARI SS ITALY | NO | | SI | | 22 | | | 10 |
| 19 | White caffè | VIA PORCELLANA FRANCESCO | 32 | SASSARI SS ITALY | NO | | SI | 4,3 | 157 | 21 | | 1224 |
| 20 | Caffetteria Ferrari | VIA RISORGIMENTO | 27 | SASSARI SS ITALY | NO | | SI | 4,8 | 252 | 7 | | 4 |
| 21 | Caffè Italiano | VIA ROMA | 38 | SASSARI SS ITALY | NO | | SI | 4,0 | 256 | 2 | | 356 |
| 22 | Bim bum bam | VIA ROMA | 117 | SASSARI SS ITALY | NO | | SI | 4,3 | 591 | 11 | | 399 |
| 23 | Caffè Ottocento | VIA ROMA | 108 | SASSARI SS ITALY | NO | | SI | 4,5 | 486 | 20 | | 143 |
| 24 | Tris Bar | VIA TEMPIO PAUSANIA | 37 | SASSARI SS ITALY | NO | | SI | 3,9 | 62 | 2 | | 643 |
| 25 | Caffetteria Viale Dante | VIALE DANTE | 71 | SASSARI SS ITALY | NO | | SI | 3,2 | 112 | | | 12 |
| 26 | Nwt1 by Nino | VIALE DANTE | 1 | SASSARI SS ITALY | NO | | SI | | 47 | 3 | | 2 |
| 27 | Colorado Caffè | VIALE UMBERTO I | 134/A | SASSARI SS ITALY | NO | | SI | 4,3 | 1492 | 9 | | 252 |
| 28 | Caffè Ristretto | VIALE UMBERTO I | 111 | SASSARI SS ITALY | NO | | SI | 3,0 | 203 | 16 | | |
| 29 | Vineria Tola di Mania Fabio | PIAZZA TOLA PASQUALE | 39 | SASSARI SS ITALY | NO | | SI | 4,3 | 51 | | | 491 |
| 30 | Enoteca Enoarda di Vignocchi | VIA NAPOLI | 43 | SASSARI SS ITALY | NO | | SI | | 49 | | | |
| 31 | Enoteca Paoli | VIA PAOLI PASQUALE | 31 | SASSARI SS ITALY | NO | | SI | | 315 | | | |
| 32 | Panine Mania | VIA MAZZINI | 13A | SASSARI SS ITALY | NO | | SI | | 52 | | | 4 |
| 33 | Da Renato | VIA ROMA | 118 | SASSARI SS ITALY | NO | | SI | 4,6 | 16.090 | 48 | | 396 |
| 34 | Il gastrolosa magico | VIA SABA MICHELE | 8 | SASSARI SS ITALY | NO | | SI | | 116 | | | 6 |

RBD_SASSARI_2014_social

**Fig. 1.** Part of the recreational activities and their presence on the Web and Social Networks (2014)

Source: our elaboration on GIS data from Yellow Pages [25] and Social networks and media

Of the 321 activities considered, a 29.28 % holds a website, while 51.09 % have a social profile. Just 22.74 % of them have both (Table 2). Restaurants are among the categories with higher presence over the social networks and internet, with a 54.79% having a web site as well as a social profile. Hotels and Bed & Breakfast follow (10.96 %) and bars and coffee shops (8.22%).

Among the social networks considered, specific attributes were defined and referred to the most popular applications. Facebook, Twitter, Google+ and Instagram were considered as the social media and network to check for each economic activity. Of such activities, characteristics as the 'Likes', 'Followers', 'Following', etc. were considered and eventually used as weights in one of the elaborations.

**Table 2.** Recreational activities grouped by their presence on the web and on social networks
Source: Our elaboration from Yellow Pages [25] (2014)

| | Activities | | Activities (%) | |
|---|---|---|---|---|
| | Yes | No | Yes | No |
| **Web site.** | 94 | 227 | 29.28 | 70.72 |
| **Social network / media** | 164 | 157 | 51.09 | 48.91 |
| **Web site + Social network / media** | 73 | 248 | 22.74 | 77.26 |
| **Total** | 321 | | 100 | |

## 4 Results and Discussion

A first visual analysis can be done on the scatterplot of point features referred to recreational activities.


**Fig. 2.** Central activities in the city of Sassari
Source: our elaboration on GIS data from Yellow Pages [25]

As a reference we represent the distribution of activities used for highlighting the Central Business District (Figure 2) and those used in the present research for the (social network) analysis of the Recreational Business District (Figure 3).

