

Guest Editorial Preface

New Approaches in Spatial Information in Real Estate Markets and Environmental Planning

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The research articles included in the second issue of volume 8 of the International Journal of Agricultural and Environmental Information Systems, mainly cover five application domains of spatial information: Environmental modeling, Spatial Decision Support System, Big Data, Geovisualization and Spatial Statistics.

In a lot of cases, users perceive a decrease of the utility of shared resources (services, goods, infrastructures, etc.) because the load exceeds its capacity. The paper “Social cooperation in Autonomous Agents to Avoid the Tragedy of the commons” by Akarsh, Kishor, Niyogi, Milani and Mengonanalyses deals with the problem of Tragedy of Commons (TOC) in terms of reduction of society sustainability, due to the reduction of the capacity of shared-resource, considering different types of agent’s behaviours. It is a typical case where the behaviour of actors, based on short term actions, produces quick profits and long term losses. Many areas of interest to society, like climate change, fisheries management, preservation of rainforests, exhibit this phenomenon. The paper is focused on understanding what is the degree of sacrifice that an agent can make so that the sustainability of the society can be extended. To this aim a mathematical model, with three algorithms, of the TOC dilemma has been developed. The first algorithm considers that agents are only interested in their individual gains, and the society survives for the least amount of time.

The second algorithm supposes that agents make decisions based on resource availability, individual gains or combination of both. The agent’s behaviour takes into account society welfare to some extent; consequently, the society survives for a longer period of time compared to that in the previous case.

The third algorithm includes a measure of social awareness of agents, defining a sort of degree of sacrifice the agent is willing to make. In this case the society performs considerably better than in the second case.

The paper analyses the relationship between the agent’s sacrifice and the increase in sustainability of society.

The paper “Nitrate, Total Ammonia, and Total Suspended Sediments modeling for the Mobile River Watershed” by Alarcon and Sassenrath presents a hydrological and water quality model for Mobile River watershed, located in northwestern Alabama and northeastern Mississippi, USA.

Hydrological modeling has been performed using the Hydrological Simulation Program Fortran (HSPF) in order to simulate also nitrogenous constituents, and sediment processes. The model

simulated Nitrate (NO₃), Total Ammonia (TAM), and Total Suspended Sediments (TSS) in the period 1970-1995 with a daily temporal frequency.

Results show that the highest reductions of NO₃ (up to 14.06%) and TAM (8.01%) concentrations is due to the implementation of “stream bank stabilization and “fencing” management practice to agricultural lands in sub-watersheds.

Our everyday life is more and more conditioned by connected technologies, big data and the paradigm of Internet of Things. In this context, modern cars, characterized by a growing percentage of electronic components and sensor devices, potentially are becoming a new kind of mobile and any time accessible sensors. In this context “Extended Floating Car Data” (XFCD) is a rich geocoded dataset for vehicle, traffic, and environment data, augmenting more traditional geospatial databases.

The paper “Processing and visualizing floating car data for human-centered traffic and environment applications: a transdisciplinary approach” by Voland and Asche analyses an approach to collect and use floating car data for traffic and environment-related applications, combining sensor parameters with spatial and temporal components. These data concern the concept of XFCD as geo-information and need to be made available and applicable to spatio-temporal visualization.

The paper “Understanding the role of Urban Morphology and Green Areas Configuration during heat waves” by Stanganelli and Gerundo analyses how Spatial Information can support urban planning strategies to climate change adaptation. More specifically temperature increase during summer produces heat waves that could be opposed modifying the organization of green areas within the city, improving natural cooling. The reorganization of green areas distribution has been developed analysing, in GIS environment, statistical correlation of urban density, temperature and green areas indicators. The main aim is to define guidelines for planning strategies to climate change adaptation through natural cooling in the metropolitan area of Naples.

The paper “Hedonic Analysis of Housing Sales Prices with Semiparametric Methods” by Del Giudice, Manganelli and De Paola, implements a hedonic price function based on penalized splines smoothing to a real estate market, comparing the obtained results with a conventional parametric model. The proposed model shows the relationship between selling housing price and explanatory variables by the combination of a generalized additive model which expresses the relationship between the non-linear response and the explanatory variables and a linear mixed effects expressing the spatial correlation of observed values.

The case study on the innovative semiparametric approach is applied to a real estate segment market, while usually in the international literature, parametric approaches are mostly employed. The study aim is to determine the marginal prices for housing properties.

The obtained results suggest that semiparametric models can be successfully used for the prediction of residential property selling prices and for determination of marginal prices.

The paper “Spatial modeling and geovisualization of rental prices for real estate portals” by Scherthanner, Asche, Gonschorek and Scheele discusses innovative approaches for a visual analysis of real estate rental price, that uses the Random Forest in punctually predicting “machine trained” observation points as input when a Kriging model misses input points. The authors demonstrated that the presented spatial analysis methods are more efficient than the conventional approaches to rental price determination and visualisation.

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