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Abstract
The milk collection problem can be basically defined as the daily collection of raw milk from different points (farms/milk collection centers) and delivering it to a dairy facility. To enhance final dairy quality, it is important to use the appropriate quality of raw milk for each dairy product. However, collecting different types of milk comes with additional logistics costs which significantly increase in an uncertain environment. In this study, we, therefore, propose a novel mathematical model for the collection of different types of milk from producers by multi-tank tankers with split deliveries, uncertain demand, service time and vehicle speed conditions. A real-life case study from a dairy company is solved under different risk assessment scenarios. Indeed, several brand-new benchmark instances for the core problem are presented and solved by utilizing an efficient heuristics approach called enhanced iterative local search. All the case study results show that considering the uncertainty is very critical for designing efficient collection networks. The findings of the study indicate that logistics decision makers should design their collection networks with low, but non-zero, risk levels.

Abstract
This paper examines the performance of improvement search as a function of the quality of the starting solution in the planar (or continuous) *p*-median problem. We show that using optimal solutions of the analogue discrete p-median problem as the starting solution for heuristic improvement algorithms, as recommended in the literature, can actually lead to inferior performance. That is, good starting solutions obtained in the discrete space with a fraction of the effort can actually be better, a counter-intuitive result that illustrates in a different context the less is more principle recently advocated in the literature.

Abstract
This paper studies the target visitation arc routing problem on an undirected graph. This problem combines the well-known undirected rural postman problem and the linear ordering problem. In this problem, there is a set of required edges partitioned into targets, which must be traversed and there are pairwise preferences for the order in which some targets are serviced, which generates a revenue if the preference is satisfied. The aim is to find a tour that traverses all required edges at least once, and offers a compromise between the revenue generated by the order in which targets are serviced, and the routing cost of the tour. A linear integer programming formulation including some families of valid inequalities is proposed. Despite the difficulty of the problem, the model can be used to solve to

optimality around 62% of the test instances.

On Hölder continuity of solution maps to parametric vector Ky Fan inequalities P. 77-94

Tran Ngoc Tam

Abstract

In this paper, we first introduce the notion of strong quasiconvexity of a vector-valued map. Then, this new condition is utilized to study the existence and stability of solutions to parametric vector Ky Fan inequalities. Namely, sufficient conditions for the nonemptiness of solutions and the Hölder continuity of solution maps to parametric vector Ky Fan inequalities are established. The results obtained in this paper are improvements of the previous ones. At the end of the paper, applications of the main results are presented.

Interdicting facilities in tree networks P. 95-118

Nicolas Fröhlich, Stefan Ruzika

Abstract

This article investigates a network interdiction problem on a tree network: given a subset of nodes chosen as facilities, an interdictor may dissect the network by removing a size-constrained set of edges, striving to worsen the established facilities best possible. Here, we consider a reachability objective function, which is closely related to the covering objective function: the interdictor aims to minimize the number of customers that are still connected to any facility after interdiction. For the covering objective on general graphs, this problem is known to be NP-complete (Fröhlich and Ruzika In: On the hardness of covering-interdiction problems. Theor. Comput. Sci., 2021). In contrast to this, we propose a polynomial-time solution algorithm to solve the problem on trees. The algorithm is based on dynamic programming and reveals the relation of this location-interdiction problem to knapsack-type problems. However, the input data for the dynamic program must be elaborately generated and relies on the theoretical results presented in this article. As a result, trees are the first known graph class that admits a polynomial-time algorithm for edge interdiction problems in the context of facility location planning.

On the axiomatic characterization of the coalitional multinomial probabilistic values P. 119–151

Francesc Carreras, María Albina Puente

Abstract

The coalitional multinomial probabilistic values extend the notion of multinomial probabilistic value to games with a coalition structure, in such a way that they generalize the symmetric coalitional binomial semivalues and link and combine the Shapley value and the multinomial probabilistic values. By considering the property of balanced contributions within unions, a new axiomatic characterization is stated for each one of these coalitional values, provided that it is defined by a positive tendency profile, by means of a set of logically independent properties that univocally determine the value. Two applications are also shown: (a) to the Madrid Assembly in Legislature 2015–2019 and (b) to the Parliament of Andalucía in Legislature 2018–2022.

Short-term steady-state production optimization of offshore oil platforms: wells with dual completion (gas-lift and ESP) and flow assurance P. 152–180

Eduardo Rauh Müller, Eduardo Camponogara, Laio Oriel Seman, Eduardo Otte Hülse, Bruno Ferreira Vieira, Luis Kin Miyatake, Alex Furtado Teixeira

Abstract

Research on short-term steady-sate production optimization of oilfields led to the development of models and solution methods, several of which have found their way into practice. Early models considered satellite wells that operate with a fixed topside pressure and gas-lift injection, while recent approaches address distinct types of artificial lifting, pressure control, and processing equipment. By integrating existing approaches, this work presents a flexible model

for production optimization that considers new features, including flow assurance constraints and smart selection of artificial lifting operating modes (gas-lift with multiple valves, electrical submersible pumping, and dual completion). Given that the proposed model is conceptual, piecewise-linear functions are obtained from field and simulation process data to approximate nonlinear relations. This way, the methodology decides the best combinations of routing and operation modes to maximize production gains. Simulated results are reported considering a representative asset that illustrates complex behavior.

A simple and effective algorithm for the maximum happy vertices problem P. 181-193

Marco Ghirardi, Fabio Salassa

Abstract

In a recent paper, a solution approach to the *Maximum Happy Vertices Problem* has been proposed. The approach is based on a constructive heuristic improved by a matheuristic local search phase. We propose a new procedure able to outperform the previous solution algorithm both in terms of solution quality and computational time. Our approach is based on simple ingredients implying as starting solution generator an approximation algorithm and as an improving phase a new matheuristic local search. The procedure is then extended to a multi-start configuration, able to further improve the solution quality at the cost of an acceptable increase in computational time.

A residual recombination heuristic for one-dimensional cutting stock problems P. 194-220

B. S. C. Campello, C. T. L. S. Ghidini, A. O. C. Ayres, W. A. Oliveira

Abstract

Cutting stock problems arise in manufacturing industries where large objects need to be cut into smaller pieces. The cutting process usually results in a waste of material; thus, mathematical optimization models are used to reduce losses and take economic gains. This paper introduces a new heuristic procedure, called the Residual Recombination Heuristic (RRH), to the one-dimensional cutting stock problem. The well-known column generation technique typically produces relaxed solutions with non-integer entries, which, in this approach, we associate with a set of residual cutting patterns. The central aspect of this contribution involves recombining these residual cutting patterns in different ways; therefore, generating new integer feasible cutting patterns. Experimental studies and statistical analyses were conducted based on different instances from the literature. We analyze heuristic performance by measuring the waste of material, the number of instances solved to optimality, and by comparing it with other heuristics in the literature. The computational time suggests the suitability of the heuristic for solving real-world problems.