Ming-Yang Kao (Ed.)

Encyclopedia of Algorithms

With 183 Figures and 38 Tables
With 4075 References for Further Reading



MING-YANG KAO

Professor of Computer Science
Department of Electrical Engineering and Computer Science
McCormick School of Engineering and Applied Science
Northwestern University
Evanston, IL 60208
USA

Library of Congress Control Number: 2007933824

ISBN: 978-0-387-30162-4

This publication is available also as: Print publication under ISBN: 978-0-387-30770-1 and Print and electronic bundle under ISBN: 978-0-387-36061-4

© 2008 SpringerScience+Buisiness Media, LLC.

All rights reserved. This work may not be translated or copied in whole or in part without the written permission of the publisher (Springer Science+Business Media, LLC., 233 Spring Street, New York, NY 10013, USA), except for brief excerpts in connection with reviews or scholarly analysis. Use in connection with any form of information storage and retrieval, electronic adaptation, computer software, or by similar or dissimilar methodology now known or hereafter developed is forbidden.

The use in this publication of trade names, trademarks, service marks, and similar terms, even if they are not identified as such, is not to be taken as an expression of opinion as to whether or not they are subject to proprietary rights.

springer.com

Printed on acid free paper

SPIN: 11563624 2109letex – 5 4 3 2 1 0

Preface

The *Encyclopedia of Algorithms* aims to provide the researchers, students, and practitioners of algorithmic research with a mechanism to efficiently and accurately find the names, definitions, key results, and further readings of important algorithmic problems.

The work covers a wide range of algorithmic areas, and each algorithmic area is covered by a collection of entries. An encyclopedia entry is an in-depth mini-survey of an algorithmic problem and is written by an expert researcher. The entries for an algorithmic area are compiled by an area editor to survey the representative results in that area and can form the core materials of a course in the area.

The *Encyclopedia* does not use the format of a conventional long survey for several reasons. A conventional survey takes a handful of individuals too much time to write and is difficult to update. An encyclopedia entry contains the same kinds of information as in a conventional survey, but an encyclopedia entry is much shorter and is much easier for readers to absorb and for editors to update. Furthermore, an algorithmic area is surveyed by a collection of entries which together provide a considerable amount of up-to-date information about the area, while the writing and updating of the entries is distributed among multiple authors to speed up the work.

This reference work will be updated on a regular basis and will evolve towards primarily an Internet-based medium to allow timely updates and fast search. If you have feedback regarding a particular entry, please feel free to communicate directly with the author or the area editor of that entry. If you are interested in authoring an entry, please contact a suitable area editor. If you have suggestions on how to improve the Encyclopedia as a whole, please contact me at kao@northwestern.edu.

The credit of the Encyclopedia goes to the area editors, the entry authors, the entry reviewers, and the project editors at Springer, including Jennifer Evans and Jennifer Carlson.

Ming-Yang Kao Editor-in-Chief

Table of Contents

Abelian Hidden Subgroup Problem	• • • • • •	. 1
Adaptive Partitions		. 4
1986; Du, Pan, Shing		
Adwords Pricing		. 7
2007; Bu, Deng, Qi		
Algorithm DC-Tree for k Servers on Trees		. 9
Algorithmic Cooling		. 11
1999; Schulman, Vazirani		
2002; Boykin, Mor, Roychowdhury, Vatan, Vrijen		
Algorithmic Mechanism Design		. 16
1999; Nisan, Ronen		
Algorithms for Spanners in Weighted Graphs	. 	. 25
2003; Baswana, Sen		
All Pairs Shortest Paths in Sparse Graphs	. .	. 28
2004; Pettie		
All Pairs Shortest Paths via Matrix Multiplication		. 31
2002; Zwick		
Alternative Performance Measures in Online Algorithms		. 34
2000; Koutsoupias, Papadimitriou		
Analyzing Cache Misses		. 37
2003; Mehlhorn, Sanders		
Applications of Geometric Spanner Networks		. 40
2002; Gudmundsson, Levcopoulos, Narasimhan, Smid		
Approximate Dictionaries		. 43
2002; Buhrman, Miltersen, Radhakrishnan, Venkatesh		
Approximate Regular Expression Matching		. 46
1995; Wu, Manber, Myers	. ,	

Approximate Tandem Repeats	. 48
2001; Landau, Schmidt, Sokol	
2003; Kolpakov, Kucherov	
Approximating Metric Spaces by Tree Metrics	. 51
1996; Bartal, Fakcharoenphol, Rao, Talwar	
2004; Bartal, Fakcharoenphol, Rao, Talwar	
Approximations of Bimatrix Nash Equilibria	. 53
2003; Lipton, Markakis, Mehta	
2006; Daskalaskis, Mehta, Papadimitriou	
2006; Kontogiannis, Panagopoulou, Spirakis	
Approximation Schemes for Bin Packing	. 57
1982; Karmarker, Karp	
Approximation Schemes for Planar Graph Problems	. 59
1983; Baker	
1994; Baker	
Arbitrage in Frictional Foreign Exchange Market	. 62
2003; Cai, Deng	
Arithmetic Coding for Data Compression	. 65
1994; Howard, Vitter	
Assignment Problem	. 68
1955; Kuhn	
1957; Munkres	
Asynchronous Consensus Impossibility	. 70
1985; Fischer, Lynch, Paterson	
Atomic Broadcast	. 73
1995; Cristian, Aghili, Strong, Dolev	
Attribute-Efficient Learning	. 77
1987; Littlestone	
Automated Search Tree Generation	. 78
2004; Gramm, Guo, Hüffner, Niedermeier	
Backtracking Based <i>k</i> -SAT Algorithms	. 83
2005; Paturi, Pudlák, Saks, Zane	
Best Response Algorithms for Selfish Routing	. 86
2005; Fotakis, Kontogiannis, Spirakis	
Bidimensionality	. 88
2004; Demaine, Fomin, Hajiaghayi, Thilikos	
Binary Decision Graph	. 90
1986; Bryant	

