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DRAFT: ESTIMATING RELIABILITY BOUNDS ON INDUSTRIAL PLANTS

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ABSTRACT
Reliability analysis is particularly relevant for industrial plants where plant failures can lead to large financial losses. Existing reliability analysis approaches mostly rely on heavyweight simulations that are computationally expensive and require extensive modeling effort. On the other hand, there is an industrial need for quickly evaluating plant reliability for assessing the current state as-is and to quickly evaluate how plant modifications affect reliability. Such quick evaluations are particularly relevant for developing new services. In this paper, we extend and apply the reliability bound approach using linear programming to address this need. The reliability bound approach is based on a system model in the form of a graph, an event vector, and estimates for component reliabilities. Based on this model, lower and upper reliability bounds are calculated by solving a linear programming problem. The advantage of this approach is the ubiquity of solvers for linear programming. Furthermore, the approach is guaranteed to produce the narrowest bound with respect to the reliability data. We demonstrate the applicability of the approach to real-world problems by analyzing the reliability of an industrial plant. Future work consists in validating the results from the reliability bound approach with simulation-based approaches and to extend the approach to system attributes such as buffers and multiple failure states.