

Contents

VOLUME ONE

	Part I Foundations
Preface	vii
List of contributors	xvii
Chapter 1 Finite automata <i>Jean-Éric Pin</i>	3
Chapter 2 Automata and rational expressions <i>Jacques Sakarovitch</i>	39
Chapter 3 Finite transducers and rational transductions <i>Tero Harju and Juhani Karhumäki</i>	79
Chapter 4 Weighted automata <i>Manfred Droste and Dietrich Kuske</i>	113
Chapter 5 Max-plus automata <i>Sylvain Lombardy and Jean Mairesse</i>	151
Chapter 6 ω-Automata <i>Thomas Wilke (revised by Sven Schewe)</i>	189
Chapter 7 Automata on finite trees <i>Christof Löding and Wolfgang Thomas</i>	235

Chapter 8	
Automata on infinite trees	265
<i>Christof Löding</i>	

Chapter 9	
Two-dimensional models	303
<i>Stefano Crespi Reghizzi, Dora Giammarresi, and Violetta Lonati</i>	

Part II Complexity issues

Chapter 10	
Minimisation of automata	337
<i>Jean Berstel, Luc Boasson, Olivier Carton, and Isabelle Fagnot</i>	

Chapter 11	
Learning algorithms	375
<i>Henrik Björklund, Johanna Björklund, and Wim Martens</i>	

Chapter 12	
Descriptional complexity of regular languages	411
<i>Hermann Gruber, Markus Holzer, and Martin Kutrib</i>	

Chapter 13	
Enumerating regular expressions and their languages	459
<i>Hermann Gruber, Jonathan Lee, and Jeffrey Shallit</i>	

Chapter 14	
Circuit complexity of regular languages	493
<i>Michal Koucký</i>	

Chapter 15	
Černý's conjecture and the road colouring problem	525
<i>Jarkko Kari and Mikhail Volkov</i>	

Part III

Algebraic and topological theory of automata

Chapter 16 Varieties <i>Howard Straubing and Pascal Weil</i>	569
Chapter 17 Profinite topologies <i>Jorge Almeida and Alfredo Costa</i>	615
Chapter 18 The factorisation forest theorem <i>Thomas Colcombet</i>	653
Chapter 19 Wadge–Wagner hierarchies <i>Jacques Duparc</i>	695
Chapter 20 Equational theories for automata <i>Zoltán Ésik</i>	729
Chapter 21 Language equations <i>Michał Kunc and Alexander Okhotin</i>	765
Chapter 22 Algebra for trees <i>Mikołaj Bojańczyk and Giorgio Satta</i>	801
Index	xxiii

VOLUME TWO

Preface	vii
List of contributors	xvii
Part IV	
Automata in mathematics	
Chapter 23	
Rational subsets of groups	841
<i>Laurent Bartholdi and Pedro V. Silva</i>	
Chapter 24	
Groups defined by automata	871
<i>Laurent Bartholdi and Pedro V. Silva</i>	
Chapter 25	
Automata in number theory	913
<i>Boris Adamczewski and Jason Bell</i>	
Chapter 26	
On Cobham's theorem	947
<i>Fabien Durand and Michel Rigo</i>	
Chapter 27	
Symbolic dynamics	987
<i>Marie-Pierre Béal, Jean Berstel, Søren Eilers, and Dominique Perrin</i>	
Chapter 28	
Automatic structures	1031
<i>Sasha Rubin</i>	
Chapter 29	
Automata and finite model theory	1071
<i>Wouter Gelade and Thomas Schwentick</i>	
Chapter 30	
Finite automata, image manipulation, and automatic real functions	1105
<i>Juhani Karhumäki and Jarkko Kari</i>	

Part V
Selected applications

List of contributors

Chapter 31 Communicating automata <i>Dietrich Kuske and Anca Muscholl</i>	1147
Chapter 32 Symbolic methods and automata <i>Bernard Boigelot</i>	1189
Chapter 33 Synthesis with finite automata <i>Igor Walukiewicz</i>	1217
Chapter 34 Timed automata <i>Patricia Bouyer</i>	1261
Chapter 35 Higher-order recursion schemes and their automata models <i>Arnaud Carayol and Olivier Serre</i>	1295
Chapter 36 Analysis of probabilistic processes and automata theory <i>Kousha Etessami</i>	1343
Chapter 37 Natural language parsing <i>Mark-Jan Nederhof and Giorgio Satta</i>	1383
Chapter 38 Verification <i>Javier Esparza, Orna Kupferman, and Moshe Y. Vardi</i>	1415
Chapter 39 Automata and quantum computing <i>Andris Ambainis and Abuzer Yakaryilmaz</i>	1457
Index	xxiii