Amor SP

Understanding socio-spatial emotions of urban poor in São Paulo

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In the last decades, the quantity of information produced and distributed due to digital resources has been growing; big data is contributing to a better perception of our cities. The aim of this paper is to understand spatial segregation in the city of São Paulo (a city known by its social inequality and urban poverty) by scraping social media tags of emotions. We compared aspects that suggest socio-spatial inequalities: urban poor versus feelings of love and hate, versus feelings of joy and fear and the social vulnerability index as background. Three issues are considered in this research: the emergence of urban space big data, digital inclusion, and architects and urbanists' access to big data. To unveil urban poor singularities through social media is an opportunity to reconnect communities to urban design.

Keywords: *Parametrics, Social media, Urban analytics, Socio-spatial interactions*

INTRODUCTION

In the last decades, the quantity of information produced and distributed due to digital resources has been growing, enabling the computational sciences to represent complex occurrences and models. Today, scientists observe the emergence of a new field related to data analysis (eScience), unifying theory, experiment and simulation (Hey et al. 2011). Instrumentation and technology contribute to the intensive use of data, stimulating the demand for tools that can assist researchers, planners and analysts to acquire, select, visualize and analyse big data; the implementation of methods to handle big data is a new science field called 'predictive analytics' (Leszczynski 2016).

The effective and convenient application of tech-

nologies might help researchers to significantly advance the understanding of the world, including its social challenges and how to face it. Thus, the technological process of acquiring, modelling, visualizing and analysing information contribute to the decision making process (Picon 2015; Batty 2018). This also commit the adoption of a scientific stance when the subjects are analysed and interpreted. In this sense, the design of information is essential for communication to reveal knowledge to other people.

In this context, utilization of maps to represent urban space related data assume a high complexity level. The possibility of combination of different types and data sources that present as reference the same territorial parameters (geo coordinates) establish a new condition for analysis and interpre-

tation of urban events. Thus, the traditional mapping techniques have limitations that impede to register a large amount of information in a same spatial data. According to Loch (2006) maps are a medium to transfer knowledge, which can be broad and diverse or more restrict and objective. Maps are an abstraction of reality, spatializing the events that are represented, being spatial or not, material or ideal (Dutenkefer 2010).

The rising of big data is contributing to a better perception of our cities (Picon 2015; Taylor et al. 2015; Leszczynski 2016), and the production of digital content reached unprecedented levels (Carpo 2017; Taylor et al. 2015; Arribas-Bel 2014), especially when it comes to volunteered geographic information in social media platforms, such as Twitter, Flickr, Instagram or Foursquare. Volumes of data about and from city spaces (Leszczynski 2016) are generated every minute, however, this data is not created in a structured way to be used as research input (Ratti & Offenhuber 2014). Alternatively this information can be mapped, selected and interpreted to support designers and planners on understanding urban spaces. In this paper three issues are orbiting around this problem:

- Emergence of urban big data is a topic widely discussed in the literature (Batty 2018; Picon 2015), including how to treat or visualize data (Singleton et al. 2018; M'Closkey & VanDerSys 2017) and the changes technologies poses to design (de Waal 2014). Social media is responsible to produce a big quantity of user-generated information, specifically data with geographic information (Campagna et al. 2015). Comments, reviews, photos, videos, and other digital media content can certainly help us to visualize human interactions with built environment (Gerbaudo 2012; Goodchild 2007). These studies can support the design and planning of urban spaces by adding new layers of information. This brings us to the question of what type and quality of data is generated by social media platforms in São Paulo?
- Digital exclusion has been a problem on cities (Picon 2015). The municipality of São Paulo started in 2014 to install 120 free Wi-Fi areas in public spaces to attend a demand for access to online information and communication, aiming at 240 free Wi-Fi spots in the subsequent years. Feeling of belonging is one issue tackled by this solution, which also reinforces democracy in the city. By being active on virtual space people can engage on participation processes, and social media becomes a tool for participative and interactive strategies (Zhou & Wang 2014; Bonsón et al. 2012). Mapping social-spatial interactions through social media can help to unveil poor communities' conflicts, demands and actions. We understand the limitations of urban poor in terms of accessibility to computer, smartphone and internet, so we propose the following question, would be possible to map the emotions of poor communities in the city of São Paulo?
- Only recently, architects and urban designers were introduced to the idea of using social media as information to support design and planning decisions (Taylor et al. 2015). Computer scientists are rapidly developing knowledge and methods for scraping data from social media, while architects and urban designers have still to learn on how to be proficient on programming methods. Programming gained a new impulse in the last decade with the creation of algorithmic design software for architecture design. The lack of knowledge on big data might lead architects and urbanists to be left unaware of developments and discoveries that deeply affect our cities. Being able to understand these concepts and work with these tools will make architects to play an active role on the development of smart cities and buildings. What are the challenges for architects to use these tools?

