UNIVERSITÉ LAVAL | Faculté des sciences de l'administration
Département d'opérations
et systèmes de décision

Séminaire du département OSD

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Robust Portfolio Decision Analysis: A Multicriteria Constrained Clustering Approach

Abstract: Organizations invest in activities towards achieving business goals and remaining competitive. Since the availability of resources, time and budget is typically limited which does not allow to simultaneously implement all activities, organizations are faced with the problem of identifying the most preferable alternatives by grouping those into portfolios, carefully allocating resources and focusing on management of these portfolios. Thus, portfolio decision has been considered as one of the most important tasks for the organizations to ensure business success. However, despite this high importance, it has significant practical challenges due to uncertain multiple criteria evaluations, decision makers' preferences and real-world constraints.
Over the last years, many methods have been developed with the aim of maximizing the sum of multicriteria scores of projects selected for the final portfolio. In our research, unlike the existing literature, we propose a new robust multicriteria clustering methodology that enables to group the best ranked projects into a new kind of cluster (so-called optimal portfolio) that complies with the given constraints. With this aim, a new Integer Programming (IP) model as an extension of the K-medoids clustering technique is combined with the PROMETHEE method. Specifically, we first apply PROMETHEE for multicriteria evaluation of the individual projects and then the two main outputs of PROMETHEE, preference matrix and net flows, are used in the IP model to generate clusters of projects with the given resource constraints. Herein, we focus on generating two clusters, with the selected projects in the best one forming the portfolio. In developing this model, we also introduce portfolio quality constraints to ensure the proper distribution of "good" evaluations among all considered criteria. We then enhance this combined model by embedding it into SMAA simulation framework to consider the inherent uncertainties. As a large number of potentially optimal portfolios are obtained through the SMAA simulation, both project and portfolio-level robustness indices are computed in order to help decision makers to identify the most robust and stable portfolio. Our experiments show that our multicriteria constrained clustering model provides a well-designed methodology to generate efficient, balanced, and robust portfolios aligned with the organizational strategies and preferences.

Biography: Dr. Makbule Kandakoglu is an Assistant Professor in Industrial Engineering at Concordia University. She holds a Ph.D. in Operations Research & Management from the RWTH Aachen University. She had her MSc in Management from Hacettepe University, and her double BSc degrees in Industrial Engineering and Computer Engineering, both from Cankaya University. Her research interests include combinatorial optimization, decision-making under uncertainty, and applied machine learning. Her recent papers have been published in the journals Computers & Industrial Engineering and Annals of Operations Research. Dr. Makbule has a unique blend of academic excellence and industry experience. She is recently passionate about leveraging operations research and machine learning to address pressing societal and industrial challenges. Besides, she has been teaching several graduate and undergraduate level courses since 2018 at the University of Ottawa, McGill University and Concordia University in both in-person and online environments. In addition to her academic achievements, Dr. Makbule possesses more than eleven years of professional industry experience in positions of increasing responsibility (recently as a Lead R&D Engineer) encompassing the areas of advanced analytics, information technologies, and project management.

Jeudi

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Pavillon Palasis-Prince

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Ouvert à tous

Café et viennoiseries

Responsable:
Jacques Renaud