

Parameter Estimation and Model-Based Decisions under Uncertainty: An Info-Gap Perspective

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Abstract

Quantitative models underlie engineering design, strategic planning, and social decision making. We formulate and update models based on historical data and scientific understanding. However, historical data does not necessarily constrain the future behavior of the systems because fundamental changes can occur. Also, our scientific understanding changes (hopefully improves) so that currently-best models are subject to error. These uncertainties — info-gaps — challenge model-based decisions.

In this talk we argue that, under severe uncertainty, a robust-satisficing decision has a better probability of success than a best-model outcome-optimizing decision. This analysis is based on non-probabilistic info-gap decision theory, which provides a quantification of Knightian uncertainty. We discuss the estimation of a pdf from historical data, decisions based on models with uncertain parameters, and (if time allows) forecasting subject to surprises.

References

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More references, links to international workshops on info-gap theory, and other sources, can be found on my website: <http://www.technion.ac.il/yakov>