This paper argues in favour of rethinking design processes by unveiling citizens' affects, ephemeral disturbances and spatial connections, by that exposing urban poor's virtual socio-spatial interactions. The aim of this paper is to understand spatial segregation in the city of São Paulo (a city known by its social inequality and urban poverty) by scraping social media tags of emotions. As starting point, the authors draw inspiration from a song of Criolo, the Brazilian hip-hop artist who wrote: "não existe amor em SP" (Love does not exist in SP) in 2011. He portrays the city as a 'labyrinth' full of violence and graffiti in poor neighbourhoods. The melancholic lyrics inspired the authors to investigate emotions and city, condition made possible by increasing social media volunteered generated content.

According to Thrift (2004) affection (feelings such as anger, fear, happiness and joy) are essential elements of urban life, however, study of affection has been neglected on cities sciences. On the other hand, recent studies are finding sophisticated methods to visualize affect in cities via social media analysis, aiming support for urban planning (Go et al. 2009; Guthier et al. 2014), or security of public spaces, for instance, the EMOTIVE initiative (Leszczynski 2016). These studies have strong impact on the field of computer science, which can be challenging for architects and urban designers. The unique contribution of this is paper is to bring to light a tool for architects and urbanists to immediately incorporate social media analysis in their design process as investigative support, to examine the availability and quality of data in São Paulo and to explore urban poor socio-spatial data. We expect that this research helps to disseminate representations of abstract aspects of social media interactions and the physicality of the city.

METHODS

With the ubiquitous presence of Grasshopper in architecture schools and practices, tools (add-ons) are continuously being developed to overcome the architects' lack of knowledge on computing. Interfaces oriented towards architects to explore big data are still in development; one alternative is the add-on Mosquito for Grasshopper. This add-on has a set of tools to connect to social media allowing data crawling. Mosquito is an application merging three disciplines: architecture and urbanism, computer science and geography. Connecting data with historical and geographical context (Wyly 2014) provide insights for the data scientist. Thrift (2014) and Blumenstock et al. (2015) suggests that big data might be the key to make urban poverty visible. Testing the imaginary of São Paulo full with emotions has the potential to reveal aspects of the city which were not previously considered in its planning. It helps to express the segregation and limits of the city in terms of social inequity, it also presents the invisible aspects of urban data. This allows emotions scraped from online posts to be spatially aggregated in dynamic 'mood maps' (Leszczynski 2016).

To exemplify new possibilities of perception, analysis and representation of urban environments using data visualization and social media tags, this paper focus on mapping of search tags related to emotions on Flickr. Twitter was also tested, generating a large number of results, but with an insignificant percentage of geo located tags. Then, we compared aspects that suggest socio-spatial inequalities: urban poor versus feelings of love and hate, versus feelings of joy and fear and the social vulnerability index as background. The base map of São Paulo are open source GIS files that can be downloaded from the portal GeoSampa (geosampa.prefeitura.sp.gov.br), we used the street network, the districts' outlines and the favelas' outlines. We compare the information with the São Paulo's Index of Social Vulnerability which can be downloaded from the portal São Paulo Governo Aberto (governoaberto.sp.gov.br), and the Census Sectors from the Brazilian Institute for Geography - IBGE (mapas.ibge.gov.br).

The shape files (.shp) are converted to .dwg by QGIS and imported to Rhino. This procedure involves to adjust the projection of the map on a World Projection for São Paulo:

Figure 1
Grasshopper data
flow definition
using Mosquito
(Authors, 2019).
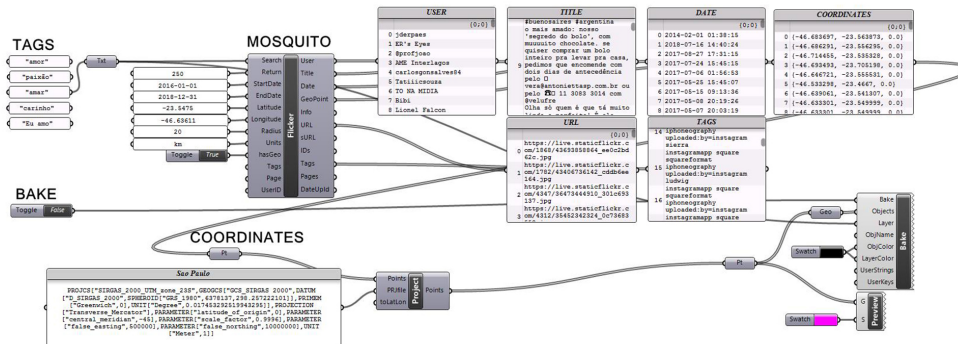
SIRGAS 2000 UTM Zone 23S EPSG 31983 (Brazil) exported from QGIS as SAD 69(96) EPSG 5530 (Brazil Polyconic).

