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Editorial

Special Issue "2021 Selected Papers from Algorithms' Editorial Board Members"

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1. Introduction

This is the second edition of a special issue of *Algorithms* that is of a rather different nature compared to other Special Issues in the journal, which are usually dedicated to a particular subject in the area of algorithms. During the last years, the Editorial Board of the journal has been considerably extended. Currently, my work as Editor-in-Chief is supported by two Associate Editors, three Section Editors-in-Chief, as well as 136 further members of the Editorial Board. Since these scientists cover a huge spectrum of research fields related to the development of algorithms, the journal decided to setup an annual issue, where our editorial members can present their latest work so that the readers of the journal *Algorithms* can get an impression about the current research of our Editorial Board members.

2. Special Issue

After a careful refereeing process, 12 papers were selected for this issue. As a rule, all submissions have been reviewed by three experts from the corresponding area. Subsequently, the published papers are surveyed in increasing order of their publication dates for this Special Issue.

The first accepted paper [1] considers the online variant of the dynamic facility location problem. In the first step of the developed algorithm, an $\Omega(\log m)$-competitive fractional solution with m being the number of facilities is presented. Then, the authors derive a randomized $O(\log m + \log n)$-competitive algorithm with n being the number of clients. In addition, lower bounds on the competitive ratio are proved both for deterministic and randomized algorithms.

The second paper [2] deals with the minimum positive influence dominating set problem, which is an APX-hard optimization problem occurring, e.g., in social networks. Due to the complexity status of this problem, fast greedy heuristics are given and compared on a wide range of social and complex networks. In addition, the performance of these heuristics is also compared with the results obtained by the CPLEX solver.

The paper [3] deals with the solution of nonlinear equations. In particular, a new family of multi-step iterative schemes is presented which is built from Ostrowski's scheme, added a Newton step and uses a divided difference operator. The dynamic behavior of this family is analyzed in terms of the parameter values, also with the goal of detecting elements with good stability properties and others with chaotic behavior. Various numerical tests on several functions show the efficiency and stability of the presented family.

The paper [4] investigates the network lifetime maximization problem and derives a greedy algorithm for a weighted version of the maximum disjoint dominating sets problem for energy conservation purposes in wireless sensor networks. In addition, an integer linear programming model is given and compared with respect to solution quality and computation time with the greedy heuristic on a large set of 640 instances. It turned out that the suggested approach outperforms recent local search algorithms from the literature.

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The paper [5] presents a cooperative optimization approach for distributing service points for mobility applications. In contrast to former works, the authors extend previous approaches towards applications in which the satisfaction of demand relies typically on the existence of appropriate pairs or tuples of service stations as it occurs for instance in care sharing systems. The authors apply a new matrix factorization model as surrogate objective function, and then a MILP model is used to generate an optimized solution with respect to the currently known user information. Finally, benchmark scenarios are generated using an idealized simulation of the user interaction, and experimental results are discussed.

In the paper [6], a logical analysis of data with the goal of building Boolean formulas represented by so-called patterns is done. After analyzing the computational complexity of the problem under consideration, strings and patterns that are mutually compatible are investigated. Then ILP models are presented for the two problems of Pattern Cover Minimality and Pattern Equivalence. The paper completes with some computational experiments.

The paper [7] deals with the problem of scheduling multiprocessor tasks with given precedence constraints and equal processing times in order to minimize the maximum lateness L_{max}. In particular, it is shown that any optimal coloring of a mixed graph is equivalent to the problem of finding an optimal schedule for partially ordered multiprocessor tasks with unit processing times and the minimization of L_{max}. The results presented in this paper can be interpreted as a new scheduling approach for mixed graph coloring problems and vice versa.

In the paper [8], the authors apply machine learning (ML) to solve the traveling salesman problem heuristically. The main contribution is the presentation of an ML-driven constructive heuristic. In the first phase, ML is used to identify edges that are likely to be contained in an optimal solution, and the second phase completes the partial solution by a classic heuristic. Experiments were performed on a set of 54 standard instances from the TSPLIB library with up to 1748 vertices as well as on non-Euclidean instances.

In the paper [9], the authors aim to divert the attention from various biases and attempts instead to quantify the randomness of the mutations observed during the evolution. Therefore, the results of the mutations have been investigated at the protein level. In particular, a codon table is used to quantify the evolutionary rule of random mutations. The author observed an increase of the correlation moving up in the evolutionary tree.

The paper [10] deals with a prediction of the seismic bearing capacity of a shallow strip footing above a void based on machine learning. Three machine learning techniques have been adopted to learn the connection between the parameters under consideration and the bearing capacity, which have been compared with each other. The results have shown that all the presented machine learning techniques performed well.

The paper [11] investigates a variant of the vehicle routing problem including time windows, site dependencies, multiple depots and outsourcing costs. The authors develop matheuristics based on column generation. In addition, machine learning techniques are applied to stabilize and speed up the convergence of the column generation algorithm. It turned out that the obtained results emphasize the interest of multiple types of hybridization between mathematical programming, machine learning and heuristics inside the column generation approach.

Finally, the last accepted review paper [12] deals with pre-detonation nuclear forensics and focuses on analyses of particle size, shape and texture signatures that could give an information on the provenance of interdicted materials. In this paper, the authors describe statistical issues and approaches in using quantitative morphological measurements such as the particle size or shape to infer production conditions. The statistical subjects included, e.g., multivariate T^2 tests and several machine learning options such as decision trees, learning vector quantization neural networks, or approximate Bayesian computation. It turned out that any calibrated Bayesian approach is appropriate for comparing candidate experimental designs.

As the current Editor-in-Chief, it is my pleasure to thank all the Editorial Board members for their support of the journal during the last years. It is planned that such an issue with recent research results of the Editorial Board members will also appear in 2022. I cordially invite the members to submit their latest high-quality work to the 2022 issue of this type.

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