Bin Packing	24
1997; Coffman, Garay, Johnson	14
Boosting Textual Compression	97
2005; Ferragina, Giancarlo, Manzini, Sciortino	
Branchwidth of Graphs)1
2003; Fomin, Thilikos	
Broadcasting in Geometric Radio Networks)5
B-trees) 8
1972; Bayer, McCreight	
Burrows–Wheeler Transform	12
Byzantine Agreement	16
1980; Pease, Shostak, Lamport	
Cache-Oblivious B-Tree	21
2005; Bender, Demaine, Farach-Colton	
Cache-Oblivious Model	23
1999; Frigo, Leiserson, Prokop, Ramachandran	
Cache-Oblivious Sorting	26
1999; Frigo, Leiserson, Prokop, Ramachandran	
Causal Order, Logical Clocks, State Machine Replication	29
1978; Lamport	
Certificate Complexity and Exact Learning	31
1995; Hellerstein, Pilliapakkamnatt, Raghavan, Wilkins	
Channel Assignment and Routing in Multi-Radio Wireless Mesh Networks	34
2005; Alicherry, Bhatia, Li	
Circuit Partitioning: A Network-Flow-Based Balanced Min-Cut Approach	38
1994; Yang, Wong	
Circuit Placement	43
2000; Caldwell, Kahng, Markov	
2002; Kennings, Markov	
2006; Kennings, Vorwerk	
Circuit Retiming	1 6
1991; Leiserson, Saxe	
Circuit Retiming: An Incremental Approach	19
2005; Zhou	

Clock Synchronization
Closest String and Substring Problems
Closest Substring
Color Coding
Communication in Ad Hoc Mobile Networks Using Random Walks
Competitive Auction
Complexity of Bimatrix Nash Equilibria
Complexity of Core
Compressed Pattern Matching
Compressed Suffix Array
Compressed Text Indexing
Compressing Integer Sequences and Sets
Computing Pure Equilibria in the Game of Parallel Links
Concurrent Programming, Mutual Exclusion
Connected Dominating Set
Connectivity and Fault-Tolerance in Random Regular Graphs
Consensus with Partial Synchrony

Constructing a Galled Phylogenetic Network	202
CPU Time Pricing	205
Critical Range for Wireless Networks	207
Cryptographic Hardness of Learning	210
Cuckoo Hashing	212
Data Migration	217
Data Reduction for Domination in Graphs	220
Decoding Reed-Solomon Codes	222
Decremental All-Pairs Shortest Paths	226
Degree-Bounded Planar Spanner with Low Weight	228
Degree-Bounded Trees	231
Deterministic Broadcasting in Radio Networks	233
Deterministic Searching on the Line	235
Dictionary-Based Data Compression	236
Dictionary Matching and Indexing (Exact and with Errors)	240
Dilation of Geometric Networks	244
Directed Perfect Phylogeny (Binary Characters)	246
Direct Routing Algorithms	248

Distance-Based Phylogeny Reconstruction (Fast-Converging)	251
Distance-Based Phylogeny Reconstruction (Optimal Radius)	253
Distributed Algorithms for Minimum Spanning Trees 	256
Distributed Vertex Coloring	258
Dynamic Trees	260
Edit Distance Under Block Operations	265
Efficient Methods for Multiple Sequence Alignment with Guaranteed Error Bounds	267
Engineering Algorithms for Computational Biology	270
Engineering Algorithms for Large Network Applications	272
Engineering Geometric Algorithms	274
Equivalence Between Priority Queues and Sorting	278
Euclidean Traveling Salesperson Problem	281
Exact Algorithms for Dominating Set	284
Exact Algorithms for General CNF SAT	286
Exact Graph Coloring Using Inclusion–Exclusion	289
Experimental Methods for Algorithm Analysis	290
External Sorting and Permuting	291

Facility Location	. 299
Failure Detectors	. 304
False-Name-Proof Auction	. 308
Fast Minimal Triangulation	. 310
Fault-Tolerant Quantum Computation	. 313
Floorplan and Placement	. 317
Flow Time Minimization	. 320
FPGA Technology Mapping	. 322
Fractional Packing and Covering Problems 1991; Plotkin, Shmoys, Tardos 1995; Plotkin, Shmoys, Tardos	. 326
Fully Dynamic All Pairs Shortest Paths	. 329
Fully Dynamic Connectivity	. 331
Fully Dynamic Connectivity: Upper and Lower Bounds	. 332
Fully Dynamic Higher Connectivity	. 335
Fully Dynamic Higher Connectivity for Planar Graphs	. 337
Fully Dynamic Minimum Spanning Trees	. 339
Fully Dynamic Planarity Testing	. 342
Fully Dynamic Transitive Closure	. 343
Gate Sizing	. 345

General Equilibrium	. 347
Generalized Steiner Network	. 349
Generalized Two-Server Problem	. 351
Generalized Vickrey Auction	. 353
Geographic Routing	. 355
Geometric Dilation of Geometric Networks	. 358
Geometric Spanners	. 360
Gomory–Hu Trees	. 364
Graph Bandwidth	. 366
Graph Coloring	. 368
Graph Connectivity	. 371
Graph Isomorphism	. 373
Greedy Approximation Algorithms	. 376
Greedy Set-Cover Algorithms	. 379
Hamilton Cycles in Random Intersection Graphs	. 383
Hardness of Proper Learning	. 385
High Performance Algorithm Engineering for Large-scale Problems	. 387

