

Random graphs and its applications for networks

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Efficient sampling of random colorings

A well-known conjecture in computer science and statistical physics is that Glauber dynamics on the set of k -colorings of a graph G on n vertices with maximum degree Δ is rapidly mixing for $k \geq \Delta + 2$. In 1999, Vigoda showed rapid mixing of flip dynamics with certain flip parameters on the set of proper k -colorings for $k > (11/6)\Delta$, implying rapid mixing for Glauber dynamics. In this paper, we obtain the first improvement beyond the $(11/6)\Delta$ barrier for general graphs by showing rapid mixing for $k > (11/6 - \eta)\Delta$ for some positive constant η . The key to our proof is combining path coupling with a new kind of metric that incorporates a count of the extremal configurations of the chain. Additionally, our results extend to list coloring, a widely studied generalization of coloring. Combined, these results answer two open questions from Frieze and Vigoda's 2007 survey paper on Glauber dynamics for colorings.

(Joint work with Michelle Delcourt and Luke Postle)