Special Issue on Bio-Inspired Computing and Underlying Biological Principles

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Artificial Life is underpinned by computing from its early conceiving till present, and the Nature has been always a source of great inspiration for computer scientists and engineers. Thus the Artificial Life and the Nature-Inspired computing always go shoulder to shoulder in the journey towards novel, emergent and future computing and engineering systems. Ways of being inspired by nature are virtually unlimited; in this special issue we focus just on few selected topics from computational biology, collective intelligence and robotics.

The first paper of the issue—"Cell Motility Viewed as Softness" by Sawa, Balaz, and Shirakawa—presents an original model of cell motility and exploratory behavior of slime mould *P. polycephalum*. Using relatively models the paper uncovers novel principles of slime mould propagation and pattern formation. In their paper "Analysis of Neural Network of *C.*

elegans by Converting into Bipartite Network" Keiu Harada and colleagues attempt to identify intrinsic structural properties of neural plexuses of the nematode using tools from the network theory. Relationships between cell length and velocity of the cells' propagation, and a role of tubular structure in cell's motility are analysed by Shirakawa in his paper "Allometric Scaling Laws in the Exploratory Behavior of the *Physarum* Plasmodium." A model of swarm propagation based on internal perturbations and simple interactions between creatures in the swarm is presented in "A Model of Scale-Free Proportion Based on Mutual Anticipation" by Murakami et al. A discrete model of swarms is presented in "Robust Swarm Model Based on Mutual Anticipation: Swarm as a Mobile Network Analyzed by Rough Set Lattice" by Gunji et al; the paper also makes a contribution towards formal analysis of swarm behavior. The

last papers of the issue deal with implementation of collective behavior of robots in space exploration (Keitaro Naruse and Tatsuya Sato) and person recognition based on a machine learning (Hiroshi Sato and Julien Rossignol).

We believe results of the inter-disciplinary research presented in this special issue will make an impact onto development of novel paradigms, techniques and architecture of computing and engineering systems based on principles of Nature.

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