Minisymposium 19 - Random Discrete Structures and Algorithms

Probabilistic analysis of game tree evaluation

RALPH NEININGER (GOETHE UNIVERSITY FRANKFURT)

In the analysis of game-searching methods a basic problem is to determine the value of the root of a minimax tree with certain given numbers at its leaves (the input). Various models for the input and related evaluation algorithms have been proposed and analyzed.
We review some of these models, in particular models with input from the set $\{0, 1\}$ and probabilistic models such as Pearl's model and the (random) incremental model. We discuss the complexity of evaluation algorithms under these models: a new tail bound for the complexity of Snir's randomized evaluation algorithm is given improving upon a Gaussian tail bound due to Karp and Zhang. Also a limit law of the root's value in Pearl's model is given leading to a conjecture on the asymptotic distribution of the complexity of α-β pruning.

The talk is based on the papers

Ali Khan, T. and R. Neininger (2004) Probabilistic analysis for randomized game tree evaluation. *Mathematics and Computer Science III (Vienna 2004)*, 163-174, Trends in Mathematics, Birkhuser, Basel.

Ali Khan, T., Devroye, L. and R. Neininger (2005) A limit law for the root value of minimax trees. *Electronic Communications in Probability* **10**, 273-281.