Reasoning about The Disruption Patterns for Train System Using Bayesian Network and Prolog

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Abstract. We construct a Prolog-based expert system to reason about the disruption patterns for train system using Bayesian network and Prolog. The disruptions dependencies are modeled using Bayesian network and the reasoning is carried on using Prolog. We choose Bayesian network because it is one of the most efficient and and elegant framework to represent and reason using probabilistic model.The causative relationship among disruptions is represented through Directed Acyclic Graph (DAG). We use Prolog to improve efficiency of the reasoning process by defining Bayesian network and its probabilistic information into a knowledge base. The causative relationship among disruptions are also modeled in terms of Prolog rules. Our Prolog-based expert system combines the statistical reasoning using Bayesian network and logic programming efficiency. The system provides comprehensive reasoning regarding the causative probability of events, the causative relationship among disruptions, as well as the most triggering and triggered disruptions in train system.