

On the Metric-based Approximate Minimization of Markov Chains

by **Giovanni Bacci**.

Joint work with Giorgio Bacci, Kim G. Larsen and Radu Mardare.

Abstract

In this talk, we present recent work addressing the behavioral metric-based approximate minimization problem of Markov Chains (MCs), i.e., given a finite MC and a positive integer k , we are interested in finding a k -state MC of minimal distance to the original. By considering as metric the bisimilarity distance proposed by Desharnais, Gupta, Jagadeesan, and Panangaden, we show that optimal approximations always exist; show that the problem can be solved as a bilinear program; and prove that its threshold problem is in PSPACE and NP-hard. Finally, we present an approach inspired by expectation maximization techniques that provides suboptimal solutions.