Super-logarithmic cliques in dense inhomogeneous random graphs

Gwen McKinley
Department of Mathematics
Massachusetts Institute of Technology

January 2, 2020

Abstract

In the theory of dense graph limits, a graphon is a symmetric measurable function W from $[0,1]^2$ to $[0,1]$. Each graphon gives rise naturally to a random graph distribution, denoted $G(n,W)$, that can be viewed as a generalization of the Erdős-Rényi random graph. Recently, Doležal, Hladký, and Máthé gave an asymptotic formula of order $\log n$ for the size of the largest clique in $G(n,W)$ when W is bounded away from 0 and 1. We show that if W is allowed to approach 1 at a finite number of points, and displays a moderate rate of growth near these points, then the clique number of $G(n,W)$ will be of order $\sqrt{n}$ almost surely. We also give a family of examples with clique number of order n^c for any $c \in (0,1)$, and some conditions under which the clique number of $G(n,W)$ will be $o(\sqrt{n})$ or $\omega(\sqrt{n})$. This talk assumes no previous knowledge of graphons.