Resumen de Tesis Doctoral

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(Mínimo 1 y màximo 4, podéis verlos en
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Resumen de la tesis de 4000 caracteres máximo (si se superan los 4000 se cortará automáticamente)

Most of the world's population now resides in urban areas, and it is expected that almost all of the planet's growth will be concentrated in them for the next 30 years, making the improvement of the quality of life in the cities one of the big challenges of this century. To that end, it is crucial to have information on how people use the spaces in the city, and allows urban planning to successfully respond to their needs.

This dissertation proposes using data shared voluntarily by the millions of users that make up social network's communities as a valuable tool for the study of the complexity of the city, because of its capacity of providing an unprecedented volume of urban information, with geographic, temporal, semantic and multimedia components.

However, the volume and variety of data raises important challenges regarding its retrieval, manipulation, analysis and representation, requiring the adoption of the best practices in data science, using a multi-faceted approach in the field of urban studies with a strong emphasis in the reproducibility of the developed methodologies.

This research focuses in the case of study of the city of Barcelona, using the public data collected from Panoramio, Flickr, Twitter and Instagram. After a literature review, the methods to access the different services are discussed, along with their available data and limitations. Next, the retrieved data is analyzed at different spatial and temporal scales.

The first approximation to data focuses on the origins of users who took geotagged pictures of Barcelona, geocoding the hometowns that appear in their Flickr public profiles, allowing the identification of the regions, countries and cities with the largest influx of visitors, and relating the results with multiple indicators at a global scale.

The next scale of analysis discusses the city as a whole, developing methodologies for the representation of the spatial distribution of the collected locations, avoiding the artifacts produced by overplotting. To this end, locations are aggregated in regular tessellations, whose size is determined empirically from their spatial distribution. Two spatial statistics techniques (Moran's I and Getis-Ord's G*) are used to visualize the local spatial autocorrelation of the areas with exceptionally high or low densities, under a statistical significance framework. Finally, the kernel density estimation is introduced as a non-parametric alternative.

The third level of detail follows the official administrative division of Barcelona in 73 neighborhoods and 12 districts, which obeys to historical, morphological and functional criteria. Micromaps are introduced as a representation technique capable of providing a geographical context to commonly used statistical graphics, along with a methodology to produce these micromaps automatically. This technique is compared to annotated scatterplots to relate picture intensity with different urban indicators at a neighborhood scale.

The hypothesis of spatial homogeneity is abandoned at the most detailed scale, focusing the analysis on the street network. Two techniques to assign events to road segments in the street graph are presented (direct by shortest distance or by proxy through the postal addresses), as well as the generalization of the kernel density estimation from the Euclidean space to a network topology.

Beyond the spatial domain, the interactions of three temporal cycles are further analyzed using the timestamps available in the picture metadata: daytime/nighttime (daily cycle), work/leisure (weekly cycle) and seasonal (yearly cycle).

Lugar	Barcelona, Spain	Fecha	February 18, 2019

Firma