Preface

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Abstract: *The volume contains extended versions of selected papers, presented at the International Symposium on INnovations in Intelligent SysTems and Applications (INISTA), held in Sofia, Bulgaria in 2019.*

Initiated in 2005 in Turkey the International Symposium on INnovations in Intelligent SysTems and Applications (INISTA) has already become annual IEEE conference, a traditionally recognized forum for fruitful communication between researchers from the entire spectrum of the multi-disciplinary field of intelligent systems. The community of researchers regularly attending INISTA grow through the years since the conference was hosted by Bulgaria, Italy, Spain, Poland, Romania and Greece. INISTA 2019 was organized for the second time in Bulgaria by the Institute of Information and Communication Technologies at Bulgarian Academy of Sciences and IEEE Bulgarian Section in cooperation with Yildiz Technical University, Turkey and by technical support from the IEEE SCM society TC on Computational Collective Intelligence.

Papers included in that Special Issue on Innovations in Intelligent Systems and Applications were selected based on their presentations at the conference as well as estimation from reviewers.

The first paper **"Design of a MAGLEV system with PID based Fuzzy control using CS Algorithm"** proposes an effective and robust Fuzzy-PID controller tuned with Cuckoo Search that demonstrates small overshoot, short settling time, fast rise time and minimum steady state error during control of a magnetic ball levitation system.

In the article **"Self-Similar Decomposition of Digital Signals"** a new self-similar decomposition of digital signals is proposed. The approach proposed demonstrates good multiscale characteristics. It can be used for compact signal presentation, restoration of distorted signals, event detection, localization, etc.

In paper **"Two Applications of Inter-Criteria Analysis with Belief Functions"** a new Belief Function-based Inter-Criteria Analysis (BF-ICrA) approach is proposed for the assessment of redundancy of criteria involved in Multi-Criteria Decision-Making (MCDM) problems that diminishes the complexity of MCDM

problem. Its performance is demonstrated in two applications: the GPS surveying problem, and the car selection problem.

A new application of Capsule Network for offline signature identification and verification is proposed in the article **"Offline Signature Identification and Verification Based on Capsule Representations"**. The capability of Capsule Network for both tasks are thoroughly evaluated for different resolutions.

In the next paper **"Second Generation Current Conveyor Based Floating Fractional Order Memristance Simulator and a New Dynamical System"** a memristance circuit element implementation providing fractional function behaviors for the physical realization of artificial neural networks and their learning algorithms is proposed.

A formulation of the problem of determining optimal pricing strategies in semi-competitive intermediation networks, as nonlinear convex optimization is given in the paper **"Optimal Semi-Competitive Intermediation Networks"**. The authors theoretically prove that a globally optimal pricing strategy always exists for collectively profitable network and the participants can employ it to maximize their Nash social welfare.

The next paper **"Semantic Classification and Indexing of Open Educational Resources with Word Embeddings and Ontologies"** concerns the problem of thematic indexing of open educational resources. The authors propose as a solution a combination of explicit knowledge graph representations with vector-based learning of formal thesaurus terms.

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