

Table of Contents

Genetic and Epigenetic Networks

Using Artificial Epigenetic Regulatory Networks to Control Complex Tasks within Chaotic Systems	1
<i>Alexander P. Turner, Michael A. Lones, Luis A. Fuente, Susan Stepney, Leo S. Caves, and Andy M. Tyrrell</i>	
A Gene Regulatory Network Simulation of Heterosis	12
<i>Peter Martin Ferdinand Emmrich, Hannah Elizabeth Roberts, and Vera Pancaldi</i>	
Comparing Discrete and Piecewise Affine Differential Equation Models of Gene Regulatory Networks	17
<i>Shahrad Jamshidi, Heike Siebert, and Alexander Bockmayr</i>	
Automatic Inference of Regulatory and Dynamical Properties from Incomplete Gene Interaction and Expression Data	25
<i>Fabien Corblin, Eric Fanchon, Laurent Trilling, Claudine Chaouiya, and Denis Thieffry</i>	

Transcriptomics and Gene Regulation

CRISPR Transcript Processing: An Unusual Mechanism for Rapid Production of Desired Molecules	31
<i>Marko Djordjevic, Konstantin Severinov, and Magdalena Djordjevic</i>	
A Comprehensive Computational Model to Simulate Transcription Factor Binding in Prokaryotes	35
<i>Nicolae Radu Zabet and Boris Adryan</i>	

Signalling Pathways and Responses

Evolved Artificial Signalling Networks for the Control of a Conservative Complex Dynamical System	38
<i>Luis A. Fuente, Michael A. Lones, Alexander P. Turner, Susan Stepney, Leo S. Caves, and Andy M. Tyrrell</i>	
The Effect of Membrane Receptor Clustering on Spatio-temporal Cell Signalling Dynamics	50
<i>Bertrand R. Caré and Hédi A. Soula</i>	

Systems Biology Analysis of Kinase Inhibitor Protein Target Profiles in Leukemia Treatments	62
<i>Jacques Colinge, Uwe Rix, Keiryn L. Bennett, and Giulio Superti-Furga</i>	
Multispecific Interactions in Enzymatic Signalling Cascades	67
<i>Daniel D. Seaton and J. Krishnan</i>	

Protein Structure and Metabolic Networks

Role of Physico-chemical Properties of Amino Acids in Protein's Structural Organization: A Network Perspective	74
<i>Dhriti Sengupta and Sudip Kundu</i>	
Tailored Strategies for the Analysis of Metabolomic Data	82
<i>Kristen Feher, Kathrin Jürchott, and Joachim Selbig</i>	

Patterning and Rhythm Generation

Evolving Locomotion for a Simulated 12-DOF Quadruped Robot	90
<i>Gordon Klaus, Kyrre Glette, and Mats Høvin</i>	
Predictive Modelling of Stem Cell Differentiation and Apoptosis in <i>C.elegans</i>	99
<i>Antje Beyer, Ralf Eberhard, Nir Piterman, Michael O. Hengartner, Alex Hajnal, and Jasmin Fisher</i>	
Criticality of Spatiotemporal Dynamics in Contact Mediated Pattern Formation	105
<i>Nicholas S. Flann, Hamid Mohamadlou, and Gregory J. Podgorski</i>	

Neural Modelling and Neural Networks

The Vasopressin System – Asynchronous Burst Firing as a Signal Encoding Mechanism	117
<i>Duncan J. MacGregor, Tom F. Clayton, and Gareth Leng</i>	
The Effective Calcium/Calmodulin Concentration Determines the Sensitivity of CaMKII to the Frequency of Calcium Oscillations	131
<i>Thiago M. Pinto, Maria J. Schilstra, and Volker Steuber</i>	
The Effect of Different Types of Synaptic Plasticity on the Performance of Associative Memory Networks with Excitatory and Inhibitory Sub-populations	136
<i>Alex Metaxas, Reinoud Maex, Volker Steuber, Rod Adams, and Neil Davey</i>	

Simulating Neurons in Reaction-Diffusion Chemistry	143
<i>James Stovold and Simon O'Keefe</i>	

Biomedical Modelling and Signal Processing

Extending an Established Simulation: Exploration of the Possible Effects Using a Case Study in Experimental Autoimmune Encephalomyelitis ...	150
<i>Richard B. Greaves, Mark Read, Jon Timmis, Paul S. Andrews, and Vipin Kumar</i>	

Human Uterine Excitation Patterns Leading to Labour: Synchronization or Propagation?	162
<i>Eleftheria Pervolaraki and Arun V. Holden</i>	

Evolving Computational Dynamical Systems to Recognise Abnormal Human Motor Function	177
<i>Michael A. Lones, Stephen L. Smith, Andy M. Tyrrell, Jane E. Alty, and D.R. Stuart Jamieson</i>	

Heat-Maps and Visualization for Heterogeneous Biomedical Data Based on Information Distance Geometry	183
<i>Esther Loeliger, Chrystopher L. Nehaniv, and Alastair J. Munro</i>	

Information Processing and Representation

Bio-inspired Information Processing Applied to Engineering Systems ...	188
<i>Cristina Costa Santini</i>	

Understanding the Regulation of Predatory and Anti-prey Behaviours for an Artificial Organism	200
<i>Maizura Mokhtar</i>	

Closing the Gap between Life and Physics	212
<i>Ron Cottam, Willy Ranson, and Roger Vounckx</i>	

Algebraic Analysis of the Computation in the Belousov-Zhabotinsky Reaction	216
<i>Paolo Dini, Chrystopher L. Nehaniv, Attila Egri-Nagy, and Maria J. Schilstra</i>	

Algorithmic Approaches in Computational Biology

Improving Transcription Factor Binding Site Predictions by Using Randomised Negative Examples	225
<i>Faisal Rezwan, Yi Sun, Neil Davey, Rod Adams, Alistair G. Rust, and Mark Robinson</i>	

Finding the Minimal Gene Regulatory Function in the Presence of
Undefined Transitional States Using a Genetic Algorithm 238
 Rocio Chavez-Alvarez, Arturo Chavoya, and
 Cuahtemoc Lopez-Martin

Extracting Tailored Protein Complexes from Protein-Protein
Interaction Networks 250
 Hiroshi Okamoto

A Parallel Algorithm for Multiple Biological Sequence Alignment 264
 Irma R. Andalon-Garcia, Arturo Chavoya, and M.E. Meda-Campana

Author Index 277