Statistics Seminar

Department of Mathematical Sciences

DATE:	Thursday, May 02, 2019
TIME:	3:00pm – 4:30pm
LOCATION:	OR 100D
SPEAKER:	Chen Liang, Binghamton University
TITLE:	Dissertation Defense - Goodness-of-fit Tests for Spatial Cluster Point Process Models

Abstract

Spatial point processes have become powerful tools to analyze explosive amount of data harvested from various disciplines such as ecology, biology, meteorology, image processing and social sciences. There has been tremendous process made in developing parametric/nonparametric models for point processes along with efficient estimation methods in the past three decades. However, relatively little attention has been devoted to assessing the overall quality of fitted models. In this dissertation, we propose three goodness-of-fit tests for the popular class of spatial cluster point process models. The first test concerns the first order intensity function of a single spatial cluster point process while treating the second order characteristics as nuisance. The second test aims at validating the proportional structure between first intensity functions of case-control point patterns. The third test is developed to assess the goodness-of-fit of a spatial cluster point process model by testing the first and second order intensity functions simultaneously. Theoretical properties of proposed tests were investigated. Compared to existing goodness-of-fit tests for spatial point processes, the main advantage of the proposed test statistics lies in that all three test statistics have closed form asymptotic distributions. Therefore, they are theoretically sound and computationally efficient. Another advantage is that the proposed tests are extremely flexible and allow users to specify their own test functions in a large class with theoretical guarantees. Detailed algorithms are provided for pratical implementations and finite sample performances of the proposed tests are evaluated through extensive simulation studies as well as real data examples.