By doing so it is necessary to inform the following projection to Mosquito:
PROJCS["SIRGAS_2000_UTM_zone_23S",
GEOGCS["GCS_SIRGAS 2000",
DATUM["D_SIRGAS_2000",
SPHEROID["GRS_1980",6378137,298.257222101]],
PRIMEM["Greenwich",0],
UNIT["Degree",0.017453292519943295]],
PROJECTION["Transverse_Mercator"],
PARAMETER["latitude_of_origin",0],
PARAMETER["central_meridian",-45],
PARAMETER["scale_factor",0.9996],
PARAMETER["false_easting",500000],
PARAMETER["false_northing",10000000],
UNIT["Meter",1]]

Mosquito is relatively easy to use tool (fig 1), being the most difficult part to set up the correct projection between the map and collected tags. We limited the data scraping from 2016.01.01 to 2018.12.31, on a 20km radius from the coordinates: -23.5475 and -46.63611, points outside the political borders of São Paulo are not counted and are deleted from the visualizations. Since Mosquito returns a maximum of

250 results for Flickr, the date range must be shifted to accumulate the dataset for each year. We recognize that the poorest communities in São Paulo might probably have less computers, smartphones and tablets, but Wi-Fi points in São Paulo are connected to public equipment such as libraries, culture centres, educational facilities, parks, fablabs, touristic places or squares, which offer computers for these communities.

The tags are searched individually, and the geo points are then transferred to Rhino by baking them. A second definition parametrize the visualization by using a hexagonal grid to sum the number of results inside each cell and then inform the radius of the circles (fig. 2).

We produced two maps using tags scrapped from Flickr: 1. love and hate São Paulo (fig.3), 2. joy and fear São Paulo (fig. 4); using as background the social vulnerability index, streets and favelas. All searches were conducted exclusively in Portuguese using the following words, for the map 1 (love and hate) we got 614 results for the search tags: amor (love), paixão (passion), amar (to love), carinho (affection), 'eu amo' (I love); and 38 results for the search tags: ódio (hate), abandono (abandonment), odiar (to hate), indiferença (indifference), raiva (rage). For

the map 2 (joy and fear) we got 1131 results for the search tags: amizade (friendship), feliz (happy), felicidade (happiness), alegria (joy), amigos (friends); and 354 results for the search tags: triste (sad), tristeza (sadness), medo (fear), confronto (clash), violento (violent), inimigo (enemy), violência (violence). We got 498 results for the search tags related to urban poor: COHAB (social housing sets of buildings), cortiço (tenement), favela (slum), comunidade (community), gueto (gueto), periferia (periphery) used in both maps.

The search tags for urban poor can have both negative and positive aspects attached to it; some dwellers proudly apply the word COHAB to their origins and community. In this sense, it is not possible to disconnect some ambiguous results, and that is not the intention. However, we emphasize the ambiguities introduced by some words and the possibility of having search returns not referring to the specific search. Since it is not possible to examine every single result, this aspect of data scraping must be balanced. This is one of the challenges of working with big data, try to avoid ambiguities to accumulate a dataset that can represent the research as accurate as possible.

The maps show the concentration of results for emotions on the old city centre and Paulista Avenue. In the case of Paulista Av., we recognize it as a hub of activity in São Paulo, especially due to public manifestations taking place in this street, therefore, the large set of results in this area. The lower Paulista Av. has more love tags, while the upper part a mix of joy and fear. The socio-spatial interactions of this specific social media platform (Flickr) are not common on favelas, but, are consistent with some of our data for urban poor communities. A special attention to one point in the north (around the district Jardim Joana D'Arc) highly active in terms of community and also in fear. The Favela Paraisópolis in the southwest part of the city did not generate any result, which is surprising, since it is one of the largest favelas in São Paulo. A high concentration of hate in four points, one in the city centre and three in the periphery, must be subject of a detailed study, being one of these points a favela in the district Jaguaré - west part of the city. Future research will verify the tags in detail to understand in which context these citizens use social media to communicate their feelings. The social vulnerability index is helpful to visualize that there are virtual activity on vulnerable communities and favelas.

Three questions proposed in the beginning of this paper are now examined.

