

Chapter 8

Mobile Phone Network Data: New Sources for Urban Studies?

Fabio Manfredini

Politecnico di Milano, Italy

Paola Pucci

Politecnico di Milano, Italy

Paolo Tagliolato

Politecnico di Milano, Italy

ABSTRACT

The chapter presents some applications of mobile phone network data analysis to urban studies. At the beginning, through examples on mobility, temporary population, and scale, the reasons are discussed for why urban analysis traditional data sources no longer appear to be adequate to describe contemporary city dynamics. Afterwards, mobile phone network data is introduced as a potential new source for urban studies, providing evidences and arguments on issues such as large events monitoring, the need of integration of mobile phone traffic data with statistical data and temporary population definition and analysis. Because of its spatial and temporal resolution, mobile phone data represent an interesting and unique source of information on urban uses variability over time. Telephone traffic can become a valid alternative/complement to traditional methods, being it able to resolve both traditional survey's limitations of latency (cellular network information can be easily retrieved in real time) and pervasivity (huge diffusion of cell-phones) at once.

INTRODUCTION

Urban analysis data sources appear to be increasingly inadequate to describe city dynamics and time-dependent variations in intensity of urban spaces usages by temporary populations.

In sum we can refer to three issues for which data normally used in urban analysis and planning have significant limitations.

A first consideration regards the traditional sources for the analysis of daily mobility, as an information through which it is possible to interpret the daily urban practices.

DOI: 10.4018/978-1-4666-1924-1.ch008

The main sources of data, at least in Italy, are Census surveys on commuters flows, collected every 10 years. They provide a very partial picture of the mobility practices in urban areas, because they collect only flows for job and study purposes. Therefore they are unable to describe the main components of urban mobility, that significantly changed in the last 20 years because of demographic, economic and social dynamics occurred.

In fact, according to a specific Survey, made by the Lombardia Region, northern Italy, in 2002 - the Origin Destination Survey - the job-related travels represent about the 29% (excluding returning home) of the whole daily mobility practices. On the contrary, we observe more articulated forms of mobility and a widened and dense use of the territories., that hardly traditional prediction methods intercept. Analyzing mobile practices in contemporary cities requires an integration between traditional data, through which it is possible to describe the job-related travels with new surveys and new sources of information aimed at identifying the complex daily mobile practices. Individual travel behaviors indeed point out a more articulated chain of daily mobility. The multi-directional mobility grows and describes an increasingly complex network of relationships (Pucci, 2008). In other words daily urban mobility describes an increasing number of places that "have a meaning" for an individual in the territories. All these places are the result of daily life and job transformations and of technological and social innovations (increasing possibilities of transportation and telecommunications) occurred in recent years. In order to analyze these new mobility practices, it becomes therefore necessary to look for new data sources, able to integrate the traditional methods of mobility surveys and to identify the variation of urban practices.

The second issue refers to the definition of the geographical scale, the most relevant to analyze urban transformations. If the micro scale allows detailed surveys on replacement and transformation processes of urban fabrics as well on urban practices, the wider urban scale – named urban

region - is the scale at which most of the urban and socio-economical phenomena are visible. Urban growth patterns, settlements and activities distribution, demographics and economics dynamics, can be fully understood and interpreted at a macro scale, which is not recognizable on the administrative boundaries.

The re-scaling of data sources requires more flexible data and tools able to intercept urban phenomena in their correct spatial dimension. It clashes with the mode of traditional data collection, because, urban and regional data are normally available at the level of different statistical subdivisions which correspond to municipal and administrative ambits and not to the geographic dimension of processes and urban transformations.

Thirdly, the temporal dimension is virtually absent from traditional surveys and investigations, despite being one of the most significant components of contemporary cities. Time-related changes in the city can be described through the concept of "temporary populations". The urban population cannot longer be regarded as a collection of residents tied to moving within the boundaries of the city.

Urban populations in the city should be described from new mixed forms of daily, residential, and travel mobility (Flamm, Kaufmann 2006). New populations are therefore defined as "communities of practices" (Amin, Thrift 2002), not belonging to the traditional categories (daily commuters, city users, business man, tourists, but also long-distance commuting, multiple residences). These populations use spaces, transports and communications modes in relationship not only to their real availability, but also in reference to their personal projects, to their preferences and their abilities (access, skills as researching information, ability to adapt to short term changes, cognitive appropriation). Therefore, the temporal dimension of city uses becomes more articulated and complex, as a result of a variety of practices, that goes beyond the traditional sources and traditional analytical tools, usually available for geographers and urban planners.

12 more pages are available in the full version of this document, which may be purchased using the "Add to Cart" button on the publisher's webpage:

www.igi-global.com/chapter/mobile-phone-network-data/69052

Related Content

Explaining the Geography of Infant Health

Andrew Curtis and Michael Leitner (2006). *Geographic Information Systems and Public Health: Eliminating Perinatal Disparity* (pp. 1-20).

www.irma-international.org/chapter/explaining-geography-infant-health/18849

Location Patterns of Section 8 Housing in Jefferson County, Kentucky

Wei Song and Karl Keeling (2010). *International Journal of Applied Geospatial Research* (pp. 1-18).

www.irma-international.org/article/location-patterns-section-housing-jefferson/42127

Bacterial Source Tracking of Nonpoint Source Pollution Using GIS and DNA Fingerprinting Technologies

M. E. Folkoff, E. A. Venso, D. W. Harris, M. F. Frana and M. S. Scott (2003). *Geographic Information Systems and Health Applications* (pp. 208-223).

www.irma-international.org/chapter/bacterial-source-tracking-nonpoint-source/18843

Algorithms for 3D Map Segment Registration

Hao Men and Kishore Pochiraju (2013). *Geographic Information Systems: Concepts, Methodologies, Tools, and Applications* (pp. 502-528).

www.irma-international.org/chapter/algorithms-map-segment-registration/70459

Indicators of Land Degradation Vulnerability Due to Anthropogenic Factors: Tools for an Efficient Planning

V. Imbrenda, M. D'Emilio, M. Lanfredi, M. Ragosta and T. Simoniello (2013). *Geographic Information Analysis for Sustainable Development and Economic Planning: New Technologies* (pp. 87-101).

www.irma-international.org/chapter/indicators-land-degradation-vulnerability-due/69050