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Prioritization and Pareto Efficient Sets: Non-dominated Sorting for Multiple-Criteria Decision Analysis

The prioritization of options occurs frequently at the Department of National Defence. In many cases, the prioritization effort is a response to a situation in which there are many options, but only enough resources to satisfy the requirements of a fraction of the options. The use of multiple criteria and a team of subject matter experts to evaluate the options against those criteria is a conventional way to prioritize many options. This report discusses a well-established method, called non-dominated sorting, that systematically processes multiple evaluations of multiple criteria and thereby organizes the many options into prioritized sets, which are eminently suitable for trade-of discussions and negotiations. By using simple examples and detailed demonstrations, this presentation takes a closer look at an old method. The development of visualizations aid the presentation of results from two actual cases. The real-world cases yield empirical evidence related to the practical utility of non-dominated sorting and entail recommendations regarding how decision analysts can make the most of the method in their own work.