University of California, Irvine
Statistics Seminar

Detection of Local Differences in Spatial Characteristics between Two Spatiotemporal Random Fields

Bo Li
Professor of Statistics
University of Illinois, Urbana-Champaign

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Join via Zoom: https://uci.zoom.us/j/91370133600

Comparing the spatial characteristics of spatiotemporal random fields is often at demand. However, the comparison can be challenging due to the high-dimensional feature and dependency in the data. We develop a new multiple testing approach to detect local differences in the spatial characteristics of two spatiotemporal random fields by taking the spatial information into account. Our method adopts a two-component mixture model for location wise p-values and then derives a new false discovery rate (FDR) control, called mirror procedure, to determine the optimal rejection region. This procedure is robust to model misspecification and allows for weak dependency among hypotheses. To integrate the spatial heterogeneity, we model the mixture probability as well as study the benefit if any of allowing the alternative distribution to be spatially varying. An EM-algorithm is developed to estimate the mixture model and implement the FDR procedure. We study the FDR control and the power of our new approach both theoretically and numerically, and apply the approach to compare the mean and teleconnection pattern between two synthetic climate fields.