

Three Challenges Confronting Spatiotemporal Hawkes Models

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ABSTRACT

Hawkes processes are useful for modeling self-exciting phenomena such as earthquakes, wildfires, gun violence, viral outbreaks and social network activity. Unsurprisingly, the stochastic process models are the subject of intense interest within the data science community. Dr Holbrook will share big picture lessons learned applying spatiotemporal Hawkes processes to the analysis of gunfire, wildfire and Ebola virus data. In particular, three barriers stand in the way of the application of Hawkes models within meaningful 21st century science: (1) big data, (2) spatial data precision and (3) big models.

Associated publications:

1. Holbrook, Andrew J., et al. "Scalable Bayesian inference for self-excitatory stochastic processes applied to big American gunfire data." *Statistics and Computing* 31.1 (2021): 1-15.
2. Holbrook, Andrew J., Xiang Ji, and Marc A. Suchard. "Bayesian mitigation of spatial coarsening for a Hawkes model applied to gunfire, wildfire and viral contagion." *Annals of Applied Statistics* (2021), in press.
3. Holbrook, Andrew J., Xiang Ji, and Marc A. Suchard. "From viral evolution to spatial contagion: a biologically modulated Hawkes model." arXiv preprint arXiv:2103.03348 (2021).