A Short Foreword to the "2011 Interdisciplinary Symposium on Complex Systems"

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Foreword

The "science of complex systems" comprises many different kinds of systems. Moreover, there is no unique definition of a "complex system" so far, so one way to show it might be by introducing the work that it is associated with it. Therefore, this is an introduction to the accepted works presented at the "2011 Interdisciplinary Symposium on Complex Systems".

The paper by O.E. Rössler introduces the concept of "cryodynamics", which can be looked at as a sister to thermodynamics demonstrated numerically. In the paper, the author also attempts to find a significant connection to cosmology. The work presented by R.L. Ricca attempts to review some of the most recent developments and results on energy-complexity relations obtained by structural complexity methods. D.L. Stein et al. review spin glasses and find a significant role for them in computer science, biology, and other fields. In addition, the authors discuss how spin glasses might lead to a kind of "new complexity".

In their work, V.J. Law et al. analyze the acoustic moment of atmospheric pressure plasma and discuss novel results. N. Miyagawa et al. formulate the decomposition rules to express the global interactions as a superposition of local interactions which cannot be decomposed further. The paper by Y.-P. Gunji et al. describes the interaction of coherent swarms in a simulation model which implements nontrivial logical gates. The paper presented by J.M. Cole investigates the construction of molecular charge-transfer algorithms to search through a representative large set of organic chemicals in order to identify compounds that have the required structural attributes to act as high-performance dyes for DSCs.

https://doi.org/10.25088/ComplexSystems.20.3.i

The work presented by T. Smaglichenko applies to modify the Gaussian elimination to a large set of complex seismic data, and the work presented by N.P. Bulatova attempts to correlate a spatio-temporal seismic data to the movement of the Moon relative to Earth. The paper presented by I. Zelinka et al. discusses a novel method to classify algorithms applicable to complex systems and networks. R. Dariani et al. investigate pinning control applied to moving agents associated to chaotic dynamics. R. Senkerik et al. deal with the synthesis of control laws by analytic programming (AP) applying them to the Hénon map in the chaotic mode. P. Belluomo et al. describe the structure of an interactive platform to better understand a control process, and F. Boschetti et al. attempt to find answers to two important questions: (i) what is the smallest number of components that a computational system needs in order to display genuine novelty? and (ii) can the features of such systems exhibit novel causal effects?

The paper by H. Zenil explores connections between algorithmic complexity and Turing universality by focusing on the qualitative behavior of computing systems that enables them to transmit and manipulate information. Finally, the contribution work presented by A. Sanayei investigates some recent definitions of "complex systems" and suggests a new way to define "complexity" based on "fuzzy logic".

Acknowledgments

The author expresses his cordial thanks to Stephen Wolfram, Todd Rowland, Glenn Scholebo, Abby Nussey, and Hector Zenil for their help and the opportunity to publish in the journal of Complex Systems the full version papers of the "2011 Interdisciplinary Symposium on Complex Systems" held in Halkidiki, Greece, from September 19-21, 2011. The organizer also thanks all the symposium Program Committee members, reviewers, speakers, and contributors.

https://doi.org/10.25088/ComplexSystems.20.3.i