

Institut für Diskrete Mathematik

Combinatorics Seminar

Friday 11th April 12:30

AE06, Steyrergasse 30

Time-Biased Random Walks and Robustness of Expanders

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We will discuss two types of controlled random walks on graphs. In the choice random walk, the controller chooses between two random neighbours at each step. Whereas, in the epsilon-biased random walk the controller instead has a small probability at each step of a free choice of neighbour. We consider the problem of finding optimal strategies for the controller minimising the expected time to hit a given vertex, or visit (cover) all vertices.

We give a potential function argument which allows us to quantify how much the controller can “boost” the probabilities of rare events using the choice/bias. We will also show how one can use this to prove upper and lower bounds on the speed-up over the simple random walk. We will also discuss our result showing that expansion in a weighted graph is robust to small local changes in edge weights, and how we can apply this to show that the cover time of an expander is $O(n)$, improving on $O(n \log n)$ for the simple random walk.

This is joint work with Agelos Georgakopoulos, John Haslegrave, Sam Olesker-Taylor and Thomas Sauerwald.

Joshua Erde, Mihyun Kang, Ronen Wdowinski