

Multiple Orientability Thresholds for Random Hypergraphs and Applications

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Abstract

A hypergraph $H = (V, E)$ is called s -orientable, if there is an assignment of each edge e to one of its vertices v such that no vertex is assigned more than s edges. Let $H(n, m, k)$ be a hypergraph, drawn uniformly at random from the set of all k -uniform hypergraphs with n vertices and m edges. We establish the threshold for the s -orientability of $H(n, m, k)$, for all $k > 2$ and s .

We present two applications of this result. Firstly, we show how it implies sharp load thresholds for cuckoo hash tables. Secondly, we study “offline” Achlioptas random graph processes, where we show the existence of a phase transition for avoiding a giant connected component.

This is joint work with Konstantinos Panagiotou (MPI Informatics).