

Introduction to Minitrack: Multi-criteria Decision Analysis and Support Systems

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Abstract

Almost all decisions people make are based on multiple factors or criteria. Decision makers generally pursue multiple, and often conflicting, objectives. A feasible solution that is optimum with respect to all such objectives or decision criteria almost never exists, and a satisfactory compromise solution is generally sought. Multi-criteria decision analysis as a field of research deals with problem theory and solution approaches directly involving multiple decision criteria. This minitrack focuses on solution approaches, technology, and systems that support decision-making under consideration of multiple decision criteria.

1. Introduction

Multiple criteria decision problems generally do not possess a mathematically well-defined optimum solution. Thus the best the decision maker (DM) can aspire is to find a satisfactory compromise solution from among the efficient (non-dominated) solutions. Usually there is no known and explicit utility function representing the preferences of the DM, and interactive solution techniques are often proposed to identify the preferred solution or perhaps a manageable set of desirable compromise solutions.

Multi-criteria decision analysis (MCDA), an active area of research since the 1970s, deals with structuring and solving decision problems with explicit consideration of multiple decision criteria. Thousands of articles and dozens of books have been devoted to this field, with several regular conferences and conference tracks focusing on this area.

This minitrack on MCDA is in its seventh year as part of the HICSS program, and has attracted an average of ten paper submissions each year, with an average acceptance of five submitted papers. In addition, at HICSS-45, Jyrki Wallenius from Aalto University in Helsinki, Finland, gave a keynote address on *Multi-objective Optimization – Different Interaction Styles and an Approach* as part of this minitrack, and at HICSS-47, Raimo Hämmäläinen, also from Aalto University, moderated a panel on *The*

Process of Multicriteria Decision Support – Practical Approaches, New Perspectives, and Behavioral Issues in this minitrack.

2. Papers in this minitrack

This year the four accepted papers in this minitrack cover a variety of multi-criteria decision topics, including consumer preference prediction from brainwaves, design optimization of physical protection systems, decision support for investments in renewable energy sources, and travelers' trade-offs with respect to aviation safety objectives.

Wei-Yen Hsu in the paper *Emotion and Concentration Integrated System: Applied to the Detection and Analysis of Consumer Preference*, examines how consumers' brainwaves, related to the consumers' emotions and concentrations and extracted via a portable electroencephalography device, can be used to predict consumer preferences.

Nathanael Brown, Katherine Jones, Alisa Bandlow, Lucas Waddell, and Linda Nozick in their paper *A Stochastic Programming Approach to the Design Optimization of Layered Physical Protection Systems*, describe an optimization model for the automatic design of multi-layered physical protection systems. Their design explicitly takes into consideration the impact of weather and visibility conditions as well as intruder capabilities on system performance.

Hanan Mengash and Alexander Brodsky in their paper *A Group Recommender for Investment in Microgrid Renewable Energy Sources*, report on the development of a recommender system that can provide guidance for group decision-making on investments in microgrid renewable energy sources.

The fourth paper, *Assessing U.S. Travelers' Trade-offs for Aviation Safety Objectives: A Natural Experiment*, by Richard John, Kenneth Nguyen, and Heather Rosoff, investigates changes in US travelers' trade-offs for passenger screening objectives, using the Malaysian Airline Flight 370 incident. The authors examine how alternative screening procedures affect trade-offs between equity and safety concerns.