

《道路网多尺度选取表达：问题，方法与应用（英文版）》

书籍信息

版次：1

页数：

字数：

印刷时间：2016年01月01日

开本：16开

纸张：胶版纸

包装：平装

是否套装：

国际标准书号ISBN：9787568012584

内容简介

空间数据多尺度表达已被广泛地应用于电子地图导航与定位、空间数据挖掘与分析。如何快速地表达与更新多尺度空间数据，仍是现有应用中的核心瓶颈问题。

道路网数据不仅是地图上最重要的地理要素之一，而且是地图导航与定位所需的空间数据。本书全面、系统地探讨了道路网数据多尺度选取表达的关键研究问题、核心方法及其典型应用，并通过一系列的实验，比较、分析了各种方法的优劣。

本书可供地图制图学与地理信息工程、地理学与地理信息系统专业的本科生，测绘科学与技术、地理学专业的研究生，以及测绘相关专业的研究人员与工程技术人员阅读参考。

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前言

Spatial data can be represented at different scales, which leads to the issue of multiscale spatial representation. Multiscale spatial representation may involve applications such as navigation, understanding and analysis of spatial data, and it has also been widely applied into web mapping and smallformat mobile devices. However, there still are some limitations of current applications. How to transform spatial data from one scale into that at any arbitrary scale in a smooth way? How to update existing spatial data at multiple scales in a short time? An ideal solution is to automatically transform the spatial representation at the largest scale to that at any smaller scale. This automated transformation is rather complex because on the one hand, different geographical features (e.g. roads, buildings and rivers) may be transformed differently; on the other hand, a transformation of each geographical feature may involve a series of operations such as collapsing, selective omission, simplification, smoothing and displacement. This book pays attention to selective omission in a road network. Because road network, consisting of a set of roads, is one type of the most important geographical features on a map, and the selective omission, meaning to retain more important roads, may be the most essential operator for transforming a road network. This book will systematically discuss the issues, approaches and applications for selective omission in a road network.

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each geographical feature may involve a series of operations such as collapsing, selective omission, simplification, smoothing and displacement. This book pays attention to selective omission in a road network. Because road network, consisting of a set of roads, is one type of the most important geographical features on a map, and the selective omission, meaning to retain more important roads, may be the most essential operator for transforming a road network. This book will systematically discuss the issues, approaches and applications for selective omission in a road network. First, this book discusses three essential issues on selective omission in a road network. That is, how to recognize roads in a road network; how to determine the importance of individual roads in a road network; and how to determine the parameters of an existing selective omission approach (Chapter 2). In terms of the first issue, a number of strategies to recognize roads in a network are compared in order to investigate which strategy performs the best; In terms of the second issue, several measures to determine the importance of individual roads in a network are compared in order to investigate which measure results in the best performance of selective omission; In terms of the third issue, an approach to determining an appropriate threshold for various parameters of existing selective omission approaches is validated (Chapter 3). Second, various approaches to selective omission in a road network are investigated. Not only typical general approaches (i.e. the strokebased approach, the meshbased approach, the combined strokesh approach and the approach in a commercial software, ArcGIS), but also a number of machine learning approaches (i.e. decision trees, support vector machine, Naive Bayes, Knearest neighbor, multilayer perception and binary logistic regression) are evaluated and compared from two aspects, i.e. quantitative analysis and visual inspection (Chapter 4). Third, two typical applications for selective omission in a road network (Chapter 5), i.e. continuous multiscale representation of a road network and road network updating, are reported. To be specific, an approach to constructing road network hierarchies is applied for continuous multiscale representation of a road network; the use of machine learning approach is applied for road network updating. Although this book mainly discussed selective omission in a road network, various strategies and approaches may also be applied into automated multiscale representation of other geographical features such as buildings, rivers, railways, contours and pip networks. Some of discussed approaches may also be available to other operators such as simplification, smoothing and displacement. However, multiscale representation of various geographical features is still a rather complex problem and further developments are needed.

Selective Omission in a Road Network for MultiScale Representation: Issues, Approaches and Applications

Acknowledgements

I would like to first express my deepest gratitude to my Ph.D. supervisor, Prof. Zhilin Li in the Hong Kong Polytechnic University. He introduced me to the problems of cartographic generalization, guided me how to do research scientifically, and gave me many good ideas and insights during my Ph.D. studies. Without his continuous support and help, I would not be able to complete the book. His rigorous academic attitude impresses me, which always urge me to do my best. He is not only a good researcher, but also a good teacher. I would like to thank him once again. I would also like to thank my parents, Nanlin Zhou, Hanmei Chen, and my wife Bowen Xie. They always supported and encouraged me every time I felt confused during writing this book. I deeply appreciate them for their continuous encouragement and understandings. Special thanks are also given to all the academic and general

staffs in Department of Land Surveying and Geoinformatics, the Hong Kong Polytechnic University and Faculty of Information Engineering, China University of Geosciences (Wuhan) for supporting my studies and work. I was indebted to the Research Grant Council (RGC) of Hong Kong Special Administrative Region, the National Natural Science Foundation of China, the China Postdoctoral Science Foundation, and the Fundamental Research Funds for the Central Universities, China University of Geosciences (Wuhan) for supporting my research grants. Especially, this book is published under the support of the National Natural Science Foundation of China and the Fundamental Research Funds for the Central Universities, China University of Geosciences (Wuhan). I am also thankful to the Lands Department of Hong Kong (the Hong Kong Special Administrative Region of the People ' s Republic of China) and the Land Information of New Zealand for providing the experimental data. This book is derived in part from articles published by Taylor and Francis in International Journal of Geographical Information Science on 03/01/2012, 03/01/2012 and 22/9/2015, and the articles published by Maney in The Cartographical Journal on 01/11/2013 and 03/25/2014, and also the article published by Springer Berlin Heidelberg in the 25th International Cartographic Conference on 09/04/2011, available online:

<http://www.tandfonline.com/10.1080/13658816.2011.609990>;
<http://www.tandfonline.com/10.1080/13658816.2011.616861>;
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<http://www.maneyonline.com/doi/full/10.1179/1743277413Y.0000000042>;
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