How does mobility shape territories? Evidences from the Metropolitan Area of Lyon (1975-2011)

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Abstract

The paper aims to analyse how the mobility can shape the territories. It takes part in the Mob Access project focused on the mobility and accessibility interactions in the French Metropolitan area of Lyon. We use the graph analysis and geovisualisation methods to model spatial interactions, based on disaggregated mobility data over the six last national censuses (1975, 1982, 1990, 1999, 2006 and 2011).

Keywords

Home/work mobility, Territorial vulnerability, Graph analysis, Geovisualisation, Metropolitan area of Lyon.

Introduction

The development of transport and mobility, especially by car, made the relocation of households and companies in suburban areas easier because of the affordable land price and the positive environment in terms of amenities and agglomeration economies.

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This improvement of accessibility contributed to a functional specialization but also to car dependency. Longer distance trips encouraged the use of individual motorized vehicle. This process led to an extension of the functional perimeter of metropolitan areas, more and more multi-polar and interdependent.
The mobility - that delimits the territory beyond its administrative borders - could be affected by upward trends regarding transport costs and accessibility, which may weaken dependent populations and companies, and hence increase their economic and social vulnerability (Bouzouina *et al.*, 2014; Nicolas *et al.*, 2012).

Mobility/accessibility observation …

In a context of financial, environmental and energy constraints, a new paradigm, that questions the transport and car oriented development, has emerged. Interactions between mobility and accessibility become the main issue to analyse territories. The observation and analysis of these interactions, at urban and regional scales, are the keys to understand and manage the metropolitan growth dynamics and forms, and to anticipate possible futures within a planning and sustainable development framework.
This paper takes part in the Mob Access project, gathers researchers from multiple fields and stakeholders of the metropolitan area of Lyon, in order to analysethe possibilities for collecting, managing and visualizing data flows, mobility behaviours, interactions between mobility and territories and their consequences in terms of job access.

… to question institutional perimeters …

Focusing on home-work mobility in a large time-scale (from 1975 to 2011), the MobAccess project aims to analyse the

evolution of everyday life spaces within the perimeter of the metropolitan area.
This kind of approach is not new (Bonnet, Touahir, 2013), but the originality of the project lies in the use of specific visualisation methods (spatial and non-spatial graphs, computer tools ...) to question the institutional perimeters (for example the areas determined by the INSEE or the metropolitan area of Lyon, France).

… with space-time visualisation and graph theory

The analysis and visualisation of this evolution should show if the changes of institutional perimeters answer to the dynamics of the functional areas.
Graphs are a powerful method for modelling, which optimizes and visualizes huge and complex data and their interactions. The analysis by graphs (Riedy *et al.*, 2013, Lemmouchi *et al.*, 2013; Tahraoui *et al.*, 2013) and the spatio-temporal visualization help to study interdependent territories and their potential vulnerability in order to facilitate the process of decision-making.
One of the project's goals is to develop and maintain a web platform that gathers data, proposes decision-making tools and performs analysis within a dynamic and interactive framework. This platform must be available for researchers, stakeholders and students: they will query the databases and use dynamic and interactive spatio-temporal tools (use of web mapping, amongst other things) but it will also be possible for them to put data in databases. For example, local stakeholders could add some contextual data that will be used ultimately by learning algorithms to generate hypothesis about impacts of public policies and their possible interactions.

Conclusion

One of the project's issues is to facilitate the communication between researchers and local stakeholders by visualising complex phenomena in a way that are understandable by both communities. Co-development is also an issue of the project. Co-develop decision-making tools appear to be an efficient way to propagate the tools amongst the stakeholders and researchers and make their use sustainable. We think that contextual data are absolutely necessary to explain the evolution of institutional and functional perimeters. The joint use of "local" knowledge and modelling tools also appears to be necessary to understand and eventually predict the effects of public policies.

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