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Bayesian Prospective Detection of Small Area Health Anomalies Using Kullback Leibler Divergence

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Abstract : Early detection of unusual health events depends on the ability to detect rapidly any substantial changes in disease, thus facilitating timely public health interventions. To assist public health practitioners to make decisions, statistical methods are adopted to assess unusual events in real time. We introduce a surveillance Kullback-Leibler (SKL) measure for timely detection of disease outbreaks for small area health data. The detection methods are compared with the surveillance conditional predictive ordinate (SCPO) within the framework of Bayesian hierarchical Poisson modeling and applied to a case study of a group of respiratory system diseases observed weekly in South Carolina counties. Properties of the proposed surveillance techniques including timeliness and detection precision are investigated using a simulation study.

Keywords : Bayesian, spatial, temporal, surveillance, prospective
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