Speaker: Chao Zheng (University of Southampton)

Date: 29/10/2024 at 13:15 in 1 West 3.107

Title: Optimal detection of spatial anomaly regions

Abstract:
There has been a growing interest in multiple changepoints/anomaly detection problems recently, whilst their focuses are mostly on changes taking place on the time index. In this work, we investigate the anomaly-in-mean model on a multidimensional spatial lattice, that is, to detect the number and locations of anomaly spatial regions from the baseline. In addition to the usual minimisation over cost function with a penalisation related to the number of anomalies, we also introduce a new penalty on the area of minimum convex hull that covers the anomaly regions. We show that our estimation on the number and locations of anomalies are consistent, and prove that the method achieves optimal estimation error under the minimax framework. We also proposed a dynamic programming algorithm to solve the penalised cost detection problem approximately and carry out large-scale Monte Carlo simulations to examine the performance of the proposed methodology.