

# Weak Bisimulation is Sound and Complete for PCTL\*

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## **Abstract.**

We investigate weak bisimulation of probabilistic systems in the presence of non-determinism, i.e. labelled concurrent Markov chains (LCMC) with silent transitions. We identify capacities as the mathematical structures to model the intuition that when we deal with nondeterminism we must work with estimates on the possible probabilities.

1. We identify an axiomatization of “image finiteness” for countable state systems and present a new definition of weak bisimulation for these LCMCs. We prove that our definition coincides with that of Philippou, Lee and Sokolsky for finite state systems.
2. We study a minor variant of the probabilistic logic pCTL\*—the variation arises from an extra path formula to address action labels. We show that bisimulation is sound and complete for this variant of pCTL\*.

*Joint work with Desharnais, Gupta and Panangaden.*