21 January 2025 ·
Qeios

Peer Review

Review of: "Aspects of a Randomly Growing Cluster in ℝ^2, d≥2"

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1. Independent researcher

This nice paper considers the following iterative model in $\mathbb{R}^d$: starting with a point X_1 at the origin, the i-th point X_i first chooses its “parent neighborhood” by picking j u.a.r. in [i-1] and then adding X_i at position $X_i:=X_j+D_i$, where $D_i=(\delta_1,\ldots, \delta_d)$, and each $\delta_i \sim N(0,i^{-\alpha})$ for some $\alpha > 0$.

The authors show that the infinite point set a.s. has bounded diameter for any $\alpha > 0$ (in fact, they show exponential tails for the diameter), and they also determine (up to log factors in certain cases) the length of the minimum spanning tree of the first n points (depending on the relation between α and d).

The results are very nice, showing differences between the models $\alpha > 0$ and $\alpha=0$ (in the latter case, the diameter scales logarithmically with the number of points). I am wondering what happens if instead of looking at $i^{-\alpha}$, one takes functions tending to zero slower? For which functions tending to zero (as a function of i, if any) is the diameter still a.s. bounded? Also, is there a specific motivation for choosing $i^{-\alpha}$ for each coordinate of the variance of the normal distribution of the i-th point?

Declarations

Potential competing interests: No potential competing interests to declare.

doi.org/10.32388/80W6NN