

Rough Multiple Objective Decision Making

Under intense scrutiny for the last few decades, Multiple Objective Decision Making (MODM) has been useful for dealing with the multiple-criteria decisions and planning problems associated with many important applications in fields including management science, engineering design, and transportation. Rough set theory has also proved to be an effective mathematical tool to counter the vague description of objects in fields such as artificial intelligence, expert systems, civil engineering, medical data analysis, data mining, pattern recognition, and decision theory. Rough Multiple Objective Decision Making is perhaps the first book to combine state-of-the-art application of rough set theory, rough approximation techniques, and MODM. It illustrates traditional techniques—and some that employ simulation-based intelligent algorithms—to solve a wide range of realistic problems. Application of rough theory can remedy two types of uncertainty (randomness and fuzziness) which present significant drawbacks to existing decision-making methods, so the authors illustrate the use of rough sets to approximate the feasible set, and they explore use of rough intervals to demonstrate relative coefficients and parameters involved in bi-level MODM. The book reviews relevant literature and introduces models for both random and fuzzy rough MODM, applying proposed models and algorithms to problem solutions. Given the broad range of uses for decision making, the authors offer background and guidance for rough approximation to real-world problems, with case studies that focus on engineering applications, including construction site layout planning, water resource allocation, and resource-constrained project scheduling. The text presents a general framework of rough MODM, including basic theory, models, and algorithms, as well as a proposed methodological system and discussion of future research.

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