- What type and quality of data is generated by social media platforms in São Paulo? Regarding data for emotions in São Paulo, the results are satisfactory, allowing similar future studies with other tags. Brazilians are well known for being active on social media in all social classes, for instance, the meme "Please come to Brasil" in which internet users ask for international artists to perform in Brazil, reflects the poor and middle class access to international culture. However, a significant amount of noise is generated, what Leszczynski (2016) calls unstructured real-time content; a smart

Figure 2
Grasshopper
definition for
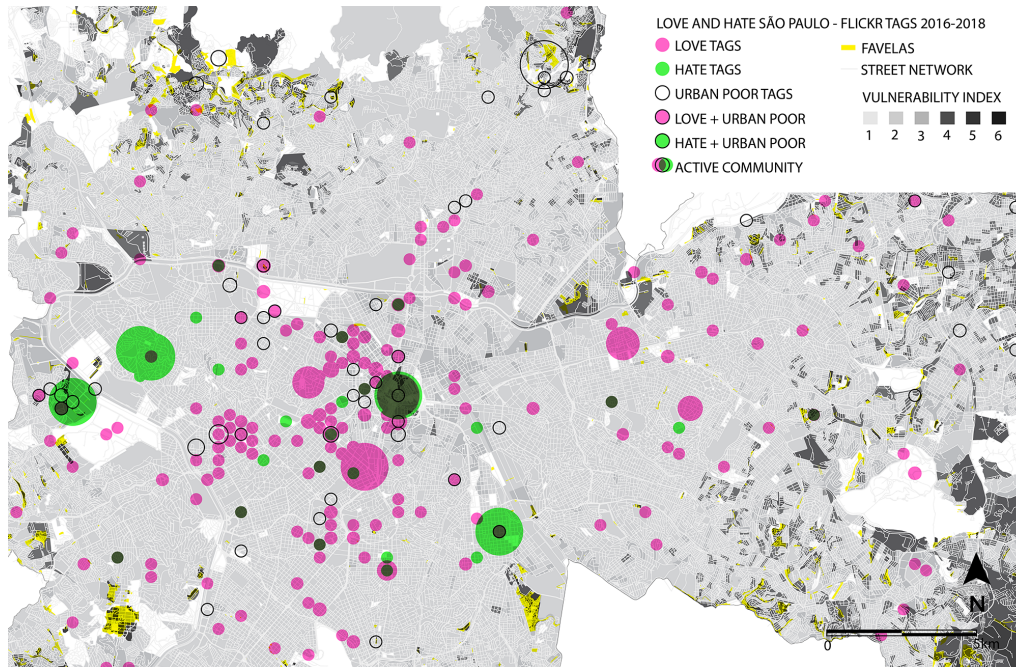visualization of
results in a
hexagonal grid
(Authors, 2019)
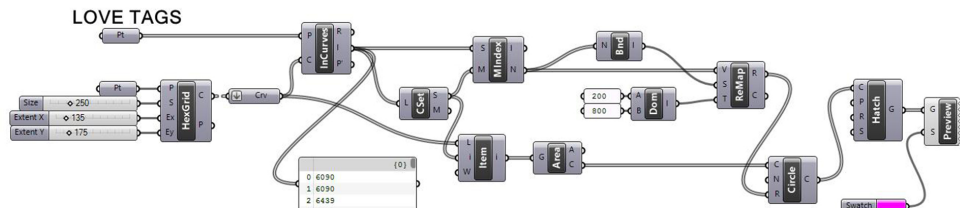
Figure 3
Love and hate from Flickr in São Paulo (Authors, 2019). Social Vulnerability Index (Source: Governo Aberto) levels: 1. super low, 2. very low, 3. low, 4. vulnerable, 5. high, 6. very high; for the Census Sector (Source: IBGE); on top of streets, slums and districts' outlines (Source: GeoSampa).

selection of search expressions is fundamental for a meaningful analysis. It can be focus on a second part of this study to look on spaces and which are their physical characteristics.

- Would be possible to map the feelings of poor communities in the city of São Paulo? We believe that in combination with other social media platforms, the results can be more accurate and complex. We aggregate a significant number of geo located tags to create two mood maps that have actual information and can be updated constantly, registering the evolution of emotion in the city. Flickr posts can be a very good data source, but the designer must be aware of its limitations: in general, the photos present positive aspects.
- What are the challenges for architects to use these tools? To understand the limitations

and potentialities of such analysis to design and plan of cities. Fundamentally the tool can assist architects to collect information on certain places and scales, allowing them to be introduced to concepts of big data. We noticed that employing Mosquito alone was not enough; some knowledge on GIS is necessary. Moreover, it is important to establish clear parameters to collect relevant information. Words might have double meaning or being applied for different contexts, for instance, the word "park" alone can be related to green spaces or car spaces. This ambiguity have to be addressed beforehand.

