

Preface

Computational Intelligence for Emerging Systems and Applications

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Computational intelligence represents a collection or set of computational techniques in soft computing, machine learning, and some engineering disciplines, which investigate, simulate, and analyze very complex issues and phenomena (see, e.g. [1]). They provide us with the opportunity to use our knowledge and raw data to approach extremely complex problems (see, e.g., [2]). This multidisciplinary research field is in continuous expansion in the artificial intelligence research community (see, e.g., [3]).

This special issue focusses on the emerging systems and applications of computational intelligence, which is becoming extremely important in research and in business [4], increasingly present in our daily life (see, e.g., [5]), associated to the huge amount of data we are recording (see, e.g. [6]). Many fields of science, and particularly social sciences (see, e.g., [7]), are being removed by this new paradigm: wide aspects of reality can be systematically observed, and such overwhelming data set requires specific technologies to be visualized (see, e.g. [8]), to be processed (see, e.g. [9]), and to be transformed into useful information for decision-makers (see, e.g. [10]), but at the same time the access to such a systematic observation, it opens the possibility of designing decision aid tools in complex problems (see, e.g. [11]) and increase the presence of autonomous systems (see, e.g., [12]). This *big data* paradigm implies a revolution in the way society has to be studied, and how society itself will evolve. Not only the economic system and labor structure is being deeply affected, but also the relationship between human beings. We do expect that machines get intelligent enough to avoid obvious mistakes produced by lacks of concentration that machines do not have, but we are also expecting much more than that: machines will establish links between somehow hidden facts, and will have the opportunity to evolve by means of an automatic learning from experience in order to produce more automatic

decisions (see, e.g. [13]), but also to interact with human beings by speaking our language and even showing emotions (see, e.g. [14]). Such a paradigm comes with a number of technological challenges (see, e.g., [15]), but also legal challenges (see, e.g. [16]) that might affect some pillars of democratic societies, like the access to communication, information, and education. Our social and economic structures, and even perhaps deep aspects of individual perception and emotion are being touched. A tremendous revolution is going on, and computational intelligence is a main driving force: no relevant improvement can be implemented in this complex society if it is not previously translated into a computable program.

Taking into account the increasing relevance of computational intelligence in society, science, and technology, this issue represented a call to submit outstanding and original unpublished research manuscripts focused on the latest findings in computational intelligence for emerging systems and applications. After a strict peer review procedure, some few papers were accepted into this special issue.

The first paper in this special issue [17] comes back to main theoretical backgrounds of fuzzy logic, which represents a natural basis of many intelligent methodologies, solving an open problem relative to the behavior of Boolean filters within algebraic structures.

The second paper [18] proposes an efficient high-utility sequential pattern mining algorithm based on tree structure over data stream.

The third paper [19] proposes a feedback control scheduling architecture for real-time database, once we realize that ontologies allow mechanisms that create formal representations of concepts, properties, and relations between concepts.

The fourth paper [20] is devoted to image segmentation, and after acknowledging that no universal accepted quality scheme exists for evaluation the performance of segmentation algorithms, a novel fusion-based measure for its quality is proposed.

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The fifth paper [21] is devoted to a close problem: edge detection, proposing a global evaluation approach based on the idea of edge list to produce a solution that suits more the human perception.

The sixth paper in this special issue [22] is focused on Software Defect Prediction, achieved by an original construction of prediction models using datasets obtained by mining software historical depositories.

The seventh paper [23] addresses e-commerce, how previous reviews influence opinions, and when those review should be considered as spam.

The eight paper [24] deals with emotion recognition, taking into account electroencephalogram and external physiological signals, considering trained Fully Connected Neural Networks to fed fusion features and classify emotions.

Finally, the ninth paper [25] focuses on decision heuristic strategies, proposing a new rewarding mechanism for branching in Boolean satisfiability problems.

We hope readers will enjoy this special issue and that its reading will help in their research and the implementation of specific tools and applications of computational intelligence, offering an interesting approach to key issues in computational intelligence, from basic mathematical issues [17] and data structures [18], to the management of emotions [24] and decision-making [25], addressing intermediate knowledge processing tools like concept representation [19], visualization of information [20] and its evaluation [21], plus software analysis [22] and spam detection [23].

Yun Li, Tianrui Li, and Javier Montero, editors.

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