## Contents

### Part I  Self-Organizing Map Learning, Visualization, and Quality Assessment

**Theoretical and Applied Aspects of the Self-Organizing Maps** .......................... 3  
Marie Cottrell, Madalina Olteanu, Fabrice Rossi and Nathalie Villa-Vialaneix

**Aggregating Self-Organizing Maps with Topology Preservation** ....................... 27  
Jérôme Mariette and Nathalie Villa-Vialaneix

**ESOM Visualizations for Quality Assessment in Clustering** .............................. 39  
Alfred Ultsch, Martin Behnisch and Jörn Lötsch

**SOM Quality Measures: An Efficient Statistical Approach** .............................. 49  
Lutz Hamel

**SOM Training Optimization Using Triangle Inequality** ................................... 61  
Denny, William Gozali and Ruli Manurung

**Sparse Online Self-Organizing Maps for Large Relational Data** ....................... 73  
Madalina Olteanu and Nathalie Villa-Vialaneix

### Part II  Clustering and Time Series Analysis with Self-Organizing Maps and Neural Gas

**A Neural Gas Based Approximate Spectral Clustering Ensemble** ....................... 85  
Yaser Moazzen and Kadim Taşdemir

**Reliable Clustering Quality Estimation from Low to High Dimensional Data** ......... 95  
Jean-Charles Lamirel

**Segment Growing Neural Gas for Nonlinear Time Series Analysis** ................. 107  
Jorge R. Vergara, Pablo A. Estévez and Álvaro Serrano
Modeling Diversity in Ensembles for Time-Series Prediction
Based on Self-Organizing Maps ........................................ 119
Rigoberto Fonseca-Delgado and Pilar Gómez-Gil

Part III Applications in Control, Planning, and Dimensionality
Reduction, and Hardware for Self-Organizing Maps

Modular Self-Organizing Control for Linear
and Nonlinear Systems .................................................. 131
Paulo Henrique Muniz Ferreira and Aluizio Fausto Ribeiro Araújo

On Self-Organizing Map and Rapidly-Exploring Random Graph
in Multi-Goal Planning .................................................. 143
Jan Faigl

Dimensionality Reduction Hybridizations with Multi-dimensional
Scaling ................................................................. 155
Oliver Kramer

A Scalable Flexible SOM NoC-Based Hardware Architecture ........ 165
Mehdi Abadi, Slavisa Jovanovic, Khaled Ben Khalifa, Serge Weber
and Mohamed Hédi Bedoui

Local Models for Learning Inverse Kinematics of Redundant Robots:
A Performance Comparison ............................................ 177
Humberto I. Fontinele, Davyd B. Melo and Guilherme A. Barreto

Part IV Self-Organizing Maps in Neuroscience and Medical
Applications

Using SOMs to Gain Insight into Human Language Processing ...... 191
Risto Miikkulainen

Prototype-Based Spatio-Temporal Probabilistic Modelling
of fMRI Data .............................................................. 193
Nahed Alowadi, Yuan Shen and Peter Tiño

LVQ and SVM Classification of FDG-PET Brain Data ............... 205
Deborah Mudali, Michael Biehl, Klaus L. Leenders
and Jos B. T. M. Roerdink

Mutual Connectivity Analysis (MCA) for Nonlinear Functional
Connectivity Network Recovery in the Human Brain
Using Convergent Cross-Mapping and Non-metric Clustering ...... 217
Axel Wismüller, Anas Z. Abidin, Adora M. DSouza
and Mahesh B. Nagarajan
Advances in Self-Organizing Maps and Learning Vector Quantization
Proceedings of the 11th International Workshop WSOM
2016, Houston, Texas, USA, January 6-8, 2016
Merenyi, E.; Mendenhall, M.J.; O'Driscoll, P. (Eds.)
2016, XIII, 370 p. 89 illus., 65 illus. in color., Softcover
ISBN: 978-3-319-28517-7