Socially and Biologically Inspired Computing for Self-organizing Communications Networks

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Abstract

The design and development of future communications networks call for a careful examination of biological and social systems. New technological developments like self-driving cars, wireless sensor networks, drones swarm, Internet of Things, Big Data, and Blockchain are promoting an integration process that will bring together all those technologies in a large-scale heterogeneous network. Most of the challenges related to these new developments cannot be faced using traditional approaches, and require to explore novel paradigms for building computational mechanisms that allow us to deal with the emergent complexity of these new applications. In this article, we show that it is possible to use biologically and socially inspired computing for designing and implementing self-organizing communication systems. We argue that an abstract analysis of biological and social phenomena can be made to develop computational models that provide a suitable conceptual framework for building new networking technologies: biologically inspired computing for achieving efficient and scalable networking under uncertain environments; socially inspired computing for increasing the capacity of a system for solving problems through collective actions. We aim to enhance the state-of-the-art of these approaches and encourage other researchers to use these models in their future work.

Keywords

Self-organization; Natural computing; Complex systems; Ad hoc networks