

existence of directional derivatives of cone-convex mappings is a crucial issue. In the present talk we consider cone-convex mappings F acting on a linear vector space X and taking values in a Banach space Y with ordering relations induced by closed convex cones K . We show that if directional derivatives of any such F exist for any direction h , the space Y is weakly sequentially complete. The talk is based on the joint work with Krzysztof Lesniewski.

2 - Generalized Asymptotic Functions and Applications in Multiobjective Optimization

Felipe Lara

We use generalized asymptotic functions and second order asymptotic functions to deal with the nonconvex multiobjective optimization problem. A general existence result for the nonemptiness of the proper efficient solution set and a sufficient condition for the domination property are given in those terms. A new necessary condition for a point to be efficient or weakly efficient solution without any convexity assumption and a finer outer estimate for the asymptotic cone of the weakly efficient solution set are also provided in the nonconvex case. Finally, we apply our results for the linear fractional programming problem.

3 - Some Useful Set-Valued Maps in Set Optimization

Ruben Lopez, Elvira Hernández

In this talk we introduce some classes of set-valued maps which can be useful in set optimization due to their applications. We study their continuity and convexity properties. We compute their asymptotic maps which can be employed to establish coercivity and existence results in the framework of set optimization problems.

4 - Limit Behaviour and Nonlinear Scalarization of Approximate Efficient Solutions in Vector Optimization

Lidia Huerga, César Gutiérrez, Bienvenido Jiménez, Vicente Novo

We study the well-known notion of approximate efficient solution of a vector optimization problem due to Kutateladze, and we prove that the Painlevé-Kuratowski limit of the set of this type of solutions when the error tends to zero is the set of weak efficient solutions. Moreover, we characterize these approximate efficient solutions through non-linear scalarization and finally, as an application, we derive a Kuhn-Tucker multiplier rule for them when considering a convex Pareto multiobjective problem with inequality constraints.

■ TB-53

Tuesday, 10:30-12:00 - Building PA, Room A

Methodological Advancements in Metaheuristics

Stream: Metaheuristics

Chair: *Alberto Santini*

1 - Design of Metaheuristics for Matheuristics: The Special Case of Column Generation

Marc Sevaux, Fabián Castaño

Designing a metaheuristic is always difficult to make it really efficient, but designing a metaheuristic for a matheuristic is much more challenging. The goal of this presentation is to intend to give keys and hints to make such a design. As a support, the design of metaheuristics that have been used inside a column generation framework will be used. These matheuristics have been successfully used to solve several variants of the lifetime maximization problem in wireless sensor networks

2 - Impact of Solution Methodology Parameters on a Flexible Integrated Supply Chain Model

Elham Behmanesh, Jürgen Pannek

Nowadays, the design of the supply chain network must allow to operate the latter at the lowest cost while providing the best customer service as well as environmental protection. We observe that due to environmental issues and economic reasons, industrial players are under a pressure to take back products after their use. Most existing logistics networks, however, are unable to handle returned products and to incorporate flexible delivery paths. In this paper, we present an integrated forward/reverse logistics network with full delivery graph as a NP hard mixed integer linear programming model. To find a near optimal solution even for large problems, we propose a memetic algorithm with a novel population generation. Here, we particularly focus on the impact of different parameters on convergence and solution properties of the proposed algorithm. Analyzing the respective sensitivities, we will identify guidelines to obtain the best parameters for these kind of logistics networks.

3 - Assisting the Developer: Characterization of Neighborhood Behaviors

Patrick De Causmaecker, Nguyen Thi Thanh Dang

Metaheuristic algorithm development builds on intuition of the developers. Given the metaheuristic schema, there still remain important decisions to be taken. These decisions can be seen as a part of the modeling process and takes observed properties of the problem into account. We investigate how the developer can be assisted in this task through an example.

We consider a situation with a large number of possible neighborhoods. The probabilities of specific neighborhoods being selected are fixed parameters of the algorithm. Off-line tuning of the algorithm's parameters can be done by automated algorithm configuration tools. We proposed a systematic method to characterize each neighborhood's behaviors. A novelty of our characterization method is the ability of reflecting changes of behaviours according to hardness of different solution quality regions. Using neighborhood clusters instead of individual neighborhoods helped to reduce the parameter configuration space without misleading the search of the tuning procedure. This method is problem-independent and potentially can be applied in similar contexts.

We argue that this example method provides further insight to the developer. We have examples where at first sight different neighborhoods show similar behaviors. Developers intuitively classified neighborhoods as similar. The method provides ways to test their hypothesis.

4 - A Comparison of Acceptance Criteria for the Adaptive Large Neighbourhood Search Metaheuristic

Alberto Santini, Stefan Ropke, Lars Magnus Hvattum

The adaptive large neighbourhood search (ALNS) metaheuristic has become a popular template for implementing heuristic solution methods. The metaheuristic allows the use of problem specific knowledge when specifying operators for partially destroying and then repairing a solution to an optimisation problem. Problem independent components of the ALNS dictate how different destroy and repair operators should be used and control the search trajectory. One presumably important component that influences the search trajectory is the move acceptance criterion. In the original ALNS, this criterion was based on simulated annealing, whereas earlier work on large neighbourhood search by Shaw had accepted only improved solutions. Recently, some implementations have used the record-to-record acceptance criterion instead. Currently, however, there are no guidelines available to recommend one acceptance criterion over another. This paper intends to fill this gap by investigating a large number of different move acceptance criteria by subjecting them to extensive computational testing. Through empirical experiments we will attempt to 1) suggest which move acceptance criterion is better suited for an implementation of ALNS, 2) quantify the effect on performance from using different acceptance criteria, 3) attempt to measure in which way the move acceptance criteria influence the search behaviour.