Limit theory for statistics of random geometric structures

Joe Yukich, Lehigh University

Abstract. Questions arising in stochastic geometry and applied geometric probability are often understood in terms of the behavior of statistics of large random geometric structures. Such structures arise in diverse settings and include:

(i) Point processes of dependent points in $\mathbb{R}^d$, including determinantal, permanental, and Gibbsian point sets, as well as the zeros of Gaussian analytic functions,

(ii) Simplicial complexes in topological data analysis,

(iii) Graphs on random vertex sets in Euclidean space,

(iv) Random polytopes generated by random data.

Global features of geometric structures are often expressible as a sum of *local* contributions. In general the local contributions have short range spatial interactions but complicated long range dependence. In this survey talk we review 'stabilization' methods for establishing the limit theory for statistics of geometric structures. Stabilization provides conditions under which the behavior of a sum of local contributions is similar to that of a sum of independent identically distributed random variables.