

URBAN BIG DATA - STUDY OF URBAN AND ECONOMIC PHENOMENA BY MEANS OF GEOLOCALISED DATA FROM SOCIAL NETWORKS

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ABSTRACT

The **Urban and Territorial Planning in the Coastal Space** research group has developed a web application that allows obtaining, downloading and filtering geolocalised data from social networks useful for identifying urban and economic phenomena. In addition, it has developed techniques and methods that make it possible to use data from these sources to inform decision-making processes in the city, thus incorporating valuable information that citizens have shared first-hand and making it possible to identify their needs and preferences. This invention overcomes the drawbacks of currently available information by providing data on the following issues:

- *Urban economic activity*: supply and demand of economic activities in the urban environment.
- *Citizen preferences*: preferred and used spaces and activities.
- *Citizen opinion*: assessment of economic and urban activities.
- *Presence*: spatial-temporal analysis (places and timings) of citizen presence.

The group is looking for companies or public/private entities interested in using this innovative tool in their analyses and urban or economic projects that will facilitate their decision-making.



INTRODUCTION

Up to now, public administrations or any other type of entity that needs to know the characteristics of a certain urban phenomenon

such as the supply and demand of economic activity, the presence of people in different urban spaces in a certain time slot, the opinion and preferences of citizens, are fundamentally faced with the following problem: official sources are not up to date because the field work necessary to obtain the data requires large investments of time and money. For this reason, decision-making is not usually based on real citizen opinion, habits and preferences and, therefore, the probability of error in strategic decisions will be much greater without this information.

Nowadays, social networks have become a constant source of geolocated data from millions of citizens, fully updated data that can be used to increase knowledge about urban dynamics. In this way, the decisions made by companies or entities will be much more accurate as they will be based on the real and current behaviour of citizens.

TECHNICAL DESCRIPTION

It is a web application called SMUA (*Social Media Urban Analysis*) designed to collect specific data and metadata, which will become part of an ad-hoc database for further analysis and visualisation through an application programming interface (API) (see Figure 1).

The screenshot displays the SMUA web application interface. At the top, there is a navigation bar with 'Area' selected. The main content area is divided into two columns. The left column contains a form with the following sections: 'Active' (set to 'On'), 'Country' (with a dropdown menu), 'City' (with a dropdown menu), 'Name' (with a dropdown menu), 'Description' (with a text area), 'Type' (set to 'Collect'), 'Twitter streaming' (checkbox), 'Scheduled tasks' (with a plus icon), and a list of tasks for Twitter, Foursquare, Google Places, and Instagram, each with a 'Run now' button. The right column features a map of the area, a 'Delete' button, and a 'Coordinates: Latitude, Longitude' section with a list of coordinates. A 'Save' button is located at the bottom right of the form.

Figure 1: SMUA Application Programming Interface (API) view

This technology focuses on those social networks that offer information on economic and urban activities in the city and, at the same time, their data is geolocated, i.e. it allows the exact location of these activities to be known. Of all the social networks currently in existence, Google Places, Foursquare and Twitter are used as the basis for the analysis, complemented by other specific networks such as Instagram, Airbnb, Idealista, Strava and Wikiloc. The reason for this selection is that information can be extracted from them about people's activities in the city and, at the same time, it allows the exact location of these activities to be known.

In terms of the technique and methods used, the filtering and analysis of data from these social networks will allow:

- **Diagnose urban problems**

The data allows for the identification of the distribution of economic activities according to sectors, preferred urban spaces and/or the spatial-temporal presence of citizens in the city. All of this with the aim of implementing urban policies or actions.

- **Monitoring urban dynamics**

The evolution of the above data over time makes it possible to understand urban and citizen behaviour in terms of specific actions or policies.

- **Establish intervention and urban regeneration strategies**

Identify actions or interventions with greater potential for generating urban activity.

- **Facilitate public participation in urban processes**

Identify citizens' opinions about the city in a non-invasive way.

TECHNOLOGY ADVANTAGES AND INNOVATIVE ASPECTS

MAIN ADVANTAGES OF THE TECHNOLOGY

The main advantages of this technology are the following:

- The data will be completely anonymous.
- This data provides geolocalised information: complete, accurate and up-to-date.
- The information is adapted to the needs of the entity or company.

- It allows agile, flexible and reliable decision-making.
- Allows monitoring of urban problems and/or policies.
- Optimisation of the information to save time and cost in the analysis.
- Creation of detailed reports.
- Adaptation of graphics for web environments.

INNOVATIVE ASPECTS

The present technology systematises the collection of specific data from a series of social networks, relying on filtering and analysis methods that generate a series of products that do not exist on the market, as follows:

1) Economic activities

The identification of the supply of different economic activities, both in terms of their location and the sector or category to which they belong, as well as the citizen demand for these economic activities. Among other aspects: What is the supply and demand for economic and urban activities in a city, including by sector? (*see figure 2*), what is the concentration of certain activities, both in urban axes and in different clusters, what discontinuities in commercial activity are identified, and what is the best location for a certain business?

