

Editorial

Preface to the Special Issue on “Computational and Mathematical Methods in Information Science and Engineering”

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With the emergence of big data and the resulting information explosion, computational and mathematical methods provide effective tools to handle the vast amounts of data and information used in big data analytics, knowledge discovery and distillation, and decision-making for solving complex problems in the world. The objective of this Special Issue titled “Computational and Mathematical Methods in Information Science and Engineering” is to provide the scientific community a channel to exchange their recent advances in computational and mathematical methods encountered in information science and engineering to address the real problems that occur in practice, including the theory and potential applications. The response of the scientific community has been significant, with nearly sixty papers being submitted for consideration, and finally, twenty papers were accepted following a rigorous peer-review process based on quality and novelty criteria.

The paper authored by Yang et al. [1] proposes a methodology based on a spatial Poisson regression model with model parameters being inferred by the Bayesian framework to investigate the occurrence rate for Earth-sized planets orbiting Sun-like stars. They analyze an exoplanet sample and its corresponding survey completeness data by using computational and mathematical methods.

The paper authored by Cheema et al. [2] studies GLM-based control charts using different link functions (i.e., logit, probit, c-log-log, and cauchit) with the binary response variable. The Pearson residuals (PR)- and deviance residuals (DR)-based control charts for logistic regression are proposed under different link functions.

The paper authored by Shan et al. [3] develops a robust online support vector regression algorithm based on a non-convex asymmetric loss function to handle the regression of noisy dynamic data streams. Inspired by pinball loss, a truncated-insensitive pinball loss (TIPL) is proposed to solve the problems caused by heavy noise and outliers.

The paper authored by Wang et al. [4] considers two control mechanisms for three types of wards and patients to prevent patients from nosocomial cross-infection and secondary infections of COVID-19: one is the dynamic bed allocation to balance the resource utilization among isolation, buffer, and general wards; the other is to effectively control the admission of arriving patients according to the evolution process of the epidemic.

The paper authored by Lee et al. [5] proposes a phase-resolved partial discharge (PRPD) shape method to classify different types of defect generator units by using off-line partial discharge (PD) measurement instruments. The experimental measurement was applied to two generators in the Inalum hydropower plant, located in North Sumatra, Indonesia.



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The paper authored by Cao et al. [6] proposes a feature image representation method and Adversarial Generative Network with Filter (Filter-GAN) to solve the problem of imbalanced data in malicious traffic classification. The results show that the feature image representation method can effectively characterize the original session traffic, and Filter-GAN can generate more efficient samples.

The paper authored by E et al. [7] aims to propose a dynamic model selection approach that combines individual selection and combination forecasts based on both the demand patterns and the out-of-sample performance for each item for sales forecasting in the retail industry.

The paper authored by He et al. [8] exploits different multiscale data features in tourist arrival movement. Two popular Mode Decomposition models (MD) and the convolutional neural network (CNN) model are introduced to model the multiscale data features in the tourist arrival data. The data patterns at different scales are extracted using these two different MD models which dynamically decompose tourist arrival into the distinctive intrinsic mode function (IMF) data components.

The paper authored by Song et al. [9] proposes a hybrid multi-attribute three-way group decision-making method and provides detailed steps. The authors transform all attribute values of each expert into IVIFNs. Then, they determine expert weights based on interval-valued intuitionistic fuzzy entropy and cross-entropy and use interval-valued intuitionistic fuzzy weighted average operator to obtain a group comprehensive evaluation matrix.

The paper authored by Wu et al. [10] proposes a two-stage model based on an improved clustering algorithm and the center of gravity to deal with the multi-facility location problem arising from a real-world case. First, a distance function used in clustering is redefined to include both the spatial indicator and the socio-economic indicator. Then, an improved clustering algorithm is used to determine the optimal number of distribution centers needed and the coverage of each center.

In mine extraction planning, the paper authored by Zhao et al. [11] establishes a multi-objective planning model with the objective of obtaining the best economic efficiency, grade, and ore quantity, taking into account the constraints of ore grade fluctuation, ore output from the mine, production capacity of mining enterprises, and mineral resources utilization.

