

Guest Editorial: Innovations in Intelligent Systems and Applications

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This special section includes extended versions of selected papers from the 15th International Conference on INnovations in Intelligent SysTems and Applications (INISTA), which has been held during August 8-10, 2022, in Biarritz, France in hybrid mode.

The series of INISTA conferences have been organized since 2005. INISTA Conferences aim to bring together researchers from the entire spectrum of the multi-disciplinary fields of intelligent systems and to establish effective means of communication between them. In particular, they focus on all aspects of intelligent systems and the related applications, from both perspectives: theory and practice. The topics of interest of INISTA 2022 covered the entire spectrum of the multi-disciplinary fields of intelligent systems and related applications. In particular, the topics included: Artificial Intelligence Algorithms, Artificial Neural Networks; Autonomous systems; Bioinformatics. Big Data Applications, Algorithms, and Systems; Cloud/Edge/Fog Computing; Computational and Data Science; Data Mining; Data Hiding; Deep Learning; Distributed Intelligence; Ensemble Learning; Evolutionary Computation; Expert Systems; Fuzzy Logic; Genetic Algorithms; Hardware Implementations for Intelligent Systems; Human-Computer Interaction; Humanoid Robotics; Hybrid Intelligence; Intelligent Agents; Intelligent Applications in Biomedical Engineering; Intelligent Approaches in Robotic and Automation; Intelligent Approaches in Signal and Image Processing; Intelligent Approaches in System Identification/Modeling; Intelligent Behavior; Intelligent Control Systems; Intelligent Defense/Security Systems; Intelligent Healthcare; Intelligent Education; Intelligent Interaction and Visualization; Intelligent Life; Information Security; Internet of Things, Internet of Everything; Machine Learning; Memetic Computing; Natural Language Processing; Neurotechnology and Emergent Intelligence in Nervous Systems; Robust Perception in Complex Environments; Reinforcement Learning; Smart Sensors, Materials, and Environments; Smart Wearables; Social Media Mining; Swarm Intelligence; Text Mining; Virtual, Augmented, and Mixed Reality; Other topics related to Intelligent Systems.

In 2022 year, there were 78 accepted papers in the conference, and 10 of them were selected and invited for this special section. Submitted papers were based on original conference papers. Moreover, they were carefully revised, extended, improved, and judged acceptable for publication in this journal. Each paper has undergone a review process of at least two rounds, as well as it has been reviewed by two or three referees. Finally, 3 papers were accepted for publishing. The aim of this special issue is to present some new directions and research results in the area of intelligent systems.

The first paper “3D Convolutional Long Short-Term Encoder-Decoder Network for Moving Object Segmentation” by Anil Turker and Ender M. Eksioğlu presented the MOS-Net (Moving Object Segmentation) deep framework, an encoder-decoder network that combines spatial and temporal features using the flux tensor algorithm, 3D CNNs, and

ConvLSTM in its different variants. In an enhanced version the framework MOS-Net 2.0, additional ConvLSTM modules are added to 3D CNNs for extracting long-term spatiotemporal features. In the final stage of the framework the output of the encoder-decoder network, the foreground probability map, is thresholded for producing a binary mask, where moving objects are in the foreground and the rest forms in the background. In addition, an ablation study has been conducted to evaluate different combinations as inputs to the proposed network, including challenging videos such as those with dynamic backgrounds, bad weather, and illumination changes. The results of the proposed approach are compared with other competitive methods from the literature using the same evaluation strategy, and it has been concluded that the introduced MOS networks give highly competitive results.

The second paper “Echo State Network for Features Extraction and Segmentation of Tomography Images” by Petia Koprinkova-Hristova, Ivan Georgiev and Miryana Raykovska proposed a novel approach for gray scale images segmentation. It is based on multiple features extraction from a single feature per image pixel, i.e., its intensity value, via a recurrent neural network (Echo state network). The preliminary tests on the benchmark gray scale image Lena demonstrated that the newly extracted features (i.e., reservoir equilibrium states) reveal hidden image characteristics. Additionally, the developed approach was applied to a real-life situation for segmentation of a 3D tomography image of a bone. The aim of this application was to explore the object’s internal structure. The achieved results confirmed that the novel approach allows for clearer revealing the details of the bone internal structure, thus, supporting further tomography image analyses. Obtained results are also valuable from the practical point of view.

The problem of integrating virtual assistants with Intent-based Networking (IBN) and Software-defined Networking (SDN) for industrial network automation is explored in the paper “Voice-Enabled Intent-Based Networking for Industrial Automation” by Raul Barbosa, Joao Fonseca, Marco Araujo and Daniel Corujo. This work presented a preliminary architecture for a voice-enabled IBN system. The proposed architecture included the support of network orchestrators and network slice managers in the existing solution to allow the configuration of more network assets, including 5G Networks, improving the system’s capabilities. The results presented in the paper provide insights into this solution’s potential benefits and limitations to enhance the automation of the management and orchestration procedures in industrial networks.

We gratefully acknowledge all the hard work and enthusiasm of authors and reviewers, without whom the special section would not have been possible. Also, we believe that readers will enjoy reading these papers and will be inspired for their future work.