Info-Gap Approaches to Planning for an Uncertain Future

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5 November 2013
Workshop on Decision Making under Uncertainty
World Bank
Washington, D.C.

Abstract

Models—both qualitative and quantitative—are used in design and strategic planning in many areas including engineering, economics, public policy, homeland security, biological conservation, medicine, and so on. Uncertainty is a major challenge in model-based planning. Uncertainty, ignorance, and the potential for surprise are all unbounded.

The practical implication of uncertainty is that we must ask: What outcomes are required? What performance is necessary? How can we be robust against surprise? This decision strategy is called *robust satisficing:* choose the design that satisfies the requirements over the largest range of deviation of reality from our current understanding. This is different from asking: What is the best possible outcome that we can achieve?

We will briefly explain the info-gap theory of robust satisficing, and its application to decision dilemmas under uncertainty. We will make the following points by using simple graphical metaphors:

1. Robustness trades off against performance: one becomes more vulnerable to uncertainty as one's performance requirements become more demanding.
2. Optimal (maximal) performance requirements have no robustness against uncertainty.
3. Prioritizing one's options according to predicted outcomes is fatuous.
4. The robust-satisficing strategy prioritizes the options according to their robustness for achieving specified performance requirements.
5. The outcome-optimization strategy prioritizes the options according to their putative outcomes (based on best-model predictions).
6. Putative and robust-satisficing prioritizations may differ. In other words, the putative optimum may be less robust for satisfying specified requirements. One should prioritize robustly.
7. With quantitative models, robustness can be operationalized quantitatively.
8. With qualitative models, robustness can be operationalized by assessing flexibility and diversity.
9. We will mention info-gap opportune-windfalling as the complement to robust-satisficing.

Selected References

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• Lots of additional sources at: http://info-gap.com

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