Figure 4
Joy and fear from Flickr in São Paulo (Authors, 2019). Social Vulnerability Index (Source: Governo Aberto) levels: 1. super low , 2. very low, 3. low, 4. vulnerable, 5. high, 6. very high; for the Census Sector (Source: IBGE); on top of streets, slums and districts' outlines (Source: GeoSampa).
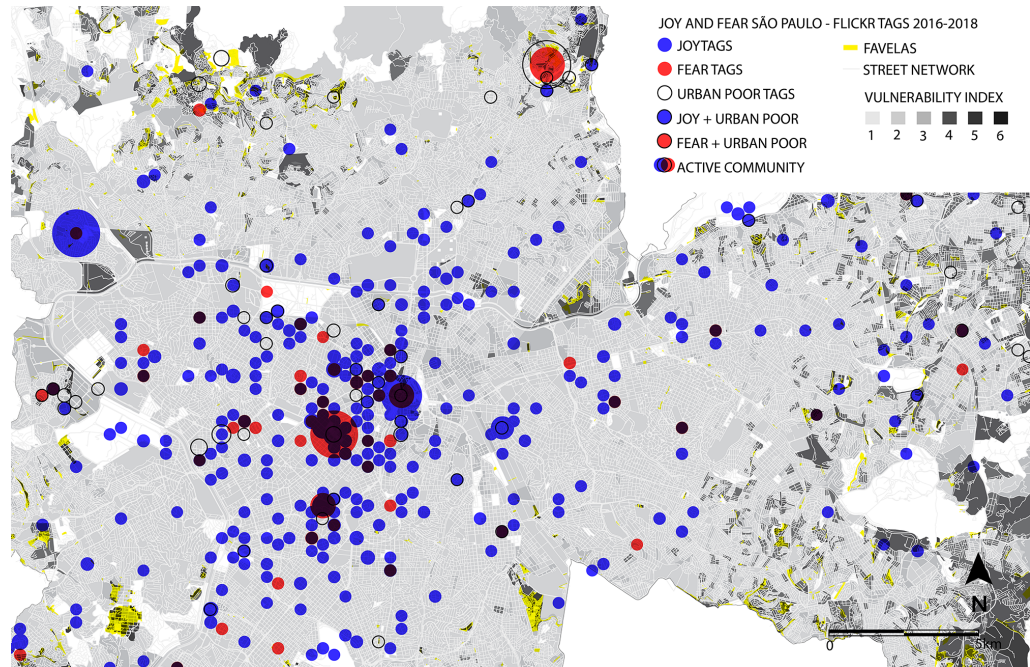
CONCLUSION

In this paper we experiment with a social media data scraper for Grasshopper. We speculate that urban poor emotions can be mapped through social-media, and create two mood maps of love and hate, joy and fear. The urban inequalities cannot be solved by this analysis, but the results offer hints to support strategies for planning and designing, for instance, Paulista Av. is perceived as the contemporary Agora, the old city as place of complex urban dynamics, and the urban poor manifesting emotions in this specific social network is a sign of accessibility to technology in these communities.

The data generated via social media tags when confronted with the statistical data of the city, might reveal the virtualization of a collective's intention. According to Levy (2011), the virtualization is the mutation of identity, a displacement from the ontolog-ical gravity centre of the object in discussion. By that mean it is possible the detachment of here and now, and, the words used to generate the map can be considered vectors of virtualization that abandoned the presence, being released from physical space. Thus, manifestations in social networks could be interpreted as an extension, complementation or even realization of desires of individuals that extrapolate the space and the physical body. Schopenhauer (2005) believes that our body is an object among other objects that brings meaning to the world and, in this way, the individual manifests his knowledge through representations that will serve as a departure point for the world's intuition. Thus, these maps can be analysed from two perspectives: the one that reveals the intentions and desires of individuals who find in virtual space the opportunity to accomplish their wills, and who have limited chances to manifest

them in physical space, configuring the universe of desire; or that which corresponds to the record of the present and becomes the representation of the world as it is.

Nevertheless, mapping the manifestations of individuals on the territory corresponds to the representation of the simultaneity of the physical and virtual space, contributing in a singular way, even before the possibility of ambiguities, for the production of information that will reveal and complement the analysis and interpretation of the urban space. Having this understanding of two separated worlds that interlace in several moments will allow architects and urbanists to interpret these visualizations in favour of their designs. To unveil urban poor singularities through social media is an opportunity to reconnect communities to urban design.

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