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Mapping of real estate prices using data mining techniques

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Abstract

The paper describes an innovative software that is used for real estate evaluation and mapping and analyzing of real estate advertisements published on the internet in the Czech Republic. The software systematically collects, analyzes and assesses data about the changes in the real estate market. For each half year, the software assembles over 650,000 price quotations concerning sale or rental of apartments, houses, business properties and building lots. All real estate advertisements are continuously stored in a software database and are thoroughly analyzed for their credibility.

There have been numerous articles concerning real estate market analysis in both mass media and scholarly publications. Unfortunately, not all presented information is objective and unbiased. Many cases by “independent specialists” have stated information with no verified research. We have witnessed manipulation of information by lobbies (such as banks offering mortgage agents, real estate companies and agents, building companies, developers, majority owners, etc.). The author of this paper offers objective and unbiased evaluation of price development in real estate market. The author brings forward information based on extensive research and large amounts of statistical data which has been collected continuously from year 2007 until today.

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1. Introduction

Real estate properties are attractive option for safe investment especially for a common person. The direction of changes of the future economy is hard to predict because of international economic direction. Also real estate is investment which does not decline in value rapidly. However, the latest recession shows that real estate prices cannot keep rising all the time. Many risks are connected to real estate management and facility management. These risks

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need to be constantly monitored and managed. The potential buyer, has to evaluate real estate property very critically, and consider it in long-term. They should decide whether real estate is an investment for them or which is too risky. The potential buyer cannot rely only on the information published in the media because the media does not often publish negative information about real estate market development. Such information, though true, is not often communicated.

2. Literature review

At this moment, there are only two institutions in the Czech Republic, and the author's work [14], which focuses on real estate changes in long-term and does so in a systematic manner. These are Institute for Regional Information, Ltd. and the Association of Realtors in the Czech Republic (ARK CR). The first institution collects advertisements of real estate property for sale and perform comparative analysis of real estate price development. However, it collects advertisements manually, which only allows for a limited scope of data retrieval. Statistical processing of such data volume is only sufficient for basic and aggregated analyses, and also causes distortion of results that can be obtained. The second institution prepared, in cooperation with Gekon Company and web server www.reality.cz, the price map of real estate market. This price map is in the terms of graphic design nicely design. The weakness of this project is that it has a very limited scope of presented information. The both institutions researches only specific areas, a very limited scope of real estate categories, and a small number of factors that determine real estate's market prices.

Many studies analyze real estate prices, especially at the international level. The study presented in reference [1], analyzes the long-run integration relationship between equity and real estate prices in 30 developed and emerging economies divided into four subpanels according to income levels and financial market structure. Reference paper [2] describes method of creation of real property database to determine capitalization rate of real estate. The article in reference [3] discusses approaches and options for identification of disequilibrium asset prices movements and referenced paper [4] presents a method of applying the ensembles of genetic fuzzy systems to build reliable predictive models from a data stream of real estate transactions. Also studies is the reference number [5] which presents a model that includes a database storing hedonic characteristics and coefficients affecting the real estate price level, and uses information from recently sold projects. The results show that fuzzy neural network prediction model has strong function approximation ability and is suitable for real estate price prediction.

The issue of real estate database creation is also solved by the team of researchers from Universidad de los Andes, Colombia [6]. The research team created unique database of residential real estate prices in Caracas containing 17,526 transactions. The statistical results of the database are used for testing the changes in housing prices in the case of occurrence of risks such as land invasions and expropriations. The research team examines the microeconomic determinants of residential real estate prices (the number of parking spaces, the age of the property, the incidence of crime, the average income in the neighborhood, etc.) that significantly affect the prices.

Additional papers are summarized in the next few paragraphs. They all had some influence on the overall design of the software being present in this paper.

The paper “Analyzing Massive Data Sets: An Adaptive Fuzzy Neural Approach for Prediction, with a Real Estate Illustration” [7] describes the data mining methods of real sales data from the assessment office in a large US city. The results are used for predicting the value of residential real estate based on past comparable sales transactions. The paper introduces an approach for improving predictions using an adaptive, neuro-fuzzy inference model.

Sensitivity analysis in building performance simulation for summer comfort assessment of apartments from the real estate market [8] presents the utilization of the database that contains 21,902 units of flats in real estate market of Santiago de Chile that is used for introducing improvements in terms of summer thermal conditions according to the specific requirements of the apartment typologies. Based on the database results, it was found that the best performance in terms of summer comfort can be obtained from the combination of diverse parameters that would be significant in respect to the reduction of overheating, such as solar protection and night ventilation.

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