Extension of some MAP results to transient MAPs and Markovian binary trees

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Abstract

In this work we extend previous results on moment-based characterization and minimal representation of stationary Markovian arrival processes (MAPs) and rational arrival processes (RAPs) to transient Markovian arrival processes (TMAPs) and Markovian binary trees (MBTs).

We show that the number of moments that characterize a TMAP of size n with full rank marginal is n^2+2n-1, and an MBT of size n with full rank marginal is n^3+2n-1. We provide a non-Markovian representation for both processes based on these moments.

Next, we discuss the minimal representation of TMAPs and MBTs. In both cases, the minimal representation, which is not necessarily Markovian, can be found using different adaptations of the STAIRCASE algorithm presented in an earlier work.

Finally, we heuristically investigate possible Markovian canonical representations for TMAPs and MBTs of order 2.