Hospitals/Residents Problem	390
1962; Gale, Shapley	
Implementation Challenge for Shortest Paths	395
Implementation Challenge for TSP Heuristics	398
2002; Johnson, McGeoch	
Implementing Shared Registers in Asynchronous Message-Passing Systems	400
Incentive Compatible Selection	403
Independent Sets in Random Intersection Graphs	405
Indexed Approximate String Matching	408
Inductive Inference	411
I/O-model	413
Kinetic Data Structures	417
Knapsack	419
Learning with the Aid of an Oracle	423
Learning Automata	425
Learning Constant-Depth Circuits	429
Learning DNF Formulas	431
Learning Heavy Fourier Coefficients of Boolean Functions	434
Learning with Malicious Noise	436
Learning Significant Fourier Coefficients over Finite Abelian Groups	438

LEDA: a Library of Efficient Algorithms	. 442
Leontief Economy Equilibrium	. 444
Linearity Testing/Testing Hadamard Codes	. 446
Linearizability	. 450
List Decoding near Capacity: Folded RS Codes	. 453
List Scheduling	. 455
Load Balancing 1994; Azar, Broder, Karlin 1997; Azar, Kalyanasundaram, Plotkin, Pruhs, Waarts	. 457
Local Alignment (with Affine Gap Weights)	. 459
Local Alignment (with Concave Gap Weights)	. 461
Local Approximation of Covering and Packing Problems	. 463
Local Computation in Unstructured Radio Networks	. 466
Local Search Algorithms for kSAT	. 468
Local Search for K-medians and Facility Location	. 470
Lower Bounds for Dynamic Connectivity	. 473
Low Stretch Spanning Trees	. 477
LP Decoding	. 478
Majority Equilibrium	. 483

Market Games and Content Distribution	185
Max Cut 1994; Goemans, Williamson 1995; Goemans, Williamson	189
Maximum Agreement Subtree (of 2 Binary Trees)	192
Maximum Agreement Subtree (of 3 or More Trees)	195
Maximum Agreement Supertree	197
Maximum Compatible Tree	199
Maximum-Density Segment	502
Maximum Matching	504
Maximum-scoring Segment with Length Restrictions	506
Maximum Two-Satisfiability	507
Max Leaf Spanning Tree	511
Metrical Task Systems	514
Metric TSP	517
Minimum Bisection	519
Minimum Congestion Redundant Assignments	522
Minimum Energy Broadcasting in Wireless Geometric Networks	526
Minimum Energy Cost Broadcasting in Wireless Networks	528
Minimum Flow Time	531

Minimum Geometric Spanning Trees	533
Minimum k-Connected Geometric Networks	536
Minimum Makespan on Unrelated Machines	539
Minimum Spanning Trees	541
Minimum Weighted Completion Time	544
Minimum Weight Triangulation	546
Mobile Agents and Exploration	548
Multicommodity Flow, Well-linked Terminals and Routing Problems	551
Multicut	554
Multidimensional Compressed Pattern Matching	556
Multidimensional String Matching 1999; Kärkkäinen, Ukkonen	559
Multi-level Feedback Queues	562
Multiple Unit Auctions with Budget Constraint	563
Multiplex PCR for Gap Closing (Whole-genome Assembly)	565
Multiway Cut	567
Nash Equilibria and Dominant Strategies in Routing	571
Nearest Neighbor Interchange and Related Distances	573

Negative Cycles in Weighted Digraphs	76
Non-approximability of Bimatrix Nash Equilibria	78
Non-shared Edges	79
Nucleolus	31
Oblivious Routing	35
Obstacle Avoidance Algorithms in Wireless Sensor Networks	38
O(log log n)-competitive Binary Search Tree	92
Online Interval Coloring	94
Online List Update	98
Online Paging and Caching)1
Optimal Probabilistic Synchronous Byzantine Agreement)4
Optimal Stable Marriage)6
P2P	11
Packet Routing	16
Packet Switching in Multi-Queue Switches	18
Packet Switching in Single Buffer	21
PAC Learning	22
PageRank Algorithm	24

Paging	25
Parallel Algorithms for Two Processors Precedence Constraint Scheduling	27
Parallel Connectivity and Minimum Spanning Trees	29
Parameterized Algorithms for Drawing Graphs	31
Parameterized Matching	35
Parameterized SAT	39
Peptide De Novo Sequencing with MS/MS	40
Perceptron Algorithm	42
Perfect Phylogeny (Bounded Number of States)	14
Perfect Phylogeny Haplotyping	17
Performance-Driven Clustering	50
Phylogenetic Tree Construction from a Distance Matrix	51
Planar Geometric Spanners	53
Planarity Testing	56
Point Pattern Matching	57
Position Auction	50
Predecessor Search	51
Price of Anarchy	55

Price of Anarchy for Machines Models	567
Probabilistic Data Forwarding in Wireless Sensor Networks	571
Quantization of Markov Chains	577
Quantum Algorithm for Checking Matrix Identities	580
Quantum Algorithm for the Collision Problem 6 1998; Brassard, Hoyer, Tapp	582
Quantum Algorithm for the Discrete Logarithm Problem	583
Quantum Algorithm for Element Distinctness	586
Quantum Algorithm for Factoring	589
Quantum Algorithm for Finding Triangles	590
Quantum Algorithm for the Parity Problem	593
Quantum Algorithms for Class Group of a Number Field	594
Quantum Algorithm for Search on Grids	596
Quantum Algorithm for Solving the Pell's Equation	598
Quantum Approximation of the Jones Polynomial	700
Quantum Dense Coding	703
Quantum Error Correction	705
Quantum Key Distribution	708
Quantum Search	712

