LSGI Distinguished Lecture Series

Spatial Point Data Decomposition

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Venue : Z503

Abstract

In a point data set, a group of points with similar high density can be seen as a pattern or cluster. However, the identification of the clusters is tricky because point data are usually the mixture of clusters of different densities and shapes. To solve this problem, we proposed the idea of spatial point process decomposition. First, a point data set is assumed to be the overlay of an unknown number of homogeneous point processes. Then, the points are converted into a mixture density function via Kth nearest distance transformation. Next, optimization methods (such as EM or MCMC) are used to decompose the mixture density function into different distinct density functions of homogeneous point process. Finally, the clusters are spatially separated using the density connectivity mechanism, which was proposed in DBSCAN. The idea is similar to that of "Fourier transform" theory, where a given point set is seen as a function while each homogeneous point process is seen as a "basic function" of the function space.

Biography

Pei Tao is the professor of Institute of Geographical Sciences of Natural Resources Research, Chinese Academy of Science, and the vice director of State Key Laboratory of Resources and Environmental Information System. His interests include spatial data mining, human behavior analysis and geostatistics. He received his BS, MS and PhD from China University of Geosciences. He has ever been a visiting professor of Senseable City Lab, MIT (09/2012-03/2013) and the department of mathematics, Imperial College London (02/2007-08/2007). He has published more than 100 papers in GIScience. He was awarded as the "Distinguished Young Scholar" by the National Science Fund of China in 2015.

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