

Connectivity Thresholds for Bounded Size Rules

- abstract -

In an *Achlioptas process*, starting with a graph that has n vertices and no edges, in each round $d \geq 1$ pairs of vertices are drawn uniformly at random, and using some rule exactly one of them is chosen and added as an edge to the evolving graph. We investigate the impact of the rule on the connectivity transition of such a process. Our main results are twofold. First, we study the prominent class of bounded size rules, which select the edge to add according to the component sizes of its vertices, treating all sizes larger than some constant equally. For such rules we provide a fine analysis that exposes the limiting distribution of the number of rounds until the graph gets connected, and we give a detailed picture of the dynamics of the formation of the single component from smaller components. Second, our results allow us to study the connectivity transition of all Achlioptas processes, in the sense that we identify a process that accelerates it as much as possible.

This result is joint work with Hafsteinn Einarsson, Johannes Lengler, Konstantinos Panagiotou and Angelika Steger.