

Effective Analysis of Infinite-state Stochastic Processes and Games

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Probability is an important tool for the design, analysis, and modelling of modern software and hardware systems. With the help of just a few randomly generated bits, randomized algorithms can efficiently solve problems that are not solvable by deterministic algorithms. In performance analysis, probability allows to estimate the average system behaviour such as throughput or expected waiting time. Probability is also used to model unreliable or uncertain behaviour where the unpredictable events are assigned an empirically evaluated probability.

The underlying mathematical model of probabilistic systems are usually Markov chains or Markov decision processes, depending on whether the system's behaviour is fully probabilistic or influenced by a choice. In some cases, it is even desirable to distinguish between a choice made by a *controller* who wants to achieve a certain goal, and a choice made by an *environment* which, in the worst case, aims at avoiding the goal. This leads to a more general model of stochastic games, where the controller and environment correspond to *players* with antagonistic winning objectives.

References

1. <http://www.fi.muni.cz/usr/kucera/publications.html>