Seminar Notice

Statistical Laboratory
Iowa State University

DATE AND TIME: Friday, June 30 12:10 p.m.

PLACE: 319 Snedecor Hall

SPEAKER: Han Wu

TITLE: Poisson process models for a combination of points and counts in space

ABSTRACT

A spatial point process is a stochastic model determining the locations of events in some region $A \subset \Re^d$. Events may be nests in a breeding colony of birds, tress in a forest, or cities in a country. One goal of spatial statistics is to model the underlying process and thus interpret a complicated point process through some parameter estimates based on the known locations of events from some spatial point processes.

Techniques have been developed for estimating the parameters of spatial point process, given data at either the aggregate or point levels. However, it remains unclear how to model aggregate data (i.e., counts for sections) with a subset of point data (i.e., exact locations of some events). This study investigates a nonhomogeneous Poisson process on $A \subset \Re^d$ with intensity function $\{\lambda(s;\theta) : \theta \in \Theta\}$. The intensity function may depend on some spatial variable, spatial location s alone, or both. We propose a model for a mixture of an aggregate and point data to accommodate both aggregate level and point level information if possible. It turns out that the proposed model for combined data forms is useful if spatial covariates are available. The combined model appears to give better estimates of parameters in the intensity than does a model only based on aggregate (i.e., count) data. The study also shows that the more exact locations we know the more precise maximum likelihood estimates become for parameters of the underlying process. The asymptotic properties of maximum likelihood estimator of the parameters of the combined model are also studied.

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