Geometric Random Graphs

Josep Díaz (UPC Barcelona)

Title: The Expected Number of Maximal Points of the Convolution of Two 2-D Distributions

Abstract: The Maximal points in a set S are those that are not dominated by any other point in S. Such points arise in multiple application settings and are called by a variety of different names, e.g., maxima, Pareto optimums, skylines. Their ubiquity has inspired a large literature on the expected number of maxima in a set S of n points chosen IID from some distribution. Most such results assume that the underlying distribution is uniform over some spatial region and strongly use this uniformity in their analysis.

This research was initially motivated by the question of how this expected number changes if the input distribution is perturbed by random noise. More specifically, let B_p denote the uniform distribution from the 2-dimensional unit ball in the metric L_p. Let \delta B_q denote the 2-dimensional L_q-ball, of radius \delta and B_pq be the convolution of the two distributions, i.e., a point v in B_p is reported with an error chosen from \delta B_q. The question is how the expected number of maxima change as a function of \delta. Although the original motivation is for small \delta, the problem is well defined for any \delta and our analysis treats the general case.

Joint work with Mordecai Golin