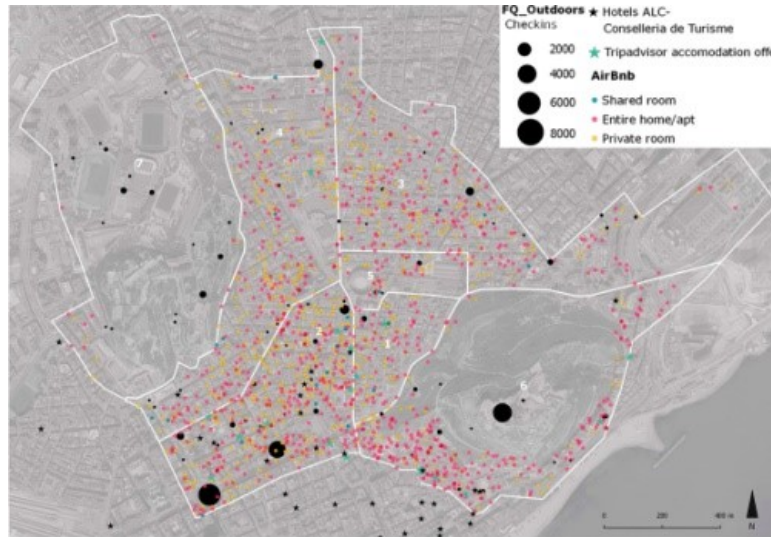


Figure 2: View of the supply of hotels and other tourist accommodation in the city of Alicante

2) Presence

The identification of the spatio-temporal presence of citizens according to their concentration in urban areas by time slots and days of the week. Thus, we identify where people are at night, during the day, during the week, during the weekend, which places and commercial activities are most frequented, or which urban public spaces are most frequented.

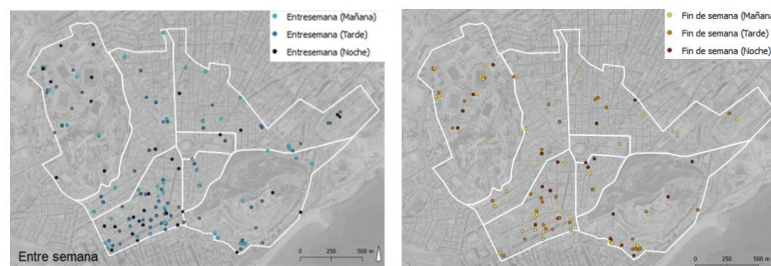


Figure 3: View of the distribution in days and hours of tweets sent in Alicante

3) Preference

Citizens' preferences for particular urban settings in both public and private spaces allow for the identification of What urban spaces and activities do citizens prefer? or What activities do they carry out in preferred urban spaces?

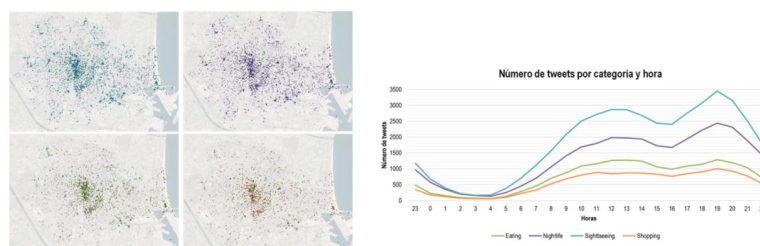


Figure 4: Presence by activity and time in the city of Valencia

4) Opinions

The opinions that citizens express, through the networks, allow us to know their positions on different urban areas or on certain issues on which opinions are exchanged: What do citizens think about urban spaces and economic activities in the city? or What do citizens think about a certain urban policy or specific issue?

All these analyses make it possible to carry out urban planning diagnoses and proposals for intervention in the city, taking into account the urban reality both from the point of view of economic supply and from the point of view of citizens' preferences in the city.

CURRENT STATE OF DEVELOPMENT

The SMUA application has been **operational and working since 2016** and its results have already been validated in several projects developed throughout the world. This is the case of a project in Guadalupe (Mexico), in which citizen presence was identified to reactivate the use of public space in the city; the analysis of the different characteristics of urban activity in structuring roads in Birmingham (United Kingdom); or the identification of third places, as spaces with potential for social relations, in residential neighbourhoods in Gothenburg (Sweden). Other examples in the Valencian Community are: the recognition of green infrastructure in the city of Valencia; the proposals for urban planning intervention based on the diagnosis of social networks in Petrer; or the work carried out for the EDUSI Las Cigarreras project in Alicante, which identified priority itineraries for intervention and reactivation of the area based on the study of different types of activity and citizen presence.

It is therefore a fully validated technology available to companies, organisations and public administrations.

MARKET APPLICATIONS

The main sectors of application would be **public administrations**, especially at local level, **companies in the commercial, advertising or tourism sector**, or any other type of entity that needs to know in depth the behaviour of citizens or the current economic supply and demand in a specific urban space.

COLLABORATION SOUGHT

The research group is looking for companies or public/private entities interested in using this innovative tool in their analysis and urban or economic projects that will facilitate their decision making.

INTELLECTUAL PROPERTY RIGHTS

This technology is protected under the **know-how** of the research group, while the software has been developed and registered by the IT team that is part of the research group.

The SMUA application is the result of several research projects developed by the group among which we can highlight: "Representación e Interpretación de dinámicas urbanas a través de los datos geolocalizados de redes sociales y servicios web " funded by the University of Alicante (2016-18), "Las ciudades de la Comunidad Valenciana a través de datos geolocalizados de redes sociales y servicios Web" funded by the Generalitat Valenciana (2017-19) and the projects currently under development "Metodologías interdisciplinarias para el estudio de la ciudad a partir de las redes sociales geolocalizadas" funded by the University of Alicante and "Espacios públicos urbanos en transformación: diagnóstico y estrategias de resiliencia urbana a partir de las redes sociales geolocalizadas" funded by the Generalitat Valenciana.

MARKET APPLICATION (5)

Economic Studies
Social Studies
Computer Science, Language and Communication
Regional Planning
Transport and Automotive