EDITORIAL

Special issue on creative intelligence

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1 Introduction

Creativity and intelligence are both terms that have been deeply studied for centuries but still generate debates. Scholars frequently relate both terms, establishing connections that allow us to understand the relationship between general intelligence and creativity. Both are considered required for addressing challenging problems, and also for creating art or appealing designs. Music, literature, architecture, painting, crafts, industrial design—they all benefit from a better understanding and conceptualization of the processes behind creativity and intelligence. Although computers have exceeded the capabilities of humans in a number of limited domains, human creativity generally remains unchallenged, and only recently some techniques, such as computational intelligence, have begun to address problems related to creativity. Computational intelligence (CI) is a term that embodies a number of nature-inspired techniques, such as evolutionary computation, neural networks, fuzzy logic systems, as well as related techniques derived from them, such as swarm optimization, artificial immune systems, and ant colony optimization, to name but a few. CI is nowadays applied routinely to solve complex real life problems. Despite the great variety of methods and applications, only very recently have researchers considered the capabilities of CI when applied to creative processes. Nevertheless, there is a long way to go before we may find a general model for creativity and its relationship with intelligence.

The interest for the synergies between computational intelligence and creativity propelled the creation in 2012 of the IEEE Creative Intelligence Task Force, which has since then organized a number of activities around the area, including special sessions in the main conferences and art exhibits around the world.

The special issue we introduce here is part of the task force's ongoing effort to promote and disseminate research in the area, and it was announced with the idea of publishing extended and improved versions of selected works from the special sessions previously organized in Brisbane 2013, and Beijing 2014.

2 Summary of the special issue

Out of a number of invited candidates from the mentioned conferences, three papers have been carefully selected, through thorough peer review, for publication in this special issue. Together, they span the field from general approaches to creative processes and algorithms, to more specific implementations towards generating artistic material.

In the first paper, *A semantic network-based evolutionary algorithm for computational creativity*, A. Gunes et al. introduce a novel evolutionary algorithm that employs semantic networks as the individual chromosome. They

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reformulate genetic operations to properly manage this chromosome, and provide the algorithm with the capability to work as a memetic algorithm in the original sense as proposed by Dawkins.

The second paper, *Monterey Mirror: an Experiment in Interactive Music Performance Combining Evolutionary Computation and Zipf's Law* by D. Hughes et al., presents an experiment in Interactive Music Performance, where the performer and the computer plays a game involving listening and exchanging of ideas. The computer applies Markov models, genetic algorithms and power-law metrics to generate musical ideas based on aesthetic variations of user input.

Finally, the third paper, *Turn-Based Evolution in a Simplified Model of Artistic Creative Process* by Palle Dahlstedt, presents an approach to modelling a simplified form of artistic creative process, where two evolutionary algorithms are applied alternately to translate between high- and low-level representations of the same aesthetic object. Due to the ambiguity and vagueness in the representations, new configurations can arise from coincidences and misinterpretations, in a kind of rudimentary creative mechanism.