Special feature section on spatial analysis and modeling

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Published online: 13 June 2019

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This is the first of two special feature sections on spatial analysis and modeling. In September 2018, the International Conference on Spatial Analysis and Modeling was held in the University of Tokyo to promote and share studies in this field. The detailed program of this 2-day event is available at <https://sam2018.wixsite.com/home>. Some of the papers presented at this conference were submitted for publication in this special feature section, in addition to some other submissions. All manuscripts were subjected to the customary review process of the journal.

A majority of socioeconomic phenomena are closely related to the geographic location and context where they occur. This underscores the need to analyze spatial processes, spatial dependence and spatial heterogeneity associated with these phenomena by means of spatially explicit models. Our understanding of urban and regional systems is uniquely enhanced by spatial analysis and modeling.

In this special feature of the Asia–Pacific Journal of Regional Science, we collected papers on a range of cutting-edge issues of spatial analysis and modeling of relevance to urban and regional science in both theoretical developments of models and empirical applications. From the theoretical point of view, spatial models have to be general enough to be applicable to a number of spatial phenomena and spatial contexts, but at the same time, the models should be flexible enough to be implemented to specific problems. From the empirical point of view, the application of spatial models should shed light on meaningful actual phenomena and their underlying processes. Economic and social issues in Asia–Pacific regions have become increasingly compelling, complex, prominent and pressing, and yet, spatial models that can be brought to bear on enhancing our understanding of these issues and on enhancing our ability to effectively alleviate them remain in their developing stage.

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The articles included in this special feature section contribute toward the development of spatial analysis and modeling in the Asia–Pacific region and the promotion of the spatially explicit modeling perspective in urban and regional science.

In spatial analysis, one of basic issues is to delimit the boundary of areas with a certain feature. Geographical data are abundant, but typically spatial unit of the data are predetermined, which sometimes hinders the delineation of the precise spatial boundaries of the concept under consideration. Afrose et al. (2019) attack this issue utilizing a kernel density estimation (KDE) approach. KDE is a method to derive surface of densities or intensity of a phenomenon based on a set of point data of known longitude and latitude coordinates, which is independent of administrative partitioning. Using commercial and community land-use data, these authors succeed in delimiting the boundaries of urban cores in Dhaka, Bangladesh, and uncover the characteristics of these cores. The KDE approach is now a common method for deriving the spatial densities of certain indicators. Their study shows that one extension of this approach is to delimit the boundaries of areas.

When we build spatial models, one key concept is distance. Typically, land-use models hypothesize that distance is an important factor of cost or travel impedance between places, which differentiates land use, due to the fact that transportation costs are different among land uses. In particular, the existence of distance factor together with increasing returns to scale typically yields a concentration of industries. This effect is called the home market effect. Zhou (2019) analyzes a general equilibrium model that features the home market effect and land use for production. The paper shows the equivalence between being high in land rent and larger share of firms theoretically. It also demonstrates that welfare in the larger region is higher and that both regions may benefit from trade liberalization.

Spatial features and properties are often the root cause of advantages and disadvantages of business conditions. Xu and Murray (2019) analyze an interesting business activity in this regard. They focus on the price gauging behavior of gasoline stations. After exploring the significant determinants of local gasoline retail price differentials and the roles they play in the retail market, they detect and seek to explain the underlying factors behind unusual pricing behavior, utilizing several spatial analysis tools.

One typical and famous concern in spatial analysis is that how spatial units are defined may influence the analytical results. Thus, if data of finer granularity are available, it is often deemed better to use them instead of coarser units to reduce bias and avoid the so-called problem of ecological fallacy. This is why micro-level geodata are highly prized in urban and regional science and geospatial big data constitute a major breakthrough in evidence-based research on urban and regional environments. Akiyama and Akiyama (2019) demonstrate this new phenomenon very effectively. In focusing on the spatial distribution of isolated dwellings (residents of which are in physically isolated settlements), they show that there is no significant relationship between isolated dwellings and aging rate according to municipality-level aggregated data, but that the aging rate of isolated dwellings is higher than that of non-isolated dwellings according to fully disaggregated data.

One promising area of application of spatial analysis is the identification of appropriate location for a certain activity. Sahani (2019) analyzes this type of

problem. In particular, the paper tries to identify ecotourism sites in the Great Himalayan National Park Conservation Area in India. A typical situation in this kind of setting is that there are a number of criteria in evaluating the sites, but no established order of importance or weights exist a priori. The paper adopts the analytical hierarchy process (AHP) to determine the weights of various criteria and presents a complete case study based on this analytical decision-making modeling tool.

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