Quorums	5
Radiocoloring in Planar Graphs	1
2005; Fotakis, Nikoletseas, Papadopoulou, Spirakis Randomization in Distributed Computing	2
1996; Chandra	•
Randomized Broadcasting in Radio Networks	5
Randomized Energy Balance Algorithms in Sensor Networks	В
Randomized Gossiping in Radio Networks	1
Randomized Minimum Spanning Tree	2
Randomized Parallel Approximations to Max Flow	4
Randomized Rounding	7
Randomized Searching on Rays or the Line	D
Random Planted 3-SAT	2
Ranked Matching	4
Rank and Select Operations on Binary Strings	В
Rate-Monotonic Scheduling	1
Rectilinear Spanning Tree	4
Rectilinear Steiner Tree	7
Registers	1
Regular Expression Indexing	4

Regular Expression Matching	68
Reinforcement Learning	71
Renaming	74
RNA Secondary Structure Boltzmann Distribution	77
RNA Secondary Structure Prediction Including Pseudoknots	80
RNA Secondary Structure Prediction by Minimum Free Energy	82
Robotics	85
Robust Geometric Computation	88
Routing	91
Routing in Geometric Networks	93
Routing in Road Networks with Transit Nodes	96
R-Trees	00
Schedulers for Optimistic Rate Based Flow Control	03
Scheduling with Equipartition	06
Selfish Unsplittable Flows: Algorithms for Pure Equilibria	10
Self-Stabilization	12
Separators in Graphs	15

Sequential Approximate String Matching	8
Sequential Circuit Technology Mapping	0
Sequential Exact String Matching	4
Sequential Multiple String Matching	6
Set Agreement	9
Set Cover with Almost Consecutive Ones	2
Shortest Elapsed Time First Scheduling	4
Shortest Paths Approaches for Timetable Information	7
Shortest Paths in Planar Graphs with Negative Weight Edges	8
Shortest Vector Problem	-1
Similarity between Compressed Strings	3
Single-Source Fully Dynamic Reachability	6
Single-Source Shortest Paths	7
Ski Rental Problem	9
Slicing Floorplan Orientation	2
Snapshots in Shared Memory	5
Sorting Signed Permutations by Reversal (Reversal Distance)	8
Sorting Signed Permutations by Reversal (Reversal Sequence)	0

Sorting by Transpositions and Reversals (Approximate Ratio 1.5)	63
Sparse Graph Spanners	67
Sparsest Cut	68
Speed Scaling	70
Sphere Packing Problem	71
Squares and Repetitions	74
Stable Marriage	77
Stable Marriage and Discrete Convex Analysis	80
Stable Marriage with Ties and Incomplete Lists	83
Stable Partition Problem	85
Stackelberg Games: The Price of Optimum	88
Statistical Multiple Alignment	92
Statistical Query Learning	94
Steiner Forest	97
Steiner Trees	00
Stochastic Scheduling	04
String Sorting	07
Substring Parsimony	10

Succinct Data Structures for Parentheses Matching	2
Succinct Encoding of Permutations: Applications to Text Indexing	5
Suffix Array Construction	9
Suffix Tree Construction in Hierarchical Memory	2
Suffix Tree Construction in RAM	:5
Support Vector Machines	8.
Symbolic Model Checking	2
Synchronizers, Spanners	5
Table Compression 93 2003; Buchsbaum, Fowler, Giancarlo	9
Tail Bounds for Occupancy Problems 94 1995; Kamath, Motwani, Palem, Spirakis	2
Technology Mapping	4
Teleportation of Quantum States	7
Text Indexing	0
Thresholds of Random k-SAT	4
Topology Approach in Distributed Computing	6
Trade-Offs for Dynamic Graph Problems	8
Traveling Sales Person with Few Inner Points	i 1
Tree Compression and Indexing	4

Treewidth of Graphs		• • • •			• •				• • •	968
1987; Arnborg, Corneil, Proskurowski										
Truthful Mechanisms for One-Parameter Agents 2001; Archer, Tardos	• • • • •	• • • •	• • •	• • •	• •		• • •		• • •	970
Truthful Multicast			• • •		• •		• • •			973
TSP-Based Curve Reconstruction	• • • • •	• • • •	• • •	• • •	• •	• • •	• • •	• • •	• • •	976
Two-Dimensional Pattern Indexing	• • • • •	• • • •	• • •	• • •	• •	• • •	• • •		• • •	979
Two-Dimensional Scaled Pattern Matching	• • • • •		• • •	• • •	• •	• • •	• • •		• • •	982
Two-Interval Pattern Problems	• • • • •	• • • •	• • •	• • •	• •	• • •	• • •	•••	• • •	985
Two-Level Boolean Minimization	• • • • •				• •	• • •			• • •	989
Undirected Feedback Vertex Set	• • • • •	• • • •	• • •	• • •	• •	• • •	• • •	• • •	• • •	995
Utilitarian Mechanism Design for Single-Minded Agents 2005; Briest, Krysta, Vöcking	s				• •		• • •		• • •	997
Vertex Cover Kernelization			• • •		• •				• • •	1003
Vertex Cover Search Trees	• • • • •		• • •	• • •	• •	• • •	• • •		• • •	1006
Visualization Techniques for Algorithm Engineering 2002; Demetrescu, Finocchi, Italiano, Näher	• • • • •		• • •	• • •	• •	• • •	• • •		• • •	1008
Voltage Scheduling	• • • • •		• • •	• • •	• •	• • •	• • •		• • •	1011
Wait-Free Synchronization	• • • • •		• • •	• • •	• •	• • •	• • •		• • •	1015
Weighted Connected Dominating Set	• • • • •		• • •	• • •	• •	• • •	• • •		• • •	1020
Weighted Popular Matchings					• •				• • •	1023

About the Editor



Ming-Yang Kao is a Professor of Computer Science in the Department of Electrical Engineering and Computer Science at Northwestern University. He has published extensively in the design, analysis, and applications of algorithms. His current interests include discrete optimization, bioinformatics, computational economics, computational finance, and nanotechnology. He serves as the Editor-in-Chief of Algorithmica.

