Case Studies for a Markov Chain Approach to Analyze Agent-Based Models

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Abstract. Agent-Based Models have become a widely used tool in social sciences, health care management and other disciplines to describe complex systems from a bottom-up perspective. Some reasons for that are the easy understanding of Agent-Based Models, the high flexibility and the possibility to describe heterogeneous structures. Nevertheless problems occur when it comes to analyzing Agent-Based Models. This paper shows how to describe Agent-Based Models in a macroscopic way as Markov Chains, using the random map representation. The focus is on the implementation of this method for chosen examples of a Random Walk and Opinion Dynamic Models. It is also shown how to use Markov Chain tools to analyze these models. Our case studies imply that this method can be a powerful tool when it comes to analyzing Agent-Based Models although some further research in practice is still necessary.

Keywords: Agent-Based Model, Markov Chain, Random Map Representation