The analysis carried on by Battino, Borruso and Donato [12] highlighted an area of concentration of the full dataset of the central activities in the compact city's urban districts and particularly in the central districts (Centro Storico, Piazza d'Italia, Viale Dante and Viale Amendola - Viale Italia) that alone covered more than 55 % of the total.

The observation of the point pattern given by the recreational activities shows obviously a less dense presence, as the recreational activities appear as a subset of the central activities' dataset (321 events versus 1,980 belonging to the central activities datasets). It can however be noticed that the areas of concentration are not very dissimilar between the two datasets, so more in depth analyses can be performed to highlight true hotspots in the study region.

A Kernel Density Estimation was therefore performed on the central activities and on the recreational ones to observe if the hot spots overlay or some other pattern arise. Also, the density estimation was performed over the activities that are actually active in social networking, or those demonstrating a higher openness to new media and new opportunities to accessing new customers.


**Fig. 3.** Recreational activities in the city of Sassari
Source: our elaboration on GIS data from Yellow Pages [25]

Different bandwidth were tested, while here we present the results related to a bandwidth of 355 m, that corresponding to the 150 nearest neighbor activities computed for the central activities. This implies the "computation of the average of intra-events distances of different orders [27], thus linking the control of the variable to a k-nearest neighbor choice instead of an arbitrarily chosen radius" [12]. We decided to maintain such a bandwidth also for the recreational activities and for the social recreational activities, as such a distance is compatible with an average 5 minutes walking distance, a good approximation of accessibility to services at urban scale.

The results from the density analysis on central activities are portrayed in Figure 4, where a suggested shape of the CBD is presented, following a North-west – South-east orientation, from the boundary of Centro storico district (in the centre map), crossing Piazza d'Italia and ending up in Viale Dante. Also a secondary hot spot can be observed on the left side of the map, West from the main elongated cluster, highlighting a shape similar to the Greek letter 'lambda' (λ).

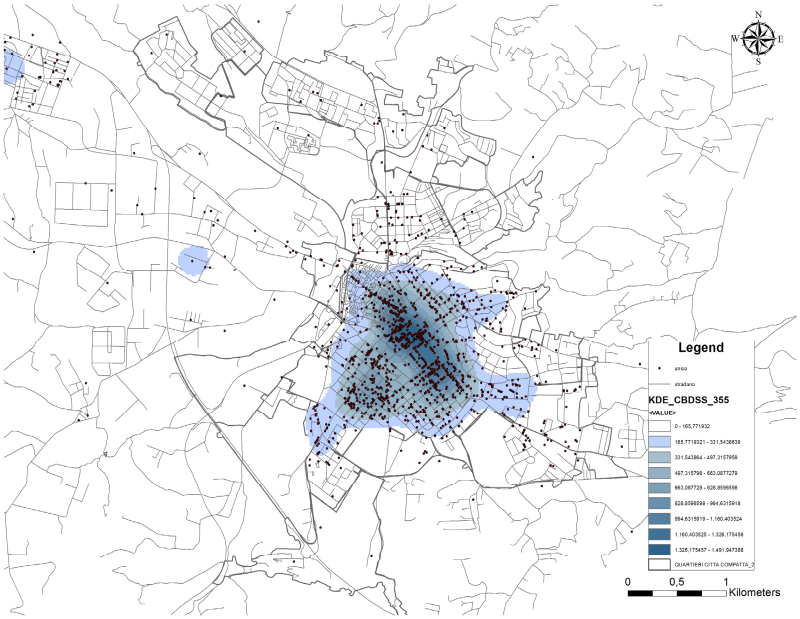



**Fig. 4.** Central business activities in the city of Sassari (355 bandwidth)
Source: our elaboration on GIS data from Yellow Pages [25]

However the main core of the CBD follows mainly an elongate shape, whose vertices are the areas of the two districts Centro Storico and Viale Dante, linked together by the two parallel streets Corso Vittorio Emanuele II and Via Roma.

The same density analysis was performed over the recreational activities, with the aim to identifying the area (s) of concentration of activities and therefore determine a shape for the Recreational Business District. Figure 5 shows the results of such an analysis. We can observe that a general trend comparable with that represented in figure 4 and related to the CBD can be noticed.