He obtained a B.S. in Mathematics from National Taiwan University in 1978 and a Ph.D. in Computer Science from Yale University in 1986. He previously taught at Indiana University at Bloomington, Duke University, Yale University, and Tufts University. At Northwestern University, he has served as the Department Chair of Computer Science. He has also co-founded the Program in Computational Biology and Bioinformatics and served as its Director. He currently serves as the Head of the EECS Division of Computing, Algorithms, and Applications and is a member of the Theoretical Computer Science Group.

For more information please see: www.cs.northwestern.edu/~kao

Area Editors

Online Algorithms Approximation Algorithms



Albers, Susanne University of Freiburg Freiburg Germany

Quantum Computing



© University of Latvia Press Center

AMBAINIS, ANDRIS University of Latvia Riga Latvia

External Memory Algorithms and Data Structures Cache-Oblivious Algorithms and Data Structures



ARGE, LARS University of Aarhus Aarhus Denmark

Mechanism Design Online Algorithms Price of Anarchy



AZAR, YOSSI Tel-Aviv University Tel-Aviv Israel

Approximation Algorithms



CHEKURI, CHANDRA University of Illinois, Urbana-Champaign Urbana, IL USA

Online Algorithms Radio Networks



CHROBAK, MAREK University of California, Riverside Riverside, CA USA

Internet Algorithms Network and Communication Protocols



COHEN, EDITH AT&T Labs Florham Park, NJ USA

Bioinformatics



Csürös, MIKLÓS University of Montreal Montreal, QC Canada

Computational Economics



DENG, XIAOTIE
University of Hong Kong
Hong Kong
China

Combinatorial Group Testing Mathematical Optimization Steiner Tree Algorithms



Du, DING-ZHU University of Texas, Dallas Richardson, TX USA

String Algorithms and Data Structures Data Compression



FERRAGINA, PAOLO University of Pisa Pisa Italy

Coding Algorithms



GURUSWAMI, VENKATESAN University of Washington Seattle, WA USA

Algorithm Engineering Dynamic Graph Algorithms



ITALIANO, GIUSEPPE University of Rome Rome Italy

Stable Marriage Problems Exact Algorithms



IWAMA, KAZUO **Kyoto University** Kyoto Japan

Approximation Algorithms



KHANNA, SANJEEV University of Pennsylvania Philadelphia, PA USA

Graph Algorithms Combinatorial Optimization Approximation Algorithms



KHULLER, SAMIR University of Maryland College Park, MD USA

Compressed Text Indexing Computational Biology



LAM, TAK-WAK University of Hong Kong Hong Kong China

Mobile Computing



LI, XIANG-YANG Illinois Institute of Technology Chicago, IL USA

Geometric Networks



LINGAS, ANDRZEJ Lund University Lund Sweden

String Algorithms and Data Structures Compression of Text Data Structures



NAVARRO, GONZALO University of Chile Santiago Chile

Parameterized and Exact Algorithms



NEIDERMEIER, ROLF University of Jena Jena Germany

Probabilistic Algorithms Average Case Analysis



NIKOLETSEAS, SOTIRIS Patras University Patras Greece

Graph Algorithms



PETTIE, SETH University of Michigan Ann Arbor, MI USA

Scheduling Algorithms



PRUHS, KIRK University of Pittsburgh Pittsburgh, PA **USA**

Distributed Algorithms



RAJSBAUM, SERGIO National Autonomous University of Mexico Mexico City Mexico

Graph Algorithms



RAMACHANDRAN, VIJAYA University of Texas, Austin Austin, TX USA

Algorithm Engineering



RAMAN, RAJEEV University of Leicester Leicester UK

Computational Learning Theory



SERVEDIO, ROCCO Columbia University New York, NY USA

Probabilistic Algorithms Average Case Analysis



SPIRAKIS, PAVLOS (PAUL) Patras University Patras Greece

Scheduling Algorithms



STEIN, CLIFFORD Columbia University New York, NY USA

VLSI CAD Algorithms



Zhou, Hai Northwestern University Evanston, IL USA

List of Contributors

AARDAL, KAREN

CWI Amsterdam The Netherlands

Eindhoven University of Technology

Eindhoven
The Netherlands

Akavia, Adi

MIT

Cambridge, MA

USA

ALBERS, SUSANNE University of Freiburg

Freiburg Germany

ALICHERRY, MANSOOR

Bell Labs Murray Hill, NJ

USA

ALON, NOGA Tel-Aviv University

Tel-Aviv Israel

ALTSCHUL, STEPHEN F. The Rockefeller University

New York, NY

USA MIT

Cambridge, MA

USA

ALURU, SRINIVAS Iowa State University

Ames, IA USA

AMBAINIS, ANDRIS University of Latvia

Riga Latvia AMBÜHL, CHRISTOPH University of Liverpool

Liverpool UK

AMIR, AMIHOOD Bar-Ilan University Ramat-Gan

Israel

Asodi, Vera

California Institute of Technology

Pasadena, CA

USA

AUER, PETER University of Leoben

Leoben Austria

AZIZ, ADNAN University of Texas Austin, TX

USA

Babaioff, Moshe

Microsoft Research, Silicon Valley

Mountain View, CA

USA

BADER, DAVID A.

