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Space-Time Monitoring of Count Data for Public Health Surveillance

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In this talk we discuss new Poisson CUSUM methods for space-time monitoring of geographical disease outbreaks. In particular, we develop likelihood ratio tests and change-point estimators for detecting changes in spatially distributed Poisson count data subject to linear drifts. The effectiveness of the proposed monitoring approach in detecting and identifying trend-type shifts is studied by simulation under various shift scenarios in regional counts. It is shown that designing the space-time monitoring approach specifically for linear trends can enhance the change-point estimation accuracy significantly. The applications to real-life examples of detecting outbreaks are presented for New Mexico male thyroid cancer data and COVID-19 infection data in the U.S.

Primary authors: VANLI, Arda; Dr GIROUX, Rupert (Florida Department of Transportation); Mr ALAWAD, Nour (Florida State University)

Presenters: VANLI, Arda; Mr ALAWAD, Nour (Florida State University)

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