Bachelor or Master thesis: Strategy Iteration on the Graphics Card

November 7, 2011

Prerequisites Familarity with C++ and Java, basic concepts of mathematics and theoretical computer science.

Description The student's task is to implement several existing algorithms for solving games like parity games [VJ00, Sch08], mean-payoff games [BSV04], or simple stochastic games [Con93] based on the principle of strategy (or: policy) iteration on the graphics card using e.g. CUDA or OpenCL, and integrate these implementations into the GAVS+ tool[1]. The implementation is then to be compared to existing CPU based implementations in order to evaluate the obtained speed-up and scalability. Finally, the influence of different heuristics for choosing the strategy update is to be studied. The precise number of algorithms to implement and to evaluate depends on whether the topic is taken for a Bachelor or Master thesis.

For more details contact either Michael Luttenberger[2] or Chihhong Patrick Cheng[3].

References

[BSV04] Henrik Björklund, Sven Sandberg, and Sergei G. Vorobyov. A combinatorial strongly subexponential strategy improvement algorithm for mean payoff games. In *MFCS*, pages 673–685, 2004.

[Con93] Anne Condon. On algorithms for simple stochastic games. *Advances in Computational Complexity Theory*, 13:51–73, 1993.

[Sch08] Sven Schewe. An optimal strategy improvement algorithm for solving parity and payoff games. In *CSL*, pages 369–384, 2008.

[VJ00] Jens Vöge and Marcin Jurdzinski. A discrete strategy improvement algorithm for solving parity games. In *CAV*, pages 202–215, 2000.

[1] See `http://www6.in.tum.de/~chengch/gavs/`.

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