

Real-time decision optimization in the face of slowly evolving natural hazard events

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Decision makers are sometimes required to make decisions in the face of slowly evolving natural hazard events. Examples of this are the decisions for continuation/shut-down of operation of technical facilities such as offshore platform or chemical processing system, or evacuation of people in affected areas, in the face of an approaching typhoon (see Figure 1). These decisions, hereafter, called real-time decisions, must be made fast in response to the information that becomes available in real time.

One of the unique characteristics of the real-time decision problem is that decision makers are often allowed for postponing decisions for actions (wait

and see) and/or taking additional or different actions in the future. Thus, the real-time decisions have sequential nature. Whether a decision problem can be better formulated as a real-time decision problem or not depends on the relative speed of the evolution of the underlying natural hazard event and time required to take actions in effect. Seeing in this light, decisions regarding climate change adaptation can also be formulated as a real-time decision problem (see Figure 2).

This presentation introduces developments of the theory, optimization algorithm as well as applications made by the author's research team.

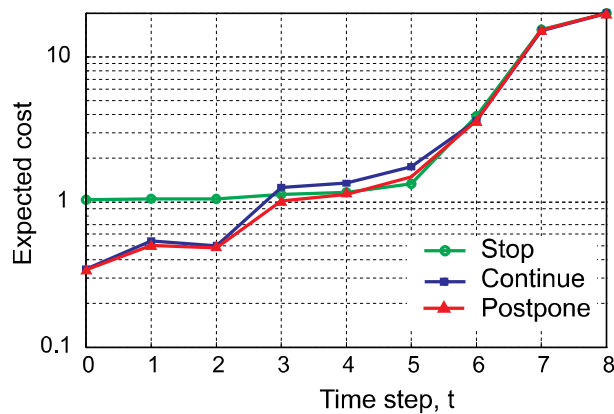
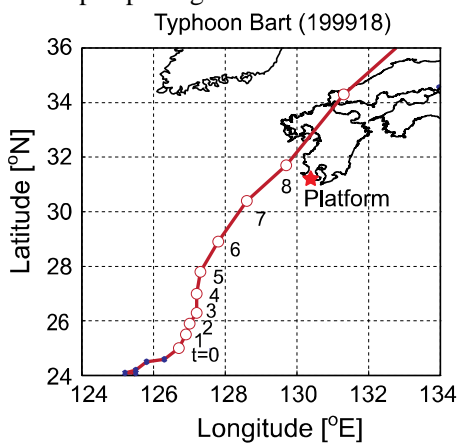


Figure 1. Real-time decision optimization in the face of approaching typhoon (left: a realization of typhoon track, right: expected cost for each decision alternative).

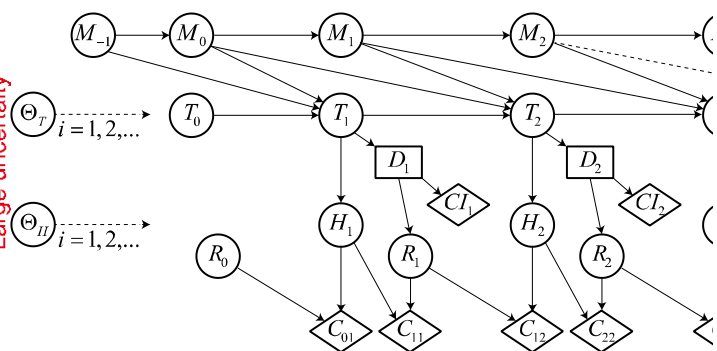
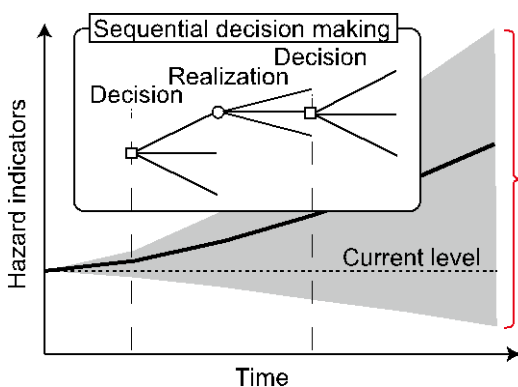


Figure 2. Real-time decision optimization for climate change adaptation (left: illustration of decision regarding climate change adaptation, right: decision graph representation)