

MICHIGAN STATE UNIVERSITY
Department of Statistics and Probability

COLLOQUIUM

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Limit Theorems for Topological Invariants of Dynamic Multi-parameter Simplicial Complex

Tuesday, September 24, 2019

10:20 AM - 11:10 AM

Refreshments 10:00 AM

C405 Wells Hall

Abstract

Topological Data Analysis (TDA) is a growing research area that broadly refers to the analysis of high-dimensional datasets, the main goal of which is to extract robust topological information from datasets. Among many fields in TDA, this talk deals with the problems related to the time evolution of topological structure.

More specifically, we shall consider a multi-parameter simplicial complex model as a higher-dimensional generalization of the Erdos-Renyi graph. We formulate the “dynamic” version of the multi-parameter simplicial complex, where the temporal evolution of simplices of various dimensions is determined by stationary on/off processes with renewal structure. The dynamic versions of the clique complex and the Linial-Meshulam complex are included as a special case.

Our primary goal is to establish the functional central limit theorem for the Euler characteristic and the Betti number, a basic quantifier of topological complexity. The functional strong law of large numbers for these topological invariants is also proven.

This is joint work with Gennady Samorodnitsky (Cornell) and Gugan Thoppe (Duke)

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