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Titel des Beitrags: Framework for Post-Earthquake Risk Assessment and Decision Making for Infrastructure Systems

Abstract: The Bayesian network (BN) and influence diagram (ID) are used to develop a framework for post-earthquake risk assessment and decision making for infrastructure systems. The BN is used to model the earthquake hazard and component and system performance, and to update these models probabilistically in light of information gained from ground motion or structural health-monitoring sensors, or from observation of system or component states. The BN is extended by addition of decision and utility nodes to construct an ID, which is used for post-earthquake decision making regarding the type of inspection to perform or for setting the operational levels of components. A value-of-information heuristic is proposed to determine the optimal temporal sequence of component inspections. The methodology is demonstrated by its application to a hypothetical model of a segment of the proposed California high-speed rail system. Although the focus in this paper is on the earthquake hazard, the methodology can be used for infrastructure risk assessment and decision making for many other kinds of hazards. The main contribution of the paper lies in the integration of BN and ID models for the hazard and the infrastructure system and its components in a logical framework that allows rapid decision making to mitigate infrastructure losses after a major hazard.

Stichworte:
Bayesian network, Decision making, Earthquakes, Hazard, Influence diagram, Infrastructure, Risk analysis, Systems

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