Bayesian probabilistic network approach for managing earthquake risks of cities

This paper considers the application of Bayesian probabilistic networks (BPNs) to large-scale risk based decision making in regard to earthquake risks. A recently developed risk management framework is outlined which utilises Bayesian probabilistic modelling, generic indicator based risk models and geographical information systems. The proposed framework comprises several modules: A module on the probabilistic description of potential future earthquake shaking intensity, a module on the probabilistic assessment of spatial variability of soil liquefaction, a module on damage assessment of buildings and a fourth module on the consequences of an earthquake. Each of these modules is integrated into a BPN. Special attention is given to aggregated risk, i.e. the risk contribution from assets at multiple locations in a city subjected to the same earthquake. The application of the methodology is illustrated on an example considering a portfolio of reinforced concrete structures in a city located close to the western part of the North Anatolian Fault in Turkey.

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