

Editorial

Overview of the Special Issue on “Deep Neural Networks and Optimization Algorithms”

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1. Introduction

Deep Neural Networks and Optimization Algorithms have many applications in engineering problems and scientific research [1,2]. This Special Issue of *Algorithms* is dedicated to recent developments related to the title topic, namely “Deep Neural Networks and Optimization Algorithms”. For this Special Issue, high-quality papers were solicited to address both theoretical and practical issues in the wide area of “Deep Neural Networks and Optimization Algorithms”. After a careful vetting process, seven papers were selected for publication in this Special Issue. As a rule, all submissions have been reviewed by two or three experts in the corresponding area.

2. Special Issue

The first accepted paper presents the problem of preprocessing pregnancy examination data and proposes an improved bi-LSTM-based missing value imputation approach, significantly enhancing the accuracy of predictions of hypertensive disorder in pregnancy (HDP) using the examination data.

The second paper explores the importance of sampling in neural network training to accelerate convergence and improve generalization, especially in imbalanced data scenarios.

In the third paper, a neural network boosting methodology for logistic regression is discussed, exploring various neural network-based models and advanced approaches applied to a binary classification task in a motor insurance portfolio while addressing model interpretability using a specific approach.

In the fourth paper published in this Special Issue, a task-driven method using CWGAN is proposed to generate high-quality artificial EEG data for emotion recognition tasks, resulting in improved performance and clearer classifications compared to real data.

Tsai M. et al. have investigated computer vision and pre-trained CNN models to enhance QR code source printer identification for digital forensics, with the customized CNN model outperforming others in terms of grayscale and color QR codes.

Lang J. proposes a gas tracking network by utilizing traceability technology and distributed sensors in chemical industry parks to monitor hazardous gas diffusion. The model, which was trained using a hybrid strategy, effectively and robustly traces leaking sources with a final classification accuracy of 99.14%, even in complex urban terrain and varying weather conditions.

Navid Nourian et al. apply the benefits of graph representation to develop a GNN-based surrogate model integrated with a particle swarm optimization (PSO) algorithm.



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3. Conclusions

In conclusion, we observed that AI [3,4] is increasingly being used in cybersecurity, with three main directions of research: (1) new areas of cybersecurity are addressed, such as CPS security and threat intelligence; (2) more stable and consistent results are being presented, sometimes with surprising accuracy and effectiveness; and (3) the presence of an AI-aware adversary is recognized and analyzed, enabling more robust and reliable solutions.

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List of Contributions:

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