Georgia Institute of Technology

Atlanta, GA USA

BAEZA-YATES, RICARDO University of Chile

Santiago Chile

BANSAL, NIKHIL

IBM

Yorktown Heights, NY

USA

BARBAY, JÉRÉMY University of Chile

Santiago Chile

BARUAH, SANJOY

University of North Carolina

Chapel Hill, NC

USA

BASWANA, SURENDER

IIT Kanpur Kanpur India

BECCHETTI, LUCA University of Rome

Rome Italy

Beimel, Amos

Ben-Gurion University

Beer Sheva Israel

Békési, József

Juhász Gyula Teachers Training College

Szeged Hungary

BERGADANO, FRANCESCO University of Torino

Torino Italy

BERRY, VINCENT

LIRMM, University of Montpellier

Montpellier France

BHATIA, RANDEEP

Bell Labs Murray Hill, NJ

USA

BJÖRKLUND, ANDREAS

Lund University

Lund Sweden

BLANCHETTE, MATHIEU McGill University

Montreal, QC Canada BLÄSER, MARKUS Saarland University Saarbrücken Germany

BODLAENDER, HANS L. University of Utrecht

Utrecht

The Netherlands

BORRADAILE, GLENCORA

Brown University Providence, RI

USA

BSHOUTY, NADER H.

Technion Haifa Israel

BUCHSBAUM, ADAM L. AT&T Labs, Inc. Florham Park, NJ

USA

BUSCH, COSTAS

Lousiana State University

Baton Rouge, LA

USA

Bu, TIAN-MING Fudan University

Shanghai China

BYRKA, JAROSLAW

CWI Amsterdam The Netherlands

Eindhoven University of Technology

Eindhoven The Netherlands

CAI, MAO-CHENG

Chinese Academy of Sciences

Beijing China

Calinescu, Gruia

Illinois Institute of Technology

Chicago, IL USA

CECHLÁROVÁ, KATARÍNA P.J. Šafárik University

Košice Slovakia CHAN, CHEE-YONG

National University of Singapore

Singapore Singapore

CHANDRA, TUSHAR DEEPAK IBM Watson Research Center Yorktown Heights, NY

USA

CHAO, KUN-MAO

National Taiwan University

Taipei Taiwan

CHARRON-BOST, BERNADETTE

The Polytechnic School

Palaiseau France

CHATZIGIANNAKIS, IOANNIS

University of Patras and Computer Technology Institute

Patras Greece

CHAWLA, SHUCHI

University of Wisconsin-Madison

Madison, WI

USA

CHEKURI, CHANDRA

University of Illinois, Urbana-Champaign

Urbana, IL USA

CHEN, DANNY Z. University of Notre Dame

Notre Dame, IN

USA

CHENG, XIUZHEN

The George Washington University

Washington, D.C.

USA

CHEN, JIANER Texas A&M University College Station, TX

USA

CHEN, XI

Tsinghua University Beijing, Beijing

China

CHIN, FRANCIS

University of Hong Kong

Hong Kong China

CHOWDHURY, REZAUL A. University of Texas at Austin

Austin, TX USA

CHRISTODOULOU, GEORGE

Max-Planck-Institute for Computer Science

Saarbruecken Germany

CHROBAK, MAREK

University of California at Riverside

Riverside, CA

USA

CHU, CHRIS

Iowa State University

Ames, IA USA

CHU, XIAOWEN

Hong Kong Baptist University

Hong Kong China

CHUZHOY, JULIA

Toyota Technological Institute

Chicago, IL USA

CONG, JASON **UCLA**

Los Angeles, CA

USA

COWEN, LENORE J. Tufts University Medford, MA

USA

CRISTIANINI, NELLO University of Bristol

Bristol UK

CROCHEMORE, MAXIME King's College London

London UK

University of Paris-East

Paris France Csűrös, Miklós University of Montreal

Montreal, QC Canada

CZUMAJ, ARTUR University of Warwick

Coventry UK

DasGupta, Bhaskar

University of Illinois at Chicago

Chicago, IL USA

DÉFAGO, XAVIER

Japan Advanced Institute of Science and Technology

(JAIST) Ishikawa Japan

DEMAINE, ERIK D.