The paper authored by Liu et al. [12] proposes a quantum privacy-preserving set intersection protocol for IoT scenarios, which has higher security and linear communication efficiency. This protocol can protect identity anonymity while protecting private data.

The paper authored by Jeganathan et al. [13] examines the demand for two commodities in a Markovian inventory system, one of which is designated as a major item (Commodity-I) and the other as a complimentary item (Commodity-II). Demand arrives according to a Poisson process, and service time is exponential at a queue-dependent rate.

The paper authored by Weng et al. [14] proposes an innovative idea to derive the mathematical model and volume equation of an egg's shape, calculate its volume, and verify the accuracy of the mathematical equation using the volume displacement method. Using the proposed equation, the minimum error between the calculated egg volume and actual egg volume is 0.01%.

The paper authored by Jiang et al. [15] proposes a knowledge interaction neural network (KINN) to solve the issue of reservoir characterization in production management by integrating the physical principle of the waterflooding process (material balance equation) with an artificial neural network (ANN).

The paper authored by Li et al. [16] propose an opinion–edges co-evolution model on a weighted signed network. By incorporating different social factors, five evolutionary scenarios were simulated to investigate the feedback effects. The scenarios included the variations in edges and signed weights and the variations in the proportions of positive and negative opinions.

The paper authored by Cheng et al. [17] examines multi-tiered closed-loop supply chain network competition under carbon emission permits and discusses how stringent carbon regulations influence the network performance.

The paper authored by Wang et al. [18] uses eXtreme Gradient Boosting (XGBoost), a machine learning (ML) technique, to predict the career choice of college students using a real-world dataset collected in a specific college. In addition, SHAP (Shapley Additive exPlanation) was employed to interpret the results and analyze the importance of individual features.

The paper authored by Fan et al. [19] studies the interaction between the product development mode and the acquisition of consumers' environmental awareness (CEA) information in a two-echelon green supply chain.

The paper authored by Meng et al. [20] proposes a lightweight image reconstruction network (MSFN) for multi-scale local feature interaction based on a global connection of the local feature channel for real-time interactive devices with a fast response.

As the Guest Editors of the Special Issue, we greatly appreciate all authors who submitted their articles for consideration. We would also like to express our gratitude to all the reviewers for their valuable comments and suggestions to improve the submitted papers. The goal of this Special Issue was to attract high-quality and novel papers in the field of "Computational and Mathematical Methods in Information Science and Engineering". We hope that these accepted and published papers will be considered impactful by the international scientific community and that these papers will motivate further research on computational and mathematical methods for solving complex problems in various fields, disciplines, and applications.

