

Relaxed Maximum a Posteriori Fault Identification

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- [fault_det.pdf](#)
- [Matlab files](#) (requires [CVX](#) to run)

We consider the problem of estimating a pattern of faults, represented as a binary vector, from a set of measurements. The measurements can be noise corrupted real values, or quantized versions of noise corrupted signals, including even 1-bit (sign) measurements. Maximum a posteriori probability (MAP) estimation of the fault pattern leads to a difficult combinatorial optimization problem, so we propose a variation in which an approximate maximum a posteriori probability estimate is found instead, by solving a convex relaxation of the original problem, followed by rounding and simple local optimization. Our method is extremely efficient, and scales to very large problems, involving thousands (or more) possible faults and measurements. Using synthetic examples, we show that the method performs extremely well, both in identifying the true fault pattern, and in identifying an ambiguity group, i.e., a set of alternate fault patterns that explain the observed measurements almost as well as our estimate.