Some differences however arise, particularly with a major elongation and higher levels of density present at the two extreme points of the elongated shape, in the 'Centro Storico' and 'Viale Dante' districts, with a denser area in the 'Centro Storico' district. So two 'hot spots' seem to be visible following the same elongated shape of the CBD, without necessarily describing a 'lambda' shape. Also, the area of concentration of the hot spots of recreational activities is not completely overlapping with the CBD area showing some mismatch.

The two hotspots or clusters in the two areas mentioned above are even more visible and neatly identifiable when the analysis is performed over the subset of the recreational activities, as those characterized by being active in social networking.

Figure 6 reveals a neatly elongated shape of the RBD following the two main streets connecting the 'Centro Storico' and 'Viale Dante' districts, with nearly equal density values for the two areas.

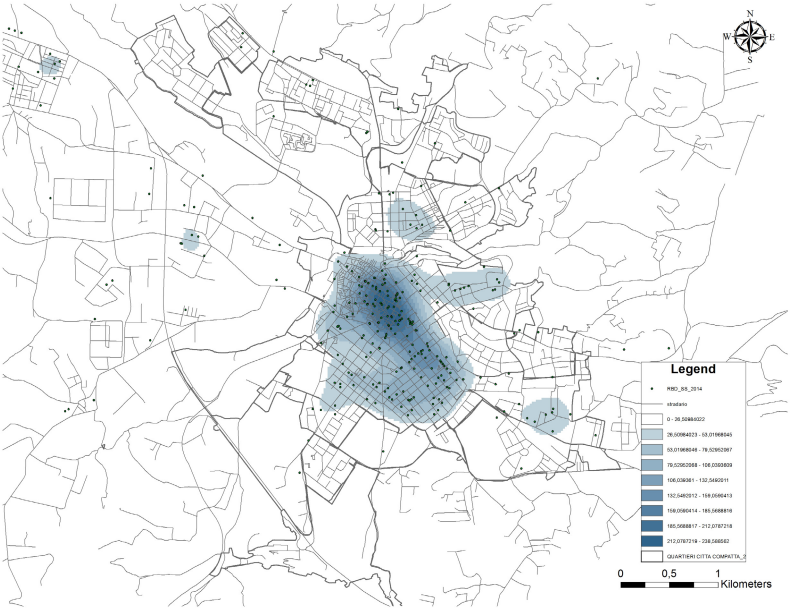



**Fig. 5.** Recreational activities in the city of Sassari

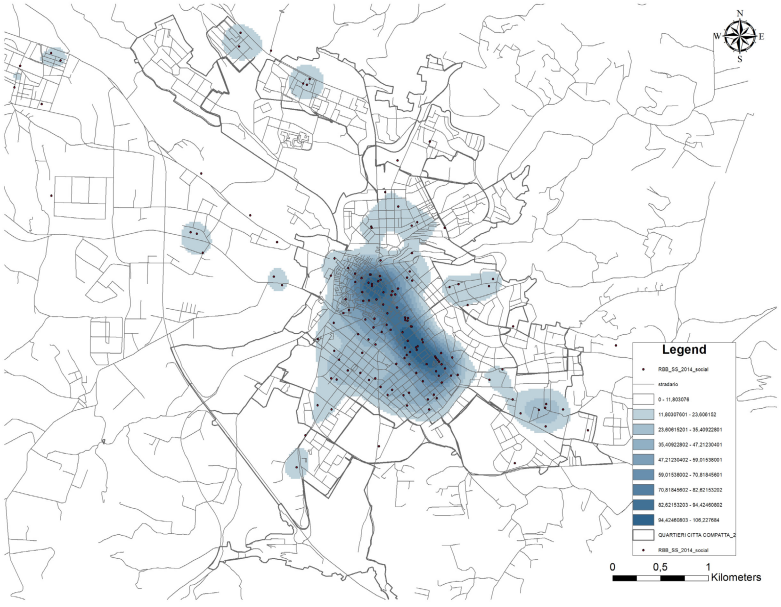



**Fig. 6.** Recreational activities in the city of Sassari on social networks

Being this work a first start of a research on such topic, at this stage we considered the possibility of weighting the events of the study region considering some of the values related to the presence of activities in the most popular social networks and media. It emerged - as expected – that Facebook is the most present among recreational activities. This is not a surprise as it is the most widespread social network in the world with over 1.2 billion users registered [28]. Many activities do not hold an Internet website but are more likely to be present on social media and networks. For this analysis we considered a quite naïve indicator, being it the number of 'likes' registered for the recreational activities holding a social component.

