Preface

This special issue is devoted to the study of urban transportation and facility location. In urban areas, demand for people to move between different geographical locations occurs for a variety of reasons. Because of this spatial and geometrical nature, the study of urban transportation and facility location decisions has rich research topics that attract a broad audience who share common interests in the study of science on form.

The aim of this issue is to present several new models and methods which take analytical and quantitative approaches to the study of transportation and location problems. Both continuous and discrete modeling approaches are included; the former takes an urban area as a continuous plane and assumes that the characteristics of the city can be represented by continuous functions, while the latter recognizes the presence of a transportation network over which movement of people is restricted. Both approaches are complementary to each other.

This issue is composed of eight papers. The first paper presents a simple geometric model of rapid transit system which provides a direct access to a particular destination such as an airport located outside the city area. Two problems concerning the optimal location of the terminal station are considered: minimization of the average access time and maximization of the number of users accessible to the airport within a given time. The second paper incorporates the temporal dimension in facility location problem and considers both location and opening hours of a single facility so that the number of people accessible to the service is maximized. These two papers employ the continuous approach which provides a framework for geometrical modeling of urban spatial structure. The third paper explores the dynamics of spatial distribution of commercial activities in cities. The paper describes how the introduction of the high speed transit system promotes the development of larger cities over smaller ones. The fourth paper focuses on growth of transportation network over time. Using reduced travel time as an evolution criterion, the paper examines road and rail transportation networks to determine the differences in growth patterns that are caused by various factors, including network speed, urban population distribution, and network shape. These papers describe the way in which the non-uniform growth of transportation systems impacts the accessibility and resultant uneven development of cities and transportation systems. The fifth paper presents a method to divide a connected network into a given number of sub-networks whose total edge length are equal. The optimization techniques employed here are interesting and useful in the analysis of the shape of the network. The sixth paper explores the theoretical properties of proximity graphs that are considered to be idealized models of transportation networks and describes several characteristics of the network. The seventh paper focuses on two regular point patterns: square and diamond lattices and derives theoretically the probability density functions of the kth nearest rectilinear distance. The paper applies these results to evaluate configurations of facilities. These papers describe how point patterns such as facilities, transfer points of a network affect the level of urban service provided. The eighth paper presents a method to extract a skeleton of a road network from an actual road network and applies the method using actual road network data. This method has various practical applications when analyzing network data using computers.

We hope models and methods presented here will be helpful to people working not only in this area but also other areas and this issue is of interest to all who are concerned with the study of science on form.

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