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2016

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citation for published version (APA)

Berkhout, J. (2016). *Topics in Markov Chain Theory and Simulation Optimisation*. Amsterdam Business Research Institute.

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TOPICS IN MARKOV CHAIN THEORY AND SIMULATION OPTIMISATION

This thesis covers an improvement of a general purpose simulation optimisation algorithm and the following topics from Markov chains:

- Parameter insecurity analysis of Jackson networks which allow simultaneous breakdowns and repairs of nodes.
- Existing perturbation bounds found in literature are compared and analysed. A novelty is that the relative error of these bounds is considered. A new perturbation bound is introduced that has the attractive feature that this relative error vanishes as the size of the perturbation tends to zero. Existing bounds such as the condition number bounds lack this feature in general.
- An efficient approximation method for the ergodic projector of Markov multi-chains is introduced and analysed which ensures a 'jump start' towards ergodicity using a power method alike approach, it is therefore called the jump start power method.
- The techniques from the jump start power method are further developed into an efficient approximation framework for the, in Markov chain theory fundamental, deviation matrix. The approximation is applied to community detection in social networks and statistical cluster analysis.
- A generalized ranking methodology based on Markov multi-chain structures is proposed that ensures more careful rankings of nodes in networks compared to the acclaimed Google PageRank.

JOOST BERKHOUT

Joost Berkhout (1990) obtained his BSc and MSc (Cum Laude) degrees in the field of Econometrics and Operations Research at the Vrije Universiteit Amsterdam (in 2011 and 2012, resp.). In 2012 he joined the Amsterdam Business Research Institute (ABRI) Junior Research Programme which allowed him to enter the three-year ABRI PhD program in 2013. During his PhD Joost was awarded with the Student Best Paper Award at the International Workshop on Discrete Event Systems (WODES) 2016 in Xi'an (China). In September 2016 Joost started as a post-doctoral researcher at the Centrum Wiskunde & Informatica (CWI).



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