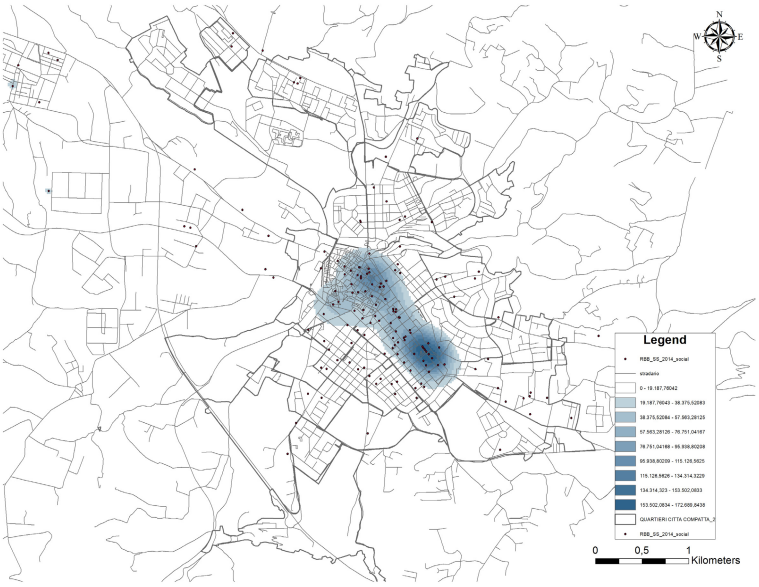



**Fig. 7.** Recreational activities in the city of Sassari on social networks (weighted)

In figure 7 the results are displayed. Here the clustered area is more neatly defined that in the previous cases along the two main high streets and with peaks in the same areas highlighted before. However an interesting element to be noticed is that, after weighting the density function, the main hot spot moves from the city center towards the South-Eastern part of the figure. Such an area is actually very close to the university and also hosting several recreational activities accessed mainly by students and university personnel working in the area. So it appears quite interesting to notice that possibly the activities more dedicated to a young public are also those more interesting in having an appealing profile on the usual social networks, so to establish a link between activities and customers that has both the characters of the virtual one (as many connections on social structures) but also between people and places, having the 'non social network component' of the advertisement a very strong and visible linkage to space – being such activities inserted in a physical, urban space.

Surely new recreational structures try to attract people and particularly, being mobile devices and social networks and media more and more widespread, it is an important way to be in touch with potential customers. Also, this represents an opportunity to test the response from clients, as social networks and media are open to comments and therefore the users have the potential to rise doubts on possible bad choices of the recreational activities and to monitor, to some extent, their performances.

## 5 Conclusions

Some final reflections can be done with reference to the methods adopted and the importance of delimiting central urban areas. The results were interesting as the methods allowed highlighting clusters of central activities in the urban areas, and also as their application, at different scales and using different parameters, can be easily repeated not only to other urban cases but also to highlight different characters and specialization of sub-areas in an urban environment, helping also in re-drawing, if needed, administrative subdivisions.

This initial research reveals as the recreational activities that characterized Sassari Recreational Business District are mostly located in proximity of the same Central Business District, although with some differences in the hot spots. In particular the hot spots concerning the activities more active in social networking and media. The presence on popular social networks and media enhances an activity's own attractive capacity and therefore allows playing a real touristic role.

However, the Recreational Business District seems to be dedicated mainly to satisfying the needs of free time of its local population and, only partly of tourists that concentrate during the summer months.

As a final comment, the perspective of Sassari as a 'historical and cultural city' must be supported by urban planning policies aimed at qualifying the urban spaces hosting the Recreational Business District and allow a sustainable tourism, trying to interpret the city as a place where functional activities different from the basic ones are located (i.e., those dedicated to residents), as well as the basic ones (or those dedicated to tourists).

The research is however at an initial stage for different reasons. On one side there is a need to debate and further develop a theoretical discussion on the activities dedicated explicitly to tourism and their relationship with the wider ones targeted on recreation – these latter including actually also locals as consumers and not just tourists. Another issue is dedicated to the weight and importance of the presence on the Internet of the activities and particularly on the social networks and media and how such elements can be effectively related to spatial elements.

A third element is dedicated to visualization issues and the perspectives of the correct choice of the cartographic representation for mapping phenomena like those observed. What used here was based mainly on a point pattern analysis and on methods to visualize them, but it must be considered that the elements considered hold a different and more complex nature in terms of their forms.

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