Generic Multi-Attribute Analysis System

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The **G**eneric **M**ulti-**A**ttribute **A**nalysis (GMAA) System is a *Decision Support System* (DSS) based on an additive multi-attribute utility model that accounts for incomplete information concerning the inputs and is intended to allay many of the operational difficulties involved in the *Decision Analysis* cycle.

The user can interactively create or delete nodes and branches to build or modify an objectives hierarchy. Alternatives and their consequences, in terms of the attributes associated with the lowest-level objectives, can be easily entered by hand or loaded from file. The system admits uncertainty about consequences.

The system also admits incomplete information about the DM's preferences through value intervals as responses to the probability questions the DM is asked, which leads to classes of utility functions and weight intervals. This is less demanding for a single DM and also makes the system suitable for group decision support.

The different alternatives under consideration can be evaluated by means of an additive multiattribute utility function. The additive model is used to assess, on the one hand, average overall utilities, on which the ranking of alternatives is based and, on the other, minimum and maximum overall utilities, which give further insight into the robustness of this ranking. It is also possible to select another objective to rank by. The system provides different displays of ranking results: *Stacked Bar Ranking, Measure Utilities for Alternatives*, *Compare Alternatives Graph* and *Paired Attributes Correlation*.

Finally, the system provides several types of Sensitivity Analysis (SA), like classical SA, which involves changing the parameters and observing their impact on the ranking of alternatives, or the assessment of *weight stability intervals*. The assessment of *non-dominated* and *potentially optimal* alternatives and the application of *Monte Carlo* simulation techniques take advantage of the useful imprecise information collected during the assignment of the component utilities and weights and the uncertain alternative consequences entered.

In some cases, the information obtained from the alternatives evaluation is not meaningful enough so as to definitively recommend an alternative. In these cases, the above techniques play a very important role. They may provide more meaningful information, and an iteration process can be carried out by tightening the respective imprecise alternative consequences, component utilities and weights and reassessing the non-dominated and potentially optimal alternatives or performing the Monte Carlo simulation techniques again, until a dominant strategy is found.

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