MIT

Cambridge, MA

USA

DEMETRESCU, CAMIL University of Rome

Rome Italy

DENG, PING

University of Texas at Dallas

Richardson, TX

USA

DENG, XIAOTIE

City University of Hong Kong

Hong Kong China

DESPER, RICHARD

University College London

London UK

DICK, ROBERT

Northwestern University

Evanston, IL USA

DING, YUZHENG Synopsys Inc. Mountain View, CA

USA

DOM, MICHAEL University of Jena

Jena Germany

DUBHASHI, DEVDATT

Chalmers University of Technology and Gothenburg

University Gothenburg Sweden

Du, Ding-Zhu

University of Dallas at Texas

Richardson, TX

USA

EDMONDS, JEFF York University Toronto, ON Canada

EFRAIMIDIS, PAVLOS

Democritus University of Thrace

Xanthi Greece

EFTHYMIOU, CHARILAOS University of Patras

Patras Greece

ELKIN, MICHAEL Ben-Gurion University

Beer-Sheva Israel

EPSTEIN, LEAH University of Haifa

Haifa Israel

ERICKSON, BRUCE W. The Rockefeller University

New York, NY

USA

EVEN-DAR, EYAL

University of Pennsylvania

Philadelphia, PA

USA

FAGERBERG, ROLF

University of Southern Denmark

Odense Denmark FAKCHAROENPHOL, JITTAT

Kasetsart University

Bangkok Thailand

FANG, QIZHI

Ocean University of China

Qingdao China

FATOUROU, PANAGIOTA University of Ioannina

Ioannina Greece

FELDMAN, JONATHAN

Google, Inc. New York, NY

USA

FELDMAN, VITALY Harvard University Cambridge, MA

USA

FERNAU, HENNING University of Trier

Trier Germany

FERRAGINA, PAOLO University of Pisa

Pisa Italy

FEUERSTEIN, ESTEBAN University of Buenos Aires

Buenos Aires Argentina

FISHER, NATHAN

University of North Carolina

Chapel Hill, NC

USA

FLAXMAN, ABRAHAM Microsoft Research Redmond, WA

USA

FLEISCHER, RUDOLF Fudan University

Shanghai China FOMIN, FEDOR University of Bergen

Bergen Norway

FOTAKIS, DIMITRIS University of the Aegean

Samos Greece

FRIEDER, OPHIR

Illinois Institute of Technology

Chicago, IL USA

FÜRER, MARTIN

The Pennsylvania State University

University Park, PA

USA

GAGIE, TRAVIS

University of Eastern Piedmont

Alessandria Italy

GALAMBOS, GÁBOR

Juhász Gyula Teachers Training College

Szeged Hungary

GAO, JIE

Stony Brook University Stony Brook, NY

USA

GARAY, JUAN Bell Labs Murray Hill, NJ

USA

GAROFALAKIS, MINOS

University of California - Berkeley

Berkeley, CA

USA

GASCUEL, OLIVIER

National Scientific Research Center

Montpellier France

GĄSIENIEC, LESZEK University of Liverpool

Liverpool UK GIANCARLO, RAFFAELE University of Palermo

Palermo Italy

GOLDBERG, ANDREW V.

Microsoft Research - Silicon Valley

Mountain View, CA

USA

GRAMM, JENS Tübingen University

Tübingen Germany

GROVER, LOV K.

Bell Labs Murray Hill, NJ USA

GUDMUNDSSON, JOACHIM National ICT Australia Ltd

Alexandria Australia

GUERRAOUI, RACHID

EPFL Lausanne Switzerland

Guo, Jiong University of Jena

Jena Germany

GURUSWAMI, VENKATESAN University of Washington

Seattle, WA USA

Hajiaghayi, Mohammad Taghi

University of Pittsburgh

Pittsburgh, PA

USA

HALLGREN, SEAN

The Pennsylvania State University

University Park, PA

USA

HALPERIN, DAN Tel-Aviv University

Tel Aviv Israel HARIHARAN, RAMESH Strand Life Sciences

Bangalore India

HELLERSTEIN, LISA Polytechnic University Brooklyn, NY

USA

HE, MENG

University of Waterloo

Waterloo, ON Canada

HENZINGER, MONIKA

Google Switzerland & Ecole Polytechnique Federale de

Lausanne (EPFL) Lausanne Switzerland

HERLIHY, MAURICE Brown University Providence, RI

USA

HERMAN, TED University of Iowa Iowa City, IA

USA

HE, XIN

University at Buffalo The State University of New York

Buffalo, NY USA

HIRSCH, EDWARD A.

Steklov Institute of Mathematics at St. Petersburg

St. Petersburg Russia

HON, WING-KAI

National Tsing Hua University

Hsin Chu Taiwan

HOWARD, PAUL G. Microway, Inc. Plymouth, MA

USA

HUANG, LI-SHA Tsinghua University Beijing, Beijing

China

HUANG, YAOCUN

University of Texas at Dallas

Richardson, TX

USA

HÜFFNER, FALK University of Jena

Jena Germany

HUSFELDT, THORE Lund University

Lund Sweden

ILIE, LUCIAN

University of Western Ontario

London, ON Canada

IRVING, ROBERT W. University of Glasgow

Glasgow UK

ITAI, ALON Technion Haifa Israel

ITALIANO, GIUSEPPE F. University of Rome

Rome Italy

IWAMA, KAZUO Kyoto University

Kyoto Japan

JACKSON, JEFFREY C. Duquesne University Pittsburgh, PA

USA

JACOB, RIKO

Technical University of Munich

Munich Germany

JAIN, RAHUL

University of Waterloo

Waterloo, ON Canada JANSSON, JESPER Ochanomizu University

Tokyo Japan

JIANG, TAO

University of California at Riverside

Riverside, CA

USA

JOHNSON, DAVID S.

