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Foreword

Urban planning and governance innovation have been topics of the latest annual conferences conducted by Urban Planning Society of China (UPSC), which best represented the spirit of UPSC in terms of transformation of urban planning system in China from conventional professional planning and design to highly complex, multidisciplinary policy processes. In China, demand-oriented approach in planning could not reveal the true direction of urbanization and fails to respond to the economic challenges. We should adopt a solution-oriented approach to urban diseases after the rapid urbanization process. Many Chinese planners and decision makers now argued that a better understanding of what happens to Chinese cities is vital to planning and design for existing cities and new towns. To say simply that a reasonable data analysis should be enhanced to conventional process of urban planning and design, comprehensive evaluation of alternative plans based on urban simulation should be conducted for decision making and regular diagnosis of status quo for city development should be made prior to any revision of statutory plans. Hence, geospatial analysis and simulation techniques become very hot topics within the field of urban planning in China recently.

Accordingly, data source for analysis, simulation, and diagnosis become important for planners to handle the new challenges posed by the solution-oriented approach. While some planners are not familiar with data analysis techniques for finding planning solutions, they have difficulties in learning data-driven approach with their professional experiences. Big data collected from sensors of Internet of Things (IoT) is a great solution for planners to find data sources. Even though statistical analysis using survey data is very popular in the field of urban planning, planners failed to obtain survey data due to the shortage of open data in China. The reasons are complicated, such as data copyright and other administrative barriers. As we all know, data analysis is the first step of the planning process for current situation analysis, and an indicator system is very powerful as planning evaluation tool for making a final decision on alternative plans. Thus, the role of data-driven approach is the same as that of the conventional planning process. Hence, it is expected that big data could bring more effective analysis than conventional survey data in order to improve quality of planning and design.

In China, smart city construction is growing rapidly under the implementation of the scheme for promotion of smart city in China. For example, in mobile devices installed with social network system (SNS), GPS function can be used as data source of big data; other data sources such as traffic card, cellphones, and so on are very often to be seen nowadays in Chinese cities. Most of chapters in this book are related to mobile devices and human mobility. There are many kinds of big data that can be possibly used in the planning field, such as SNS, Points of Interest (POI), Taxi GPS tracking, and cellular signal for urban structure analysis from views of human mobility. In addition, real time big data collected from smart infrastructure, such as transportation monitoring system, environment monitoring system, and security system can be stored in database and developed as Cyber infrastructure that is a cloud-based urban management platform for urban management, as presented in this book.

There is a big demand for big data analysis in China. In the field of planning, many our colleagues, particularly young generation, are eager to handle big data for urban planning and design, including those in planning research institutes, faculties, and students in universities. It is very exciting that symposiums and conferences were organized for sharing planning experience on big data application for new approaches of urban planning in the recent years. In 2014, we hosted the first symposium of smart city and big data application in UPSC Annual Conference in Haikou city, and after that many events and forums were organized on this topic. We also invited Prof. Zhenjiang SHEN from Japan and others to give lectures on the topic. As promoted by our Society, more planners and researchers in China have shown strong interests in big data application, and best practices and case studies have been published in journals and books.

Thanks to many researchers and planners in China who have contributed to this book; it is my great honor to present this first book introducing Chinese case studies of big data application in planning. I sincerely hope that the audience will enjoy reading this book and take it as a reference for understanding big data analytics. This publication, which shares experiences on smart city and big data application, will of immense use to friends and colleagues who concern with China.

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Foreword

It is the first book to introduce case studies of big data application for planning practices in China. This book, consisting 22 chapters, elaborates diverse planning support efforts on big data analysis in many Chinese cities, which primarily introduced how geospatial analysis using big data could be conducted and how big data will help planners and decision makers for understanding what are happening in their cities.

Using big data for spatiotemporal analysis of human mobility is a new challenge for easing the urban diseases caused by rapid urbanization in China. The Chinese Society for Urban Studies has newly launched the Urban Big Data Commission on 15 November 2016. Most of the contributors in this book are members of this community. I am happy to see that all authors explore the new potential of urban-rural planning and management using data-driven approaches from practical perspectives in this book, which is a multidisciplinary cooperation related to smart city construction in China. As mentioned above, a collection of up-to-date case studies using big data has been presented, and contributors draw a picture of the current research status of big data application in urban China.

