Offline thresholds for online games

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Abstract

We compare the offline versions of three Ramsey-type one-player games that have been studied in an online setting in previous work: the online Ramsey game, the balanced online Ramsey game, and the Achlioptas game. The goal in all games is to color the edges of the random graph $G_{n,m}$ (a graph drawn uniformly at random from all graphs on n vertices with exactly m edges) according to certain rules without creating a monochromatic copy of some fixed forbidden graph H. While in general the three online games have different thresholds, we prove that for most graphs H, the offline threshold for all three problems is $m_0(n) = n^{2-1/m_2(H)}$, where $m_2(H) := \max_{H' H}(e_{H'} - 1)/(v_{H'} - 2)$.