Component Games on Random Graphs

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Abstract

We discuss the Maker-Breaker component game, played on the edge set of a sparse random graph. Given a graph G and positive integers s and b, the s-component $(1 : b)$ game is defined as follows. In every round Maker claims one free edge of G and Breaker claims b free edges. Maker wins this game if her graph contains a connected component of size at least s; otherwise, Breaker wins the game.

We show that for the Erdős–Rényi graph $\mathcal{G}(n, p)$, the maximum component size achievable by Maker undergoes a phase transition around $p = \lambda_{b+2}/n$, where λ_k is the threshold for the appearance of a non-empty k-core in $\mathcal{G}(n, \lambda/n)$. To this end, we analyze the stabilization time of the k-core process in $\mathcal{G}(n, p)$.

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