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References

1. Yang, H.-D.; Lee, Y.-H.; Lin, C.-Y. On Study of the Occurrence of Earth-Size Planets in Kepler Mission Using Spatial Poisson Model. *Mathematics* **2023**, *11*, 2508. [\[CrossRef\]](#)
2. Cheema, M.; Amin, M.; Mahmood, T.; Faisal, M.; Brahim, K.; Elhassanein, A. Deviance and Pearson Residuals-Based Control Charts with Different Link Functions for Monitoring Logistic Regression Profiles: An Application to COVID-19 Data. *Mathematics* **2023**, *11*, 1113. [\[CrossRef\]](#)
3. Shan, X.; Zhang, Z.; Li, X.; Xie, Y.; You, J. Robust Online Support Vector Regression with Truncated ε -Insensitive Pinball Loss. *Mathematics* **2023**, *11*, 709. [\[CrossRef\]](#)
4. Wang, C.; Yang, F.; Li, Q.-L. Optimal Decision of Dynamic Bed Allocation and Patient Admission with Buffer Wards during an Epidemic. *Mathematics* **2023**, *11*, 687. [\[CrossRef\]](#)
5. Lee, C.-Y.; Purba, N.; Zhuo, G.-L. Defects Classification of Hydro Generators in Indonesia by Phase-Resolved Partial Discharge. *Mathematics* **2022**, *10*, 3659. [\[CrossRef\]](#)
6. Cao, X.; Luo, Q.; Wu, P. Filter-GAN: Imbalanced Malicious Traffic Classification Based on Generative Adversarial Networks with Filter. *Mathematics* **2022**, *10*, 3482. [\[CrossRef\]](#)
7. Yu, M.; Tian, X.; Tao, Y. Dynamic Model Selection Based on Demand Pattern Classification in Retail Sales Forecasting. *Mathematics* **2022**, *10*, 3179. [\[CrossRef\]](#)
8. He, K.; Wu, D.; Zou, Y. Tourist Arrival Forecasting Using Multiscale Mode Learning Model. *Mathematics* **2022**, *10*, 2999. [\[CrossRef\]](#)
9. Song, J.; He, Z.; Jiang, L.; Liu, Z.; Leng, X. Research on Hybrid Multi-Attribute Three-Way Group Decision Making Based on Improved VIKOR Model. *Mathematics* **2022**, *10*, 2783. [\[CrossRef\]](#)
10. Wu, J.; Liu, X.; Li, Y.; Yang, L.; Yuan, W.; Ba, Y. A Two-Stage Model with an Improved Clustering Algorithm for a Distribution Center Location Problem under Uncertainty. *Mathematics* **2022**, *10*, 2519. [\[CrossRef\]](#)
11. Zhao, Y.; Chen, J.; Yang, S.; Chen, Y. Mining Plan Optimization of Multi-Metal Underground Mine Based on Adaptive Hybrid Mutation PSO Algorithm. *Mathematics* **2022**, *10*, 2418. [\[CrossRef\]](#)
12. Liu, B.; Zhang, X.; Shi, R.; Zhang, M.; Zhang, G. SEPSI: A Secure and Efficient Privacy-Preserving Set Intersection with Identity Authentication in IoT. *Mathematics* **2022**, *10*, 2120. [\[CrossRef\]](#)

13. Jeganathan, K.; Reiyas, M.A.; Selvakumar, S.; Anbazhagan, N.; Amutha, S.; Joshi, G.P.; Jeon, D.; Seo, C. Markovian Demands on Two Commodity Inventory System with Queue-Dependent Services and an Optional Retrial Facility. *Mathematics* **2022**, *10*, 2046. [[CrossRef](#)]
14. Weng, Y.-K.; Li, C.-H.; Lai, C.-C.; Cheng, C.-W. Equation for Egg Volume Calculation Based on Smart's Model. *Mathematics* **2022**, *10*, 1661. [[CrossRef](#)]
15. Jiang, Y.; Zhang, H.; Zhang, K.; Wang, J.; Cui, S.; Han, J.; Zhang, L.; Yao, J. Reservoir Characterization and Productivity Forecast Based on Knowledge Interaction Neural Network. *Mathematics* **2022**, *10*, 1614. [[CrossRef](#)]
16. Li, Z.; Ma, L.; Chi, S.; Qian, X. Structural Balance under Weight Evolution of Dynamic Signed Network. *Mathematics* **2022**, *10*, 1441. [[CrossRef](#)]
17. Cheng, P.; Zhang, G.; Sun, H. The Sustainable Supply Chain Network Competition Based on Non-Cooperative Equilibrium under Carbon Emission Permits. *Mathematics* **2022**, *10*, 1364. [[CrossRef](#)]
18. Wang, Y.; Yang, L.; Wu, J.; Song, Z.; Shi, L. Mining Campus Big Data: Prediction of Career Choice Using Interpretable Machine Learning Method. *Mathematics* **2022**, *10*, 1289. [[CrossRef](#)]
19. Fan, M.; Huang, Y.; Xing, W. Information Acquisition for Product Design in a Green Supply Chain. *Mathematics* **2022**, *10*, 1160. [[CrossRef](#)]
20. Meng, Z.; Zhang, J.; Li, X.; Zhang, L. Lightweight Image Super-Resolution Based on Local Interaction of Multi-Scale Features and Global Fusion. *Mathematics* **2022**, *10*, 1096. [[CrossRef](#)]

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