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Title:

A geospatial approach to air pollution exposure assessment

Abstract:
In this talk I will discuss how health research has evolved in line with advancements in geospatial computing, which encompass statistical models for correlated spatiotemporal data, computational tools for big data, and technologies for location-aware surveys and monitoring. For example, in our recent study on individuals' activity-based dynamic exposure to air pollution, we demonstrated how individuals' mobility and the spatiotemporal variability of ambient air pollution affect personal exposure estimates using both real world data and simulated environmental conditions. Personal exposure to air pollution is highly dependent on one's mobility and the spatiotemporal variability of air pollutant concentrations. Therefore, when individual level exposures are estimated based solely on the person's residence or from air quality data collected from sparse monitoring networks, exposure misclassification is likely, which in turn will negatively impact the accuracy of estimates of exposure-disease associations. Specifically, there can be substantial differences between the static and dynamic approaches when air pollution concentrations show low variation over time and space and when individuals spend considerable time away from home. On the other hand, we found that time-activity-based exposure estimates can be quite similar to static estimates if spatiotemporal patterns of air pollution concentration surfaces lack autocorrelation or if an individual has a low level of mobility.