## Table of Contents

Foreword ............................................................................................................................................. xvi

Preface ................................................................................................................................................ xvii

### Section 1

**Chapter 1**
Integration of Data Mining and Statistical Methods for Constructing and Exploring Data Cubes ........ 1  
_Muhammad Usman, Shaheed Zulfikar Ali Bhutto Institute of Science and Technology, Pakistan_

**Chapter 2**
Online Processing of End-User Data in Real-Time Data Warehousing............................................... 13  
_M. Asif Naeem, Auckland University of Technology, New Zealand_
_Noreen Jamil, University of Auckland, New Zealand_

**Chapter 3**
Multi-Relational Data Mining A Comprehensive Survey ................................................................. 32  
_Ali H. Gazala, Auckland University of Technology, New Zealand_
_Waseem Ahmad, Auckland University of Technology, New Zealand_

**Chapter 4**
Comparative Study of Incremental Learning Algorithms in Multidimensional Outlier Detection  
on Data Stream...................................................................................................................................... 54  
_Simon Fong, University of Macau, Macau SAR_
_Dong Han, University of Macau, Macau SAR_
_Athanassios V. Vasilakos, Lulea University of Technology, Lulea, Sweden_
Section 2

Chapter 5
Advances of Applying Metaheuristics to Data Mining Techniques ............................................ 75
Simon Fong, University of Macau, Macau SAR
Jinyan Li, University of Macau, Macau SAR
Xueyuan Gong, University of Macau, Macau SAR
Athanasios V. Vasilakos, Kuwait University, Kuwait

Chapter 6
Artificial Immune Optimization Algorithm................................................................. 104
Waseem Ahmad, International College of Auckland, New Zealand

Chapter 7
The Role of Hypermutation and Affinity Maturation in AIS Approaches to Clustering .......... 124
Waseem Ahmad, International College of Auckland, New Zealand
Ajit Narayanan, Auckland University of Technology (AUT), New Zealand

Chapter 8
Cancer Pathway Network Analysis Using Cellular Automata ........................................... 145
Kalyan Mahata, Government College of Engineering and Leather Technology, India
Anasua Sarkar, Government College of Engineering and Leather Technology, India

Section 3

Chapter 9
Knowledge Extraction from Information System Using Rough Computing ....................... 161
D. P. Acharjya, VIT University, India

Chapter 10
Data Mining Techniques on Earthquake Data: Recent Data Mining Approaches ................ 183
Negar Sadat Soleimani Zakeri, University of Tabriz, Iran
Saeid Pashazadeh, University of Tabriz, Iran

Chapter 11
An Evaluation of C4.5 and Fuzzy C4.5 with Effect of Pruning Methods .............................. 200
Tayyeba Naseer, PMAS Arid Agriculture University, Pakistan
Sohail Asghar, COMSATS Institute of Information Technology, Pakistan

Chapter 12
An Empirical Evaluation of Feature Selection Methods ................................................... 233
Mohsin Iqbal, University Institute of Information Technology, Pakistan
Saif Ur Rehman, University Institute of Information Technology, Pakistan
Saira Gillani, Corvinus University of Budapest, Hungary
Sohail Asghar, COMSATS Institute of Information Technology, Pakistan
Section 4

Chapter 13
Data Mining Driven Rule Based Expert System for Medical Billing Compliance: A Case Study .... 260
Umair Abdullah, Foundation University, Pakistan
Aftab Ahmed, Foundation University, Pakistan
Sohail Asghar, Comsats Institute of Information Technology, Pakistan
Kashif Zafar, National University of Computer and Emerging Sciences, Pakistan

Chapter 14
A Web Backtracking Technique for Fraud Detection in Financial Applications......................... 289
Tasawar Hussain, Mohammad Ali Jinnah University, Pakistan
Sohail Asghar, COMSATS Institute of Information Technology, Pakistan

Chapter 15
Segmentation of Crops and Weeds Using Supervised Learning Technique.......................... 308
Noureen Zafar, University Institute of Information Technology, Pakistan
Saif Ur Rehman, University Institute of Information Technology, Pakistan
Saira Gillani, Corvinus University of Budapest, Hungary
Sohail Asghar, COMSATS Institute of Information Technology, Pakistan

Chapter 16
A Supervised Learning Model for AGV Perception in Unstructured Environment.................. 334
Rizwan Aqeel, University Institute of Information Technology, Pakistan
Saif Ur Rehman, University Institute of Information Technology, Pakistan
Saira Gillani, Corvinus University of Budapest, Hungary
Sohail Asghar, COMSATS Institute of Information Technology, Pakistan

Compilation of References ............................................................................................................ 354

About the Contributors ................................................................................................................ 383

Index................................................................................................................................................ 389