algorithms

MDPI

Editorial

Special Issue: "2022 and 2023 Selected Papers from Algorithms' Editorial Board Members"

Frank Werner

Faculty of Mathematics, Otto-von-Guericke University Magdeburg, P.O. Box 4120, D-39016 Magdeburg, Germany; frank.werner@ovgu.de; Tel.: +49-391-675-2025

This is the third edition of a Special Issue of *Algorithms*; it 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. In particular, the first edition of such an issue from 2020 [1] contained 8 papers, and the second edition from 2021 [2] contained 12 papers. Over the last few years, the Editorial Board of the journal has been considerably extended. Currently, my work as Editor-in-Chief is supported by 2 Associate Editors, 5 Section Editors-in-Chief, and 135 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 set up Special Issues of this type, in which our Editorial Board Members can present their latest work to the readers of *Algorithms* so that they can have an overview of our Editorial Board Members' current research. The current issue considers submissions from the past two years, 2022 and 2023.

After a careful review process, 16 papers were selected for this issue. As a rule, all submissions have been reviewed by two (and often even more) experts from the corresponding area. Subsequently, for this special issue, the published research papers were surveyed in the order of their publication dates.

The first accepted research paper by Leone and Cohen considers a rendezvous game, where players move at different speeds and markers can be left by one of the players on the infinite line. For its solution, an LP-based formulation is suggested. The authors showed how the search space can be reduced to a space of significantly smaller dimensions by making the enumeration of all elements realistic.

The next paper by Sangaiah et al. presents a method for tackling fault detection and diagnosis in a cellular network. The authors use two datasets made up of performance support system data and drive test data. They also present a framework for identifying the need for handovers. By applying the dynamic neural network method, great accuracy was achieved.

Then, Cordero et al. present a study on the generalization of a known family of multi-point scalar iterative processes for approximating solutions of non-linear systems. A convergence analysis under different smooth conditions is given. They also investigate stability, analyze the fixed and critical points of the resulting rational operator, and present graphical analyses of dynamical planes, parameter lines, and bifurcation planes. Finally, numerical tests are produced for various non-linear systems in order to check the obtained theoretical results and to compare the proposed schemes with existing ones.

In the next paper, Maniezzo and Zhou deal with the setting of hyperparameters in optimization algorithms and propose a novel learning scheme. Their approach differs from existing ones and exploits the learning and generalization capabilities of artificial neural networks, with the goal of adapting a general setting using automatic configurators. The suggested approach is tested on two algorithms: one algorithm that is very sensitive to parameter settings applied to instances of the generalized assignment problem, and a robust tabu search algorithm applied to instances of the quadratic assignment problem. In both cases, the approach turned out to be effective.

Citation: Werner, F. Special Issue: "2022 and 2023 Selected Papers from Algorithms' Editorial Board Members". *Algorithms* **2024**, *17*, 65. https://doi.org/10.3390/a17020065

Received: 1 February 2024
Accepted: 1 February 2024
Published: 3 February 2024

The paper by Efrimov et al. deals with the optimization of the formation and use of a machine and tractor fleet within a crop farming enterprise. The authors discuss the concepts and indicators that characterize the process of agricultural operations related to said machine fleet. In particular, after presenting the problem and context in detail, an optimization model for executing a complex of mechanized works in agricultural production is presented. Then the authors present a general scheme consisting of five stages. It includes a heuristic algorithm for performing a set of agricultural works, the results of which are compared with those obtained by the GAMS solver. In particular, the authors present results for real data in an agricultural enterprise alongside interpretations of the obtained results.

Then, in contribution 6, Belousov et al. present a neural network package which has been optimized for the use on a high-performance computing cluster for a future compressed baryonic matter (CBM) experiment at a research facility in Germany. The package has been developed in C++. To identify events containing quark–gluon plasma, fully connected and convolutional neural networks have been created. The tests show the superiority of convolutional neural networks over fully connected networks, and achieved high accuracy with the considered dataset.

