# Advances in Probabilistic Model Checking

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**Abstract.** Random phenomena occur in many applications: security, communication protocols, distributed algorithms, and performance and dependability analysis, to mention a few. In the last two decades, efficient model-checking algorithms and tools have been developed to support the automated verification of models that incorporate randomness. Popular models are Markov decision processes and (continuous-time) Markov chains. Recent advances such as compositional abstraction-refinement and counterexample generation have significantly improved the applicability of these techniques. First promising steps have been made to cover more powerful models, real-time linear specifications, and parametric model checking. In this tutorial I will describe the state of the art, and will detail some of the major recent advancements in probabilistic model checking.