



Editorial

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Editorial for the first volume of the “Foundations and Applications of Evolving Intelligence at the 21st century” as a Special Issue of the *Evolving Systems (EVOS)* Springer Journal. Totally, five (5) papers were accepted for publication in this Special Issue, after passing through a peer review process by independent academic referees. The papers presented herein, explore diverse timely algorithmic approaches and applications of Intelligent Systems, applying certain level of evolution and novelty.

The first paper is entitled: “Hybrid intelligent modeling of wild fire risk” and it is authored by: Vardis-Dimitris Anezakis, Konstantinos Demertzis, Lazaros Iliadis, and Stefanos Spartalidis, from the School of Engineering, Department of Civil Engineering, Lab of Mathematics and Informatics (ISCE) of the Democritus University of Thrace, Greece. The authors propose an interesting and intelligent Soft Computing Multivariable Analysis system, that develops and uses reliable and flexible fuzzy wild fire risk indices. The core is a Takagi–Sugeno Fuzzy Inference system. The main novelty is the production of Partial Risk indices which are then unified to an Overall one, by employing fuzzy T-Norms, offering ground for experimentation. The system has proven to be reliable when tested with real data.

The second paper “Kernel averaged gradient descent subtractive clustering for exemplar selection” is written by: Yiannis Kokkinos and Konstantinos G. Margaritis, from the Department of Applied Informatics, University of Macedonia, Thessaloniki, Greece. This very interesting and novel

research presents a new algorithmic scheme for automatic selection of representative real data points as exemplars. The authors employ a leave-one-out kernel averaged Gradient Descent, that automatically estimates a suitable bandwidth parameter from the data in conjunction with the Subtractive Clustering algorithm. This bandwidth is used to extract the most representative exemplars, without initial knowledge of their number. Both Experimental simulations and comparisons of the proposed solution with Affinity propagation offered promising results.

The title of the third paper by Mandani Ntekouli, Maria Marouli, Georgia Konstantopoulou, George Anastassopoulos, and Dimitrios Lymperopoulos, from University of Patras and Democritus University of Thrace Greece, is the following: “A mapping of epilepsy’s evolution: implementation of the proposed knowledge-based model”. This is an intelligent medical application which could have a great application potential in real life. Authors propose a novel health status transition model in epilepsy, as well as an implementation scheme suitable to be used in health telemonitoring systems. This model is capable to monitor the patient and to detect abnormalities, providing a time margin for him/her to take actions and for his/her caregivers to be prepared to help and act. Based on the model’s transitions information, a health-caring ontology has been produced. A decision-making telemonitoring algorithm based on the proposed model was developed in Java.

Dimitrios Mallis, Thomas Sgouros, and Nikolaos Mitianoudis, from the Department of Electrical and Electronic Engineering of the Democritus University of Thrace Greece, are presenting the fourth paper entitled: “Convolutive audio source separation using robust ICA and an intelligent evolving permutation ambiguity solution”. This research introduces a multiple-microphone audio source separation algorithm, which is a significantly optimized version of their earlier work. The major improvements are the following: The Complex Fast Independent Component Analysis (ICA) of the previous version, is substituted by the Robust ICA. This is increasing both the robustness and the performance. Finally, the Permutation ambiguity is solved using the

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Likelihood Ration Jump (LRJ) solution, which is modified to decrease computational complexity in the case of multiple microphones. The Reduced LRJ, although a suboptimal solution, seems to achieve better separation, since it does not allow more source flipping than necessary.

The fifth and last paper is entitled: “Producing fuzzy inclusion and entropy measures and their application on global image thresholding”. The authors are Athanasios C. Bogiatzis, and Basil Papadopoulos from the School of Engineering, Department of Civil Engineering of the Democritus University of Thrace, Greece.

The authors continue and significantly expand their previous research on fuzzy subsethood and entropy measures. They cause a minor alteration to the axioms of fuzzy inclusion, and they produce new potential fuzzy inclusion and entropy indicators. These indices are used in applications which require or properly exploit fuzzy inclusion and entropy measurements (e.g., Image Processing, Feature Selection, Fuzzy Controllers, Similarity Measures). This research also proposes a general method of global image thresholding, which effectively uses some of the above measures. Unlike other common techniques of global image

thresholding, this method does not depend on histogram concativity analysis. Also, it does not rely on optimizing some statistical measure (e.g. variance minimization) of the gray-level information. It only needs specific attributes of the images which are measured by some fuzzy inclusion and entropy indicators. It is more of an adaptable process rather than a “strict” procedure and it can be easily adjusted to meet the needs of different domains.

We hope that the readers will find the above contributions very interesting and that they will be motivated in their research efforts. The Guest editors wish to thank all the authors and reviewers that contributed to this special issue, and also to the editors-in-chief and the editorial office of the *Evolving Systems* (Springer) journal for their kind and invaluable support.

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