In the next paper, Gursesli et al. introduce a system which makes the collection, processing, real-time streaming, and storage of eye tracking data possible. For the development of this system, the Java programming language, WebSocket protocol, and Representational State Transfer were used. The results were obtained under two sets of test conditions, namely local and online scenarios. The results show that this system can significantly support the research community by providing real-time data transfer and storage.

Then, Tetteh et al. present a Multi-Genome Grammatical Evolution which is better suited to treating multi-output problems, in particular for digital circuits. They adapt genetic operators, mappers, and initialisation routines to work with the new genome representation. The authors also develop custom grammar syntex rules and a new wrapping operator. The approach is tested on combinatorial circuit benchmark problems. It turns out that the developed approach outperforms standard Grammatical Evolution.

In contribution 9, Belousow et al. present a second paper within this issue; they discuss a neural network-based competition between short-lived particle candidates in the CBM experiment at the same research facility mentioned in contribution 7. The authors replace the existing particle competition between K_s-mesons and Λ-hyperons of the Kalman Filter Particle Finder with a neural network approach, which provides a raw classification performance with an error of less than 2 %. They also demonstrate that their approach improves the quality of the physics analysis.

Leon et al. deal with improving the efficiency of warehouse operations and explore the possibilities of combining simulation with reinforcement learning, with the goal of developing effective mechanisms for the quick acquisition of information in complex environments (occurring, for instance, in manufacturing and logistic systems). In particular, the paper showcases the integration of the FlexSim commercial simulator and the RL OpenAI Gym library in Python. The effectiveness of the suggested method is evaluated by several experiments.

In the paper by Halawi et al., a new multi-objective anonymization approach is suggested. It generalizes the known-degree anonymization problem and intends to model data security and privacy more realistically. Their model guarantees a convenient privacy level. The resulting multi-objective graph realization approach is derived and solved by means of Integer Linear Programming

In the paper by Manescu and Dumitrescu, a novel global optimization approach is developed, which is based on differential evolution combined with two other approaches based on the Sparrow Search Algorithm and Bald Eagle Search, respectively. As a high-level online learning mechanism, a genetic algorithm is adopted. The proposed methods are compared with 10 state-of-the-art heuristics and well-established algorithms based on a

set of 12 difficult problems. It turns out that the performance of the main algorithm, called HyperDE, is superior to that of the existing heuristics.

The paper by Belcastro et al. deals with a cryptocurrency problem and suggests a strategy for maximizing profits through identifying when it is advantageous to buy or sell cryptocurrencies. The authors combine various statistical, text analytical, and deep learning techniques to produce recommendations for a trading algorithm. The resulting trading algorithm is tested on historical data and turns out to be very successful.

Dell'Amico et al. deal with a minimum-cost arborescence problem with precedence constraints and waiting times. For this NP-hard problem, compact models of polynomial size are discussed, which turned out to be essentially smaller than earlier ones. These models are experimentally evaluated. As a result, the authors were able to close 7 previously open instances; they were also able to derive better lower bounds on the optimum cost for 71 instances and improved upper bounds for 80 instances among 88 open instances.

Shokouhifar et al. present an ensemble heuristic–metaheuristic feature fusion learning algorithm for the prediction of heart disease. The construction of the ensemble learning model comprises seven base learners. The objectives are to identify the most pertinent features for each base learner and to aggregate the decision outcomes of the particular base learners through ensemble learning. The performance of the developed EHMFFL algorithm is evaluated using different measures for the Cleveland and Statlog datasets, and the new algorithm turns out to be superior to existing state-of-the-art algorithms.

In the last paper, Fotakis et al. deal with sharp-based time-series clustering using Dynamic Time Warping distance. A two-stage framework is presentedm which is based on Sparse Gaussian Modeling. An extensive computational evaluation is carried out using datasets from the UCR Time Series Classification Archive. The proposed framework generates results that can compete with those of a standard k-means algorithm but also has considerable advantages in clustering quality, CPU utilization, and memory requirements.

As the current Editor-in-Chief, it is my pleasure to thank all the Editorial Board Members for their support for *Algorithms* over the last few years. I hope that the Editorial Board Members of the journal will also submit their most recent high-quality works to Special Issues of this type in the future.

Conflicts of Interest: The author declares no conflict of interest.

