Abstract submission for:

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Supporting Robust Decisions with Classification and Data-Mining Algorithms

This paper illustrates the concept of scenario discovery and its implementation in a new R package, 'sdtoolkit'. Scenario discovery is a recently developed and useful tool for decisionmaking under uncertainty, in which algorithms are used to identify key sets of plausible future conditions that may lead to unacceptable policy outcomes, in turn allowing decisionmakers the opportunity to create hedging strategies and increase the robustness of their policies. While scenarios have been used for many years to support thinking about the future, scenario discovery is unusual in its quantitative approach to scenario generation, relying on mathematical models of the relevant system to interact policy decisions with exogenous uncertainties and then generate a database of quantitative outcome measures under hundreds to millions of uncertainty combinations. In this context, scenarios are defined as regions of the uncertainty space exhibiting a behavior of interest (typically, poor policy performance). To usefully search through this database and identify relevant scenarios in a form that are still highly interpretable, we have developed a modified version of Friedman and Fisher's Patient Rule Induction Algorithm and implemented it as an R package. Both the algorithm and the package itself are highly interactive, with features for automated data checking, enhanced graphics beyond those of the original PRIM algorithm, and some diagnostic statistics to help the user better judge the confidence they may place in the scenario descriptions.