Session Title: Special Session on "New Models of Bio-inspired computation for Massive Complex Environments"

Organizers:

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Description:

This special session is focused on the application of bioinspired algorithms in massively complex systems/environments, where the latter encompass both non-conventional computational platforms and complex problems. This goal includes both the complexity of the underlying computational substrate on which the bioinspired algorithms are executed, and the complexity of the problem/data environment the algorithm is tackling. In both cases, complexity is to be understood as the intricate relationships among the components of the corresponding system giving rise to emergent properties of the latter, as well as the sheer difficulty for coping with the system due to its size or its dynamic nature, just to mention a couple of features.

From the computational point of view, properties of interest in such massively complex systems are heterogeneity, instability, decentralization, asynchrony and non-regular connectivity among other features (all of which, or at least some of them, commonly found in, e.g., P2P networks, volunteer computing grids, or pool-based environments). As for the data perspective, we are interested in scenarios featuring massive size, and dynamic patterns arising from emergent phenomena such as self-organization (as in technosocial systems such as, e.g., collaborative repositories or social networks). Algorithms used in these contexts must be resilient, adaptable and flexible. Hence bioinspired algorithms (such as evolutionary algorithm or swarm intelligence) are particularly well-suited to this endeavor. Augmenting them with domain knowledge in order to tackle specific problems, and adapting them to exploit adequately the resources of a complex computational environment, requires the orchestrated interplay of a large number of algorithmic components within a composite architecture, giving rise to deep bioinspired algorithms. It is particularly important in this context the adaptation of the algorithm to changing conditions in a decentralized and emergent way, in particular to attain sensible energy/resource-aware self-adjustment and for self-repairing damages infringed by the volatility of the system, among others properties.

We hope that this session can provide a common forum for researchers and practitioners to exchange their ideas and report their latest finding in the area.
The topics of interest include, but are not limited to:
- Heuristic optimization, algorithms, parallel computing.
- Complex systems and/or massively complex environments
- Mining the structure of massively complex systems
- Characterize the types of algorithms that can be applied on massively complex social networks.
- Use bio-inspired techniques for procedural generation in videogames design.
- Design of bio-inspired algorithm for solving problems in massively complex environments.
- Community finding and pattern mining algorithms in massively complex real domains.