List of Contributors

1. Leone, P.; Cohen, N. Rendezvous on the Line with Different Speeds and Markers That Can Be Dropped at Chosen Time. *Algorithms* **2022**, *15*, 41.
2. Sangaiah, A.K.; Rezaei, S.; Javadpour, A.; Miri, F.; Zhang, W.; Wang, D. Automatic Fault Detection and Diagnosis in Cellular Networks and Beyond 5G: Intelligent Network Management. *Algorithms* **2022**, *15*, 432.
3. Cordero, A.; Maimo, J.G.; Rodriguez-Cabral, A.; Torregrosa, J.R. Convergence and Stability of a New Parametric Class of Iterative Processes for Nonlinear Systems. *Algorithms* **2023**, *16*, 163.
4. Maniezzo, V.; Zhou, T. Learning Individualized Hyperparameter Settings. *Algorithms* **2023**, *16*, 267.
5. Efremov, A.A.; Sotskov, Y.N.; Belotzkaya, Y.S. Optimization of Selection and Use of a Machine and Tractor Fleet in Agricultural Enterprises: A Case Study. *Algorithms* **2023**, *16*, 311.
6. Belousov, A.; Kisel, I.; Lakos, R.; Mithran, A. Neural-Network-Based Quark-Gluon Plasma Trigger for the CBM Experiment at FAIR. *Algorithms* **2023**, *16*, 344.
7. Gursesli, M.C.; Selek, M.E.; Samur, M.E.; Duradoni, M.; Park, K.; Guazzini, A.; Lanata, A. Design of Cloud-Based Real-Time Eye-Tracking Monitoring and Storage System. *Algorithms* **2023**, *16*, 355.

8. Tetteh, M.; de Lima, A.; McEllin, J.; Murphy, A.; Dias, D.M.; Ryan C. Evolving Multi-Output Digital Circuits Using Multi-Genome Grammatical Evolution. *Algorithms* **2023**, *16*, 365.
9. Belousov, A.; Kisel, I.; Lakos, R. A Neural-Netwok Based Competition between Short-Lived Particle Candidates in the CBM Experiment at FAIR. *Algorithms* **2023**, *16*, 383.
10. Leon, J.F., Li, Y.; Martin, X.A.; Calvet, L.; Panadero, J.; Juan, A.A. A Hybrid Simulation and Reinforcement Learning Algorithm for Enhancing Efficiency in Warehouse Operations. *Algorithms* **2023**, *16*, 408.
11. Halawi, O.N.; Abu-Khzam, F.N.; Thoumi, S. A Multi-Objective Degree-Based Network Anonymization Method. *Algorithms* **2023**, *16*, 436.
12. Manescu, A.-R.; Dumitrescu, B. HyperDE: An Adaptive Hyper-Heuristic for Global Optimization. *Algorithms* **2023**, *16*, 451.
13. Belcastro, L.; Carbone, D.; Cosentino, C.; Marozzo, F.; Trunfio, P. Enhancing Cryptocurrency Price Forecasting by Integrating Machine Learning with Social Media and Market Data. *Algorithms* **2023**, *16*, 542.
14. Dell'Amico, M.; Jamal, J.; Montemanni, R. Compact Models to Solve the Precedence-Constrained Minimum-Cost Arborescence Problem with Waiting Times. *Algorithms* **2024**, *17*, 12.
15. Shokouhifar, M.; Hasanvand, M.; Moharamkhani, E.; Werner, F. Ensemble Heuristic-Metaheuristic Feature Fusion Learning for Heart Disease Diagnosis Using Tabular Data. *Algorithms* **2024**, *17*, 34.
16. Fotakis, D.; Patsilinakos, P.; Psaroudaki, E.; Xefteris, M. Efficient Timne-Series Clustering through Sparse Gaussian Modeling. *Algorithms* **2024**, *17*, 61.

References

1. Werner, F. 2020 Selected Papers from Algorithms' Editorial Board Members. *Algorithms* **2021**, *14*, 32. [CrossRef]
2. Werner, F. 2021 Selected Papers from Algorithms' Editorial Board Members. *Algorithms* **2021**, *14*, 357. [CrossRef]