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Editorial

Bioinspired Intelligent Algorithms for Optimization, Modeling and Control: Theory and Applications

Alma Y. Alanis

Department of Innovation, Centro Universitario de Ciencias Exactas e Ingenierías (CUCEI), University of Guadalajara, Guadalajara 44430, Mexico; alma.alanis@academicos.udg.mx

This book contains the successful invited submissions [1–13] to a Special Issue of *Mathematics* on the subject area of "Bioinspired Intelligent Algorithms for Optimization, Modeling and Control: Theory and Applications".

Nowadays, the relevance of bioinspired intelligent systems in our daily lives is indubitable; this topic has gained a significant amount of relevance for the development of a wide variety of solutions for complex tasks in real-world applications. This has been increasing, along with the need for explainability, interpretability, traceability and adequate comprehension of their processes and all mathematical foundations behind them, in such a way that it is currently not possible to conceive bioinspired intelligent algorithms without their respective theoretical and algorithmic analysis, in addition to their multidisciplinary motivation and applications. These applications vary from mechatronics to artificial vision, biomedical systems, energy, transportation, complex networks, among others. Hence, this Special Issue is intended to emphasize advances in the development and application of bioinspired intelligent algorithms to solve real-world problems related to the above-described problems, and to provide a place for collaboration between researchers from different disciplines to solve real-world applications with their respective constraints and features in different fields of research.

This Special Issue includes the most important applications of bioinspired intelligent algorithms, such as interpretability, image segmentation, classification, reconstruction, modeling, identification, control and synchronization, with applications in artificial vision, mechatronics, robotics, energy, transportation, complex networks and biomedical problems.

Interpretability in real-world data applications is not an easy task; in [1], a novel heuristic algorithm is proposed that allows simple structure-leading matrices in order to compute disjoint orthogonal components. Similarly, image segmentation, classification and reconstructions are complex tasks that have attracted the attention of researchers around the world, as can be exemplified in this Special Issue by the works reported in [2–5] covering different edges of these topics, all of them solved by using bioinspired intelligent algorithms.

Modeling energy systems is a complex activity; for instance, parameter identification on photovoltaic models [6] is solved by means of a Runge Kutta optimizer in order to catch the random behavior of weather to optimize output current from a photovoltaic nonlinear model. Similarly, in [7], a performance gradient-based optimizer is analyzed, applied to a charging station placement. Another type of energy system is considered in [8], with a parameter identification of an optimized fractional maximum power point tracking for thermoelectric generation systems using a new bioinspired intelligent algorithm, motivated by a manta ray behavior. The research results presented in [9] analyze stability for the control of an actuated electric vehicle with its respective validation. In [10], an optimal operation for reduced energy consumption in an air conditioning system based on a neural controller is considered. In this way, identification is a well-known methodology to obtain an accurate model of a complex dynamic system, and with the obtained model, it is possible to solve difficult nonlinear problems such as those represented by complex

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networks, as exemplified in [11] with a neural identifier used to design an impulsive pinning control. Another approach for trajectory tracking is presented in [12] for robot manipulators; the proposed methodology is based on biologically inspired metaheuristic optimization algorithms.

Finally, in [13], a biomedical application of bioinspired intelligent algorithms is presented; in particular, the proposed methodology deals with serum albumin levels in patients on hemodialysis, based on a whale optimization algorithm. The relevance of this type of application relies on improving the quality of life for patients and can be extended to other biomedical applications.

Therefore, this Special Issue includes a selection of thirteen papers covering different types of applications for bioinspired intelligent algorithms in order to solve real-world problems with the complexity associated with them that impedes their solution by means of traditional algorithms. All the contributors are convinced of the relevance of the proposed methodologies to improve existing results in the different research areas considered here, and we hope to contribute to enriching the research in bioinspired intelligent algorithms and their applications.

We found the editing and selection of papers for this book very inspiring and rewarding. We also thank the editorial staff and reviewers for their efforts and help during the process.

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