

DD2552 - Seminars on Theoretical Computer Science, Programming Languages and Formal Methods, Seminar 8

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Last Seminar and Today

Last seminar:

- comparison of numerical and statistical methods
- statistical checking of unbounded untils

Today:

- more tradeoffs
- nondeterminism

Probabilistic vs. non-probabilistic model checking

Non-probabilistic:

- explicit counterexamples for property violations

Numerical probabilistic:

- yes/no answer or probability for properties

Statistical probabilistic:

- yes/no answer or probability, and traces

Limits of probability and Markov chains

- all Markov chain transitions governed by probabilities
- crucial to get *measure space*
- real-world systems may not have explicit probabilities
- can “guess” probabilities, or set 1 or 0

- possibilism
- a way to view the world
- a way to avoid making choices “beforehand”
- leaving implementors with more design options

Markov Decision Processes (MDPs)

- interleaving of nondeterministic and probabilistic transitions
- local vs. global
- “natural” model for concurrent probabilistic systems

Different ways to specify MDPs

- explicit set of independent Markov processes