UNIVERSITÄT DORTMUND

Fachbereich Informatik
– Kolloquiumsbetreuung –

Dortmund, 16. Oktober 2007

EINLADUNG

Am Fachbereich Informatik wird

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einen Vortrag halten über

Deterministic Random Walks and their Applications to Rumor Spreading

ORT: OH-14, R.304
ZEIT: Montag, 22. Oktober 2007, 16:15 Uhr

ZUSAMMENFASSUNG:

Randomness is a major ingredient for the design of efficient algorithms. However, often not much randomness is actually needed. This talk presents two results on quasi-random models. First, we examine Jim Propp's rotor router model which is a deterministic analogue of a random walk on a graph. Instead of distributing chips randomly, each vertex serves its neighbors in a fixed order. Cooper and Spencer (Comb. Probab. Comput. 2006) showed a remarkable similarity of both models. If an (almost) arbitrary population of chips is placed on the vertices of a grid Z^d and does a simultaneous walk in the Propp model, then at all times and on each vertex, the number of chips deviates from the expected number the random walk would have gotten there, by at most a constant. This constant is independent of the starting configuration and the order in which each vertex serves its neighbors. This result raised the question if all graphs do have this property. We show that on regular trees the deviation between both models is unbounded (SODA 2008). Second, we examine how to disseminate information in networks ("randomized rumor spreading"). In the classical push model, in each round each informed node chooses a neighbor and informs it. It is known that this simple protocol succeeds in spreading a rumor from one node to all others within $O(\log n)$ rounds on a complete graph, a hypercube and sufficiently dense random graphs (RS&A 1990). We present a quasi-random analogue and prove that the above mentioned bounds

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still hold (SODA 2008). For sparsely connected random graphs this model suceeds in $O(\log n)$ steps while the classical model needs $\log^2 n$ steps. Hence, the quasi-random model achieves similar or better broadcasting times with a greatly reduced use of random bits.