The applications of geospatial analysis using big data in this book are described as several essential aspects of elaborating urban structure: social network system and human behaviors, POI mapping and urban space recognition, mobile device data, and urban form reflecting human activities, all these works are related to visualizing conflicts between land use and transportation in China. Authors of this book proved that big data collected from mobile devices and social network are useful for analyzing human mobility, obtaining urban space recognition, and exploring spatiotemporal urban structure. Exploring urban structure after the rapid urbanization process in China is concerned with possible solutions of urban diseases in Chinese cities. The case studies in this book will explain how big data changes the perception of planners and researchers in their practices.

Under the rapid development of information and communication technology, the emergence of big data available from various IoT sensors has presented significant opportunities for urban management. While reading these contributions in this book, we are witnessing a dramatic change of our data environment with smart

infrastructure construction. IoT sensors for collecting mobile device data and system platform that uses real-time traffic monitoring data are opening a new era for urban management. I expect there would be more and more new big data sources from smart city construction, hereby promoting urban studies to a new stage.

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Foreword

Rapid urbanization has not only modernized the Chinese lifestyle, but has also led to significant challenges, including, increased energy consumption, pollution and traffic congestion, to name a few.

With the development of information-sensing technologies and large-scale computing infrastructures that have generated huge amounts of urban spatial big data of mobility, environmental quality, and energy consumption, the relationship between these issues have become more easily identifiable. This identification creates a call for smarter, more environmentally conscious urban planning decisions.

One possible answer to the problems facing a rapidly urbanized China is the "smart city concept." This approach, relying on the huge volume of data being absorbed by countless inconspicuous sensors spread across the subject city, provides hints on the direction that should be taken by modern urban planners. The implementation of the smart city concept is predicated on the ubiquity of smart technologies, namely, cellphones and other portable devices comprising the Internet of Things (IoT). These technologies augment the volume, velocity, and variety of the information that is accessible to those tasked with urban planning. In other words, there is an inverse relationship between the size of technologies and the quality and quantity of information that can be gathered. Chips are capable of gathering data on environmental quality, urban mobility, and energy consumption, thereby informing future research into the human lifestyle patterns.

It behooves us to not only recognize the usefulness of big data, but to manipulate it to our greater end in urban planning: the creation of a healthy, highly developed, and highly integrated ecosystem. This book attempts to take a multidisciplinary approach to explore new perspectives on urban planning and management through the use of case studies. In most of the case studies included in this book, big data is applied to investigate more thoroughly urban phenomena.

I wish for this book to be a platform upon which researchers might share their thoughts on computational and data-driven techniques as they relate to urban planning and design in future China. I would urge the reader to make use of the accounts held within its pages to enter the conversation on the applications and limitations of big data in China's push towards smart and sustainable urbanization.

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Acknowledgment

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Jay Lee is a professor in the Department of Geography at Kent State University. His interests include relating geographic events and patterns through time and space. This includes quantitatively modeling changing geographic events as diffusing spatial processes. This may be applied to many aspects of our daily life: land use, air pollution, crime, public health, and how all these interact with the environment. Some of his publications and research grants have involved digital elevation models, environmental conservation, GIS, web-based GIS, urban growth, urban sprawl, management of urban growth, and areal health disparities. His recent work includes developing an urban growth simulator, an environmental pollution simulator, and an urban crime simulator. Currently, his team is developing a simulator that uses agent-based models to simulate how neighborhoods develop disparities in public health.

Dong Li is deputy director of the newly formed Innovation Center of Technology at Beijing Tsinghua Tongheng Urban Planning and Design Institute. He received his doctoral degree in ecology at the Research Center for Eco-Environmental Sciences, Chinese Academy of Sciences, and has spent more than 7 years as a senior engineer in the China Academy of Urban Planning and Design. His researches focused on planning projects of environment, infrastructure, and disaster prevention on urban

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