Preface

From the early 1990s, the introduction of the term "*Computational Intelligence*" (CI) highlighted the potential applicability of this field. One of the preliminary applications of the field was in the realm of optimization. Undoubtedly, the tasks of design and operation of systems can be approached systematically by the application of optimization. And while in most real-life problems, including engineering problems, application of the classical optimization techniques were limited due to the complex nature of the decision space and numerous variables, and the CI-based optimization techniques, which imitated the nature as a source of inspiration, have proven quite useful. Consequently, during the last passing decades, a considerable number of novel nature-based optimization algorithms have been proposed in the literature. While most of these algorithms hold considerable promise, a majority of them are still in their infancy. For such algorithms to bloom and reach their full potential, they should be implemented in numerous optimization problems, so that not only their most suitable sets of optimization problems are recognized, but also adaptive strategies need to be introduced to make them more suitable for wider sets of optimization problems. For that, this book specifically aimed to introduce some of these potential nature-based algorithms that could be useful for multidisciplinary students including those in aeronautic engineering, mechanical engineering, industrial engineering, electrical and electronic engineering, chemical engineering, civil engineering, computer science, applied mathematics, physics, economy, biology, and social science, and particularly those pursuing postgraduate studies in advanced subjects. Chapter 1 of the book is a review of the basic principles of optimization and nature-based optimization algorithms. Chapters 2–15 are respectively dedicated to Cat Swarm Optimization (CSO), League Championship Algorithm (LCA), Anarchies Society Optimization (ASO), Cuckoo Optimization Algorithm (COA), Teacher-Learning-Based Optimization (TLBO), Flower Pollination Algorithm (FPA), Krill Herd Algorithm (KHA), Grey Wolf Optimization (GWO), Shark Smell Optimization (SSO), Ant Lion Optimization (ALO), Gradient Evolution (GE), Moth-Flame Optimization (MFO), Crow Search Algorithm (CSA), and Dragonfly Algorithm (DA). The order of the chapters corresponds to the order of chronological appearance of these algorithms, from earlier algorithms to newly introduced ones.

Each chapter describes a specific algorithm and starts with a brief literature review of its development and subsequent modification since the time of inception. This is followed by the presentation of the basic concept on which the algorithm is based and the steps of the algorithm. Each chapter closes with a pseudocode of the algorithm.

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