An Asynchronous Synchronization Strategy for Parallel Large-scale Agent-based Traffic Simulations

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A novel asynchronous conservative synchronization strategy named Mutual Appointment (MA) is proposed to address synchronization issues in parallel agent-based traffic simulations. MA removes global barriers and allows Logical Processes (LPs) to communicate individually. A lookahead heuristic is developed to increase the lookahead in agent-based traffic simulations, which takes advantage of the uncertainties in traffic simulations. The efficiency of MA strategy was investigated using the parallel agent-based traffic simulator SEMSim Traffic with real-world traffic data. The experiment results showed that the MA strategy improved the...
speed-up of the parallel simulation compared to the barrier method, and the RMA strategy further improved
the MA strategy by reducing the number of synchronization messages significantly.

Stichworte:
agent-based traffic simulation, asynchronous conservative synchronization, relaxation, RP 5, TUM
CREATE, CLUSTER B

Kongress-/Buchtitel:

Verlag/Institution:
ACM

Verlagsort:
London, UK

Jahr:
2015

Occurences:
- Einrichtungen > Fakultäten > Fakultät für Informatik > Lehrstühle der Informatik > Informatik 6 - Lehrstuhl
  für Echtzeitsysteme und Robotik (Prof. Knoll) > 2015

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