

On the assessment of Reliability, Availability and Maintainability of Complex HW/SW systems using a Bayesian Analyzer

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HW/SW systems are present in many fields of human activity. Estimating the reliability, availability and maintainability (RAM) of complex HW/SW systems is becoming increasingly important, specially for safety critical systems. Although there are several software packages available to support reasonably complex RAM analyses, they have several limitations, being possibly the most important one, the fact that they provide little support to Bayesian analysis. With this drawback in mind, we are developing BayRAM to support Bayesian RAM analysis of complex HW/SW systems, based on three key ideas:

- Description of complex systems, in terms of series and parallel RBDs with pending blocks (HW or SW), and forecasting their reliabilities.
- Software block reliability modeling is based on model selection over mixtures of Software Reliability Growth models.
- Hardware block RAM modeling is based on Continuous Time Markov Chains, with some ON states and some OFF states and the use of phase-type distributions.

The package includes a graphical interface to describe the system, input data routines, some exploratory data analysis routines, prior specification modules, and modules to undertake inference and prediction tasks. We illustrate the basic features of BayRAM, with an exhaustive analysis of a schematic version of our university resource planner.