

Lecture Notes in Bioinformatics

5410

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Subseries of Lecture Notes in Computer Science

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Transactions on Computational Systems Biology X

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Library of Congress Control Number: Applied for

CR Subject Classification (1998): J.3, F.1-2, F.4, I.6, C.2

LNCS Sublibrary: SL 8 – Bioinformatics

ISSN 0302-9743 (Lecture Notes in Computer Science)

ISSN 1861-2075 (Transactions on Computational Systems Biology)

ISBN-10 3-540-92272-5 Springer Berlin Heidelberg New York

ISBN-13 978-3-540-92272-8 Springer Berlin Heidelberg New York

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Printed in Germany

Typesetting: Camera-ready by author, data conversion by Scientific Publishing Services, Chennai, India

Printed on acid-free paper SPIN: 12589234 06/3180 5 4 3 2 1 0

Preface

Technology is taking us to a world where myriads of heavily networked devices interact with the physical world in multiple ways, and at many levels, from the global Internet down to micro and nano devices. Many of these devices are highly mobile and autonomous and must adapt to the surrounding environment in a totally unsupervised way.

A fundamental research challenge is the design of robust decentralized computing systems that are capable of operating in changing environments and with noisy input, and yet exhibit the desired behavior and response time, under constraints such as energy consumption, size, and processing power. These systems should be able to adapt and learn how to react to unforeseen scenarios as well as to display properties comparable to social entities. The observation of nature has brought us many great and unforeseen concepts. Biological systems are able to handle many of these challenges with an elegance and efficiency far beyond current human artifacts. Based on this observation, bio-inspired approaches have been proposed as a means of handling the complexity of such systems. The goal is to obtain methods to engineer technical systems, which are of a stability and efficiency comparable to those found in biological entities.

This *Special Issue on Biological and Biologically-inspired Communication* contains the best papers from the Second International Conference on Bio-Inspired Models of Network, Information, and Computing Systems (BIONET-ICS 2007). The BIONETICS conference aims to bring together researchers and scientists from several disciplines in computer science and engineering where bio-inspired methods are investigated, as well as from bioinformatics, to deepen the information exchange and collaboration among the different communities.

We selected eight outstanding papers from both domains and invited the authors to prepare extended versions of their manuscripts. The first three papers by Forestiero et al., Meyer et al., and Dubrova et al. describe the applicability of bio-inspired techniques in the technical domain of computing and communication. Atakan and Akan, and Nakano et al. focus on molecular communication and the properties of such communication channels. In the domain of bioinformatics, the papers by Rueda et al., and Smith and Wiese demonstrate techniques for the analysis of genes. We would like to highlight the paper by Wang et al. in which a bio-inspired approach is applied in the field of bioinformatics. This approach specifically complements our special issue on bio-inspired solutions and bioinformatics. The final paper describes a stochastic pi-calculus model of the PHO pathway, and it is a regular paper.

July 2008

Falko Dressler
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