Info-Gap Approaches to Planning for an Uncertain Future

Yakov Ben-Haim
Yitzhak Moda'i Chair in Technology and Economics
Faculty of Mechanical Engineering
Technion—Israel Institute of Technology
yakov@technion.ac.il, info-gap.com
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Abstract Models 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 discuss two examples: climate change management and environmental monitoring.

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:

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. Robustness can be operationalized quantitatively.
8. We will mention info-gap opportune-windfalling as the complement to robust-satisficing.

Selected References

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