



Editorial: Optimization Methods, Mobile Networks and Data Analytics: Applications in Engineering and Industry 4.0

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Editorial:

The business world is changing and demands the integration of various engineering techniques to make the operation of the system in general more efficient. Optimization, information security and a prospective business vision is essential for companies to be more productive. The application of new technological solutions to manufacturing and management processes is one of the ways through which digital transformation in the supply chain advances, on the road to industry 4.0. To achieve this, optimization techniques, soft-computing, machine learning and Big Data technologies must be combined. With this integration it is possible to work with real-time sensed data to build and simulate Digital Twins with very high precision.

This special issue features six selected papers with high quality. The first article, “ $\mu\theta$ -EGF: A new multi-thread and nature-inspired algorithm for the packing problem”, authored by Félix Martínez-Rios, José Antonio Marmolejo-Saucedo, César Raúl García-Jacas and Alfonso Murillo-Suarez, proposed a new algorithm efficient solution to the packing problem in two dimensions. The authors propose a new heuristic using the value of the electromagnetic field to determine the best position to place a circular object in a configuration of other circular objects previously packed. Also, this algorithm simulates two processes to compact objects already placed, inspired by gravitational forces, to minimize the empty space in the container and maximizing the number of objects in the container. To determine the efficacy of this algorithm, the authors carried out experiments with twenty-four instances.

The second article titled “Mixed integer programming model for facility location problems: case study for consolidation centers” present a MILP based on case of a construction toy manufacturing company located in Mexico, whose current supply chain consists of importing raw materials from Europe, through shipments known as LCL. To minimize total transportation costs, the activation of consolidation centers located near the ports of departure currently used by the organization is proposed. They proposed scenarios are analyzed and the final recommendation is made.

In the next article with the title “Lagrangian Approach to Modeling Placement Conditions in Optimized Packing Problems”, Litvinchev et al. study packing problems arising, e.g., in installing service centers (mobile phone stations) in a region to reduce blind zones. Placement conditions are stated for the general packing problems using Lagrangian multipliers techniques. The approach is illustrated by numerical examples of packing regular and irregular polygons in the smallest circle and circular quadrant.

The fourth article titled “Traffic forecasting on mobile networks using 3D convolutional layers” the paper consider the use of spatio-temporal features from neighboring stations to the target base stations on wireless networks. Experimental results demonstrate that the proposed method outperforms other approaches used to predict traffic data.

The fifth article, “Design and Development of Digital Twins: A Case Study in Supply Chains” proposed a Digital twin technology that consists of creating virtual replicas of objects or processes that simulate the behavior of their real counterparts. The objective is to analyze its effectiveness or behavior in certain cases to improve its effectiveness. Applied to products, machines and even complete business ecosystems, the digital twin model can reveal information from the past, optimize the present and even predict the future performance of the different areas analyzed. The author proposes the design and development of a digital twin for a case study of a pharmaceutical company. The technology used is based on simulators, solvers and data analytic tools that allow these functions to be connected in an integral interface for the company.

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The last article titled “Proposal for a comprehensive Environmental Key Performance Index of the green supply chain” shows how the consideration of environmental objectives in the design of green supply chains creates the need to build a set of key performance indicators for monitoring and control. The present work is a proposal of a general index of environmental performance that includes operational, financial, and environmental aspects that allow monitoring the integral performance of the supply chain.

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Félix Martínez-Ríos, received his B.Sc. degree in Physics from the Universidad de la Habana, Cuba, in 1985, and the M.Sc. and Ph.D. degrees in Computer Science from the Tecnológico de Monterrey, Mexico City, Mexico, in 2005 and 2009, respectively. From July 1985 to July 1987 he joined the Telecommunications Research Laboratory in Havana as a researcher, Cuba. In July of 1987, he began as a professor at the Higher Pedagogical Institute in Havana, Cuba until 1994. In

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