

Preface to Special Issue on Advanced Optimization Methods for Uncertainties in Intelligent Industrial Systems

We are pleased to present this special issue of Computer Assisted Methods in Engineering and Science on Advanced Optimization Methods for Uncertainties in Intelligent Industrial Systems. It includes the state-of-the-art studies with extended research on the challenges encountered when computational intelligence meets industrial systems.

Recently, the research on intelligent industrial applications has been stimulated by the recent advances in artificial intelligence, advanced computational algorithms and programming models. Intelligent industrial systems have been found to be extremely effective at enhancing the reliability and resource utilization for achieving an advanced task allocation and industrial collaboration. With the increasing data rate and system complexity, there is a significant need to develop optimum and interpretable solutions for handling industrial operations. The next logical step was to incorporate optimization and computational intelligence at different industrial levels.

This special issue includes some of the papers from this new interdisciplinary research field. We received a number of submissions covering a wide variety of new optimization approaches and challenges, an initiative to expand the research possibilities in this newly emerging field. We selected an assortment of papers that capture some of the diverse research works, though this is far from exhaustive. The research articles in this issue introduce new problems, solutions, and datasets from industrial environments, advancing the research towards a deeper understanding of the industrial environment and providing the ability to communicate that understanding of the complexity and incorporate intelligent optimization approaches. The articles presented in this issue include:

Impact of Improved Whale Optimization Algorithm [Medical Data Optimization]: The first article discusses automating the process of lung nodule detection from CT images with the optimized convolutional neural network (CNN) model. For more precise detection of a lung nodule, the filter size of a convolution layer, hidden unit in the fully connected layer and the activation function in CNN are tuned optimally by using an improved whale optimization algorithm (WOA) [1].

Hybrid Encryption Algorithm [Industrial Security]: This research aims to secure big data using a novel hybrid encryption algorithm combining cipher-text policy attribute-based encryption (CP-ABE) and advanced encryption standard (AES) algorithms. The performance of the proposed model is compared with traditional encryption algorithms to validate superior performance in terms of throughput, encryption time, decryption time, and efficiency [2].

Multi-Objective Approach for Wireless Sensor Networks [Industrial Network Optimization]: This article proposes a fuzzy neural network-based clustering with dolphin swarm optimization routing and congestion control (FNDSOC), where an energy-efficient cluster head selection using a deep fuzzy neural network (DFNN) model and an energy-aware optimal routing using an improved dolphin swarm optimization (DSO) enhance the network lifetime by reducing the energy consumption of the nodes [3].

Speech Enhancement using Deep Neural Network [Industrial Communication Optimization]: In this research article, the speech signal corrupted by noise is enhanced. Evaluation of enhanced speech signal by performance metrics such as short time objective intelligibility and signal-to-noise ratio of the denoised speech show that the speech intelligibility and speech quality are improved by using the proposed method [4].

A Hybrid Optimized Multi-Cloud Environment [Industrial Data Optimization]: This research article presents a hybrid optimized resource allocation model by using the bat optimization algorithm and particle swarm optimization algorithm to allocate the resources by considering the resource status, distance, bandwidth, and task requirements. The proposed model performance is evaluated through simulation, and later it is compared with conventional optimization algorithms [5].

Intelligent Network for Food Quality Assurance Model [Industrial Uncertainty Handling]: In this research article, food quality is tested by sensing the product odor. When some of the employed sensors fail to operate imposing great uncertainty on the food quality assurance model, to handle this uncertainty, a support vector machine (SVM) classifier algorithm is developed to deal with the failure sensor effect by using a data imputation strategy [6].

Word Sense Disambiguation and Translation Memory [Industrial Communication Optimization]: This research work aims to design and implement English to Hindi machine translation. The design methodology addresses improving the speed and accuracy of the machine translation process. Later, the speed of execution is increased by replacing the modules in the machine translation process with lightweight modules, which reduces infrastructure and execution time [7].

Cat Swarm Optimization Algorithm Tuned Multilayer Perceptron for Stock Price Prediction [Predictive Intelligence and Optimization]: This article assesses the efficiency of the hybrid stock prediction model using the multilayer percep-

tron (MLP) and cat swarm optimization (CSO) algorithm. The model's prediction efficiency is evaluated in terms of MSE, MAPE, RMSE and MAE. The empirical findings confirm that the proposed CSO-MLP prediction model provides the best performance compared to other models taken for analysis [8].

Intelligent Agrobots for Crop Yield Estimation [Agricultural Data Optimization]: This article introduces a novel method for quantitative assessment of a tomato crop using color thresholding in MATLAB using the RGB color model. The performance of the berry counting algorithm is evaluated, and the technique is determined to have a high precision and recognition ratio of 96%. The research indicates that such a technique may be used to estimate the crop yield, which is helpful for forecasting yields, planning harvest plans, and generating prescription maps for field-specific management strategies [9].

We hope that readers will enjoy this in-depth exploration of modern optimization and uncertainty handling approaches in different industrial environments.

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