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Preface

Alex Graudenzi · Giulio Caravagna · Giancarlo Mauri

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The goal of this Special Issue is to present high-quality articles in the intimately related areas of Artificial Life and Evolutionary Computation, which reflect the major interests and achievements of the Italian scientific community.

Artificial Life (AL) is a relatively new multidisciplinary research field concerned with designing and investigating artificial systems that exhibit behaviors of either existing or hypothetical living systems. Typical topics in this area include: Bioinspired Robotics, Complex Systems, Models of Artificial and Biological systems, Models of Social and Economical Systems, Synthetic and Systems Biology, Systems Chemistry, and Origin of Life.

Evolutionary Computation (EC) is concerned with the study of the theoretical and applied aspects of algorithms and computational systems inspired by natural systems and, in particular, by the theory of evolution. Key topics are Genetic Algorithms and Programming, Bioinspired and Evolutionary Programming, Swarm Intelligence and other Optimization Techniques.

The main forum for the Italian research community dealing with AL and EC is the *Italian Workshop on Artificial Life and Evolutionary Computation* (Wivace).

Wivace series has a rather long history and, in fact, is the result of the merging of the *Italian Workshop on Artificial Life* (WIVA, first edition in 2003) and the *Italian Day on Evolutionary Computation* (GSICE, first edition in 2005).

A. Graudenzi (✉) · G. Caravagna · G. Mauri
Department of Informatics, Systems and Communication, University of Milan-Bicocca, Viale Sarca 336, 20126 Milan, Italy
e-mail: alex.graudenzi@unimib.it

Despite the Italian denomination, the workshop is highly international with frequent contributions from researchers from various European countries.

The 2013 edition of Wivace was held on July 1–2 at the University of Milan-Bicocca in Milan, as a satellite workshop of the 2013 conference on *Unconventional Computation & Natural Computation* (UCNC 2013) and co-located with *Computability in Europe* (CiE 2013).

Wivace 2013 provided an opportunity for researchers in AL, EC and Complex Systems to present relevant novel research in a strongly multidisciplinary context. The Italian word *'vivace'* means *'lively'* and this word describes well the general atmosphere of the event, indicating a bright future for the Wivace series.

Four different sessions, including the invited talks by Wim Hordijk, Alberto D'Onofrio and Enrico Formenti, were organized: *'Origin of life and synthetic biology'*, *'Complex systems: modeling, simulation and theory'*, *'Bioinformatics and Systems Biology'* and *'Bioinspired and evolutionary computation'*.

This Special Issue contains the revised and extended versions of a selection of the best contributions presented at Wivace 2013, as well as invited articles from former Wivace contributors, invited speakers and researchers maintaining strong contact with the community.

17 papers, including invited contributions, were accepted for the presentation at Wivace 2013 and in the successive publication in the *Electronic Proceedings in Theoretical Computer Science* (EPTCS, volume 130).

From these contributions, 8 were selected for the submission of an extended and revised version to this Special Issue and 3 further articles were independently submitted, resulting in the total of 11 submitted papers.

After the peer-review process, 9 papers were accepted for publication.

The special issue includes the following articles.

Wim Hordijk et al. investigate the existence and composition of the smallest possible Reflexively Autocatalytic Set in the Origin of Life research area. Alberto D'Onofrio et al. review the role of both extrinsic and intrinsic noise in shaping the dynamics of bio-molecular networks, also proposing examples of molecular circuits under the influence of bounded noises.

Andrea Citrolo and Giancarlo Mauri introduce a novel hybrid Monte Carlo ant colony optimization algorithm for the hydrophobic-polar model for protein structure prediction. Chiara Damiani et al. present a new modeling approach based on flux balance analysis, aimed at uncovering the design principles of metabolic networks by means of evolutionary techniques. Giordano Rampioni et al. investigate the potential interactions between living and synthetic systems by combining wet-lab experiments with mathematical models. Paolo Milazzo et al. validate a previously defined component identification algorithm to a number of real-world SBML models. Roberto Serra et al. introduce the first stochastic model of catalytic reaction network in a protocell, and show some preliminary analysis of its dynamics. Emanuele Massaro et al. present local strategies to generate different classes of networks, as well as a new model of the evolutionary dynamics and growth of on-line social networks. Finally, Onofrio Gigliotta et al. describe a population of homogeneous robots evolved to dynamically allocate roles via communicative interactions.

We finally want to thank all the people that made this Special Issue possible.

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