Chapter 49
Spatial Modeling and Geovisualization of Rental Prices for Real Estate portals

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ABSTRACT

From a geoinformation science perspective real estate portals apply non-spatial methods to analyse and visualise rental price data. Their approach shows considerable shortcomings. Portal operators neglect real estate agents' mantra that exactly three things are important in real estates: location, location and location (Stroisch, 2010). Although real estate portals retacord the spatial reference of their listed apartments, geocoded address data is used insufficiently for analyses and visualisation, and in many cases the data is just used to "pin" map the listings. To date geoinformation science, spatial statistics and geovisualization play a minor role for real estate portals in analysing and visualising their housing data. This contribution discusses the analytical and geovisual status quo of real estate portals and addresses the most serious deficits of the employed non-spatial methods. Alternative analysing approaches from geostatistics, machine learning and geovisualization demonstrate potentials to optimise real estate portals´ analysing and visualisation capacities.

DOI: 10.4018/978-1-7998-2460-2.ch049

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INTRODUCTION

Numerous real estate portals apply hedonic regressions to model real estate prices in general and rental prices in particular. Regression results are used as a basis to create suboptimal rental price maps without showing the real spatial price distribution. In fact portal operators ignore Tobler´s famous first law of geography: "Everything is related to everything, but near things are more related than distant things" (Tobler, 1970). For more than a decade portal operators collect rental price data and use it to offer analytical products, e.g. real estate reports, rental price indices and rental price maps. Spatial analysis and geovisualization techniques are hardly used in the development of those products. A frequently used workflow consists of calculating prices by means of descriptive statistics or hedonic regression and mapping the results on not suitable geometric boundaries.

This article starts giving an overview of the analytical and geovisual state of the art of real estate portals. Next suitable alternatives to optimize modeling and visualization of rental prices, coming from the fields of machine learning, geostatistics and grid mapping, are identified through an in depth literature review and by examining the results of conducted expert interviews. The third section refers to the implementation and validation of identified methods, focusing on finding the most suitable model parameters, to achieve the best performance for estimating rental prices. A description on how the best performing price estimation results can be applied as basis to create a prototype of a web-based rental price map is given. Finally, a conclusion, summarizing the major results of the presented research and an outlook is presented.

STATE OF THE ART OF ANALYZING AND MAPPING RENTAL PRICES

To determine how real estate portals analyse and map rental prices, 32 real estate portals were examined by 14 criteria by applying statistical and visualization methods. In addition to this examination, and according to a designed standardized questionnaire, five 45 minutes interviews with renowned German real estate agents and real estate portal experts were conducted. The analysis examined the 32 largest real estate portals by unique web access (Alexa, 2013). Real estate portals have replaced newspapers as the go-to medium to search for rental property. Just to demonstrate the dimensions, the Germany portal Immobilienscout24 constantly stores 1.5 million rental properties in its database (Immobilienscout 24, 2012). The fact that all these offers are geocoded makes them a great, but so far insufficient used source for spatial real estate analysis and visualization.

Summarizing the results of the portal examination, it can be stated that the most real estate portals offer real estate market indices for clients as banks, investors and public authorities. Those indices neglect the location of real estates and are built by means of the non-spatial statistical method of simple descriptive statistics (mean, median) or by applying hedonic regressions. A common procedure is to map descriptive statistics- or hedonic regression results onto non-appropriate reference geometries, e.g. on ZIP code areas or on city district levels. Trulia.com for example maps the median rental price by ZIP code (cf. Figure 1). The resulting rental price maps show a distorted distribution of rental prices in space, which does not correspond to the real distribution of price in space.

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