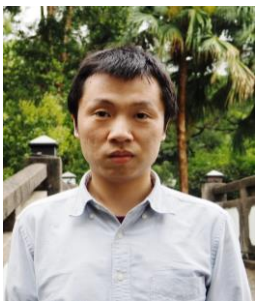
报告



城市增长中的标度律

Scaling laws of urban growth

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讲者介绍 Biography

Yu Zhou is a research assistant professor at the Institute of Future Cities and Stanley Ho Big Data Decision Analytics Research Centre at CUHK. He has been carrying out research on complex systems and data analysis, especially scaling laws in complex systems and (multi-)fractal analysis with their applications. His research problems in theory usually stem from real-life data analysis, especially analysis of geographical data. He has applied relevant theories and methods to solve the practical problems, e.g., quantifying and modeling scaling laws, detecting dependence and trends, and characterizing the geographical processes with respect to fractal and multifractal properties. He is currently contributing his knowledge and experience of theoretical and applied research of complex systems to study of scaling laws in urban systems.

报告摘要 Abstract

Despite its complexity, urban growth usually follows two simple empirical laws, namely Zipf's law and Gibrat's law. Study of these two empirical laws involves the variation of city rank, definition of cities, and perspective urban growth. In contrast to Gibrat's law, a turbulent micro dynamics of urban growth under the macro stableness of Zipf's law has been uncovered by a recent rank-clock study. Employing the city clustering algorithm, cities are manifested as human agglomerations, and behaviors of the statistics on the growth rate of cities deviate from Gibrat's law. Though using demographic data has long been a tradition in the analysis of urban growth, many non-demographic dynamics are also essential signature worthy of investigation. Capitalizing on the power of remote sensing and the ability of the city clustering algorithm (CCA) to agglomerate urban areas, we utilize the nighttime light (NTL) clusters formed by CCA as a composite proxy to unravel the scaling behaviors of urban growth in China and the US against the two laws. Here we show that the NTL results are generally similar to those of the population-based analyses. However, cities with NTL larger than the critical size and above the crossover point simultaneously follow Zipf's law and Gibrat's law; and information extracted from the statistics related to Gibrat's law is actually consistent with that related to changes in rank. Furthermore, the comparison between results reveals differences in their stages of urban development in China and the US.