Geospatial co-location pattern mining for understanding spatiotemporal associations in smart cities: from global to regional, from static to mobile

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Geospatial co-location pattern (GeoCLP) mining aims to reveal the valuable spatiotemporal associations underlying different types of geographic phenomena and human activities (e.g., drunk driving and public order offenses usually co-occur around bars after bar-closing time). The problem is challenging because ignoring the characteristics (e.g., autocorrelation, heterogeneity, scale dependence and spatial dynamics) of geospatial data could lead to incorrect decisions when provided to domain scientists. This presentation will introduce our novel definitions and statistical interpretations of GeoCLPs at global and regional spatial scales as well as in static and mobile geographic contexts. Then, I will present our systematic solutions that fully consider multiple characteristics of geospatial data in GeoCLP mining models to alleviate major methodological issues in the past research. Finally, the applicability of our models will be demonstrated using a series of smart-city applications, e.g., detecting mismatching regions of taxi demand and supply, uncovering spatial associations between diseases and risk factors, and revealing the spatial segregation among different social groups experienced in their daily mobility.

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Dr. Jiannan Cai is an RGC postdoctoral fellow at the Institute of Space and Earth Information Science, CUHK. His research focuses on developing new geospatial data science approaches to uncover interesting spatiotemporal patterns hidden in geospatial big data and facilitate the understanding of complex associations between human activities and urban environment. He is currently supported by an RGC Postdoctoral Fellowship awarded by the Research Grants Council of Hong Kong. He has published more than fifteen papers in flagship international GIS journals, e.g., International Journal of Geographical Information Science, Computers, Environment and Urban Systems, Geographical Analysis, and Transactions in GIS.

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