

20th Workshop on Stochastic Geometry, Stereology and Image Analysis

2–7 June, 2019, Sandbjerg Estate, Denmark

Abstract



Benjamin Taylor

Inference Under Obfuscation of Stochastic Processes

Joint with Various Collaborators

Inference under obfuscation of stochastic processes is a common modelling challenge that is often ignored, or substantially simplified in practice (sometimes for good reason). In this talk I will discuss three projects I have worked on in which this phenomenon occurs and some thoughts about how to overcome the challenges we encountered, covering ideas in various stages of intellectual development.

The first project, joint with Hugh Sturrock, Ricardo Andrade-Pacheco and Adam Bennett (USCF) concerns the modelling of case counts of malaria at the health facility level in Zambia. Health facilities have unknown catchment areas which report irregularly and change over time. We treat the underlying data-generation process as a spatially continuous point process and seek to explicitly capture the obfuscation process through an additional model hierarchy, with inference following from a GPU-accelerated data-augmentation scheme.

The second project, joint with Ruy Ribeiro (Universidade de Lisboa), Ashwin Balagopal (Johns Hopkins) and Paula Moraga (Lancaster/Bath) concerns the modelling of the propagation of hepatitis C (HCV) infection in the liver. We have data from a grid of cells collected from patients with HCV and I will talk about our increasing understanding of the nature of these data and potential ways we can proceed with their analysis.

The third project, joint with Jorge Mateu and Jonatan Gonzalez-Monsalve (Universitat Jaume I), we consider the modelling of the locations and sizes of bubbles in a flotation chamber that have arisen as a result of a chemical metal extraction process. I will talk about some of the subtleties in analysing data from this experiment.