AT&T Labs Florham Park, NJ

USA

Kajitani, Yoji

The University of Kitakyushu

Kitakyushu Japan

KAPORIS, ALEXIS University of Patras

Patras Greece

KARAKOSTAS, GEORGE McMaster University Hamilton, ON

Canada

KÄRKKÄINEN, JUHA University of Helsinki

Helsinki Finland

KELLERER, HANS University of Graz

Graz Austria

KENNINGS, ANDREW A. University of Waterloo

Waterloo, ON Canada

KEUTZER, KURT

University of California at Berkeley

Berkeley, CA

USA

KHULLER, SAMIR University of Maryland College Park, MD

KIM, JIN WOOK HM Research Seoul

Korea

Кім, Ү00-Ан

University of Connecticut

Storrs, CT USA

KING, VALERIE University of Victoria

Victoria, BC Canada

KIROUSIS, LEFTERIS University of Patras

Patras Greece

KIVINEN, JYRKI University of Helsinki

Helsinki Finland

KLEIN, ROLF University of Bonn

Bonn Germany

KLIVANS, ADAM

University of Texas at Austin

Austin, TX USA

KONJEVOD, GORAN Arizona State University

Tempe, AZ USA

KONTOGIANNIS, SPYROS University of Ioannina

Ioannina Greece

Kranakis, Evangelos

Carleton Ottawa, ON Canada

KRATSCH, DIETER Paul Verlaine University

Metz France KRAUTHGAMER, ROBERT Weizmann Institute of Science

Rehovot Israel

IBM Almaden Research Center

San Jose, CA USA

KRIZANC, DANNY Wesleyan University Middletown, CT

USA

KRYSTA, PIOTR University of Liverpool

Liverpool UK

KUCHEROV, GREGORY LIFL and INRIA Villeneuve d'Ascq

France

KUHN, FABIAN ETH Zurich Zurich Switzerland

KUMAR, V.S. ANIL Virginia Tech Blacksburg, VA

USA

KUSHILEVITZ, EYAL

Technion Haifa Israel

Lam, Tak-Wah

University of Hong Kong

Hong Kong China

LANCIA, GIUSEPPE University of Udine

Udine Italy

LANDAU, GAD M. University of Haifa

Haifa Israel

LANDAU, ZEPH City College of CUNY New York, NY

LANGBERG, MICHAEL
The Open University of Israel

Raanana Israel

LAVI, RON Technion Haifa Israel

LECROQ, THIERRY University of Rouen

Rouen France

LEE, JAMES R.

University of Washington

Seattle, WA USA

LEONARDI, STEFANO University of Rome

Rome Italy

LEONE, PIERRE University of Geneva

Geneva Switzerland

LEUNG, HENRY

MIT

Cambridge, MA

USA

LEVCOPOULOS, CHRISTOS

Lund University

Lund Sweden

LEWENSTEIN, MOSHE Bar-Ilan University

Ramat-Gan Israel

LI, LI (ERRAN) Bell Labs Murray Hill, NJ

USA

Li, Ming

University of Waterloo

Waterloo, ON Canada LI, MINMING

City University of Hong Kong

Hong Kong China

LINGAS, ANDRZEJ Lund University

Lund Sweden

LI, XIANG-YANG

Illinois Institue of Technology

Chicago, IL USA

Lu, Chin Lung

National Chiao Tung University

Hsinchu Taiwan

LYNGSØ, RUNE B. Oxford University

Oxford UK

MA, BIN

University of Western Ontario

London, ON Canada

MAHDIAN, MOHAMMAD

Yahoo! Research Santa Clara, CA

USA

MÄKINEN, VELI University of Helsinki

Helsinki Finland

Malkhi, Dahlia

Microsoft, Silicon Valley Campus

Mountain View, CA

USA

Manasse, Mark S. Microsoft Research Mountain View, CA

USA

MANLOVE, DAVID F. University of Glasgow

Glasgow UK Manzini, Giovanni

University of Eastern Piedmont

Alessandria

Italy

MARATHE, MADHAV V.

Virginia Tech Blacksburg, VA

USA

MARCHETTI-SPACCAMELA, ALBERTO

University of Rome

Rome Italy

Markov, Igor L.

University of Michigan

Ann Arbor, MI

USA

McGeoch, Catherine C.

Amherst College Amherst, MA

USA

McGeoch, Lyle A.

Amherst College Amherst, MA

USA

MCKAY, BRENDAN D.

Australian National University

Canberra, ACT Australia

MENDEL, MANOR

The Open University of Israel

Raanana Israel

MESTRE, JULIÁN

University of Maryland

College Park, MD

USA

MICCIANCIO, DANIELE

University of California, San Diego

La Jolla, CA USA

Miklós, István

Eötvös Lóránd University

Budapest Hungary MIRROKNI, VAHAB S. Microsoft Research

Redmond, WA

USA

Miyazaki, Shuichi

Kyoto University

Kyoto Japan

Moffat, Alistair

University of Melbourne

Melbourne, VIC

Australia

Moir, Mark

Sun Microsystems Laboratories

Burlington, MA

USA

MOR, TAL

Technion

Haifa

Israel

Mosca, Michele

University of Waterloo

Waterloo, ON

Canada

St. Jerome's University

Waterloo, ON

Canada

Moscibroda, Thomas

Microsoft Research

Redmond, WA

USA

MUCHA, MARCIN

Institute of Informatics

Warsaw

Poland

Munagala, Kamesh

Duke University

Durham, NC

USA

Munro, J. Ian

University of Waterloo

Waterloo, ON

Canada

NA, JOONG CHAE Sejong University

Seoul Korea

NARASIMHAN, GIRI

Florida International University

Miami, FL USA

NAVARRO, GONZALO University of Chile

Santiago Chile

NAYAK, ASHWIN

University of Waterloo and Perimeter Institute for

Theoretical Physics Waterloo, ON Canada

NEWMAN, ALANTHA

Max-Planck Institute for Computer Science

Saarbrücken Germany

NIEDERMEIER, ROLF University of Jena

Jena Germany

NIKOLETSEAS, SOTIRIS University of Patras

Patras Greece

OKAMOTO, YOSHIO

Toyohashi University of Technology

Toyohashi Japan

OKUN, MICHAEL

Weizmann Institute of Science

Rehovot Israel

PAGH, RASMUS

IT University of Copenhagen

Copenhagen Denmark

PANAGOPOULOU, PANAGIOTA

Research Academic Computer Technology Institute

Patras Greece PANIGRAHI, DEBMALYA

MIT

Cambridge, MA

USA

PAN, PEICHEN

Magma Design Automation, Inc.

Los Angeles, CA

USA

PAPADOPOULOU, VICKY University of Cyprus

Nicosia Cyprus

PARK, KUNSOO

Seoul National University

Seoul Korea

PARTHASARATHY, SRINIVASAN IBM T.J. Watson Research Center

Hawthorne, NY

USA

Pătrașcu, Mihai

MIT

Cambridge, MA

USA

PATT-SHAMIR, BOAZ Tel-Aviv University

Tel-Aviv Israel

PATURI, RAMAMOHAN

University of California at San Diego

San Diego, CA

USA

PELC, ANDRZEJ

University of Québec-Ottawa

Gatineau, QC Canada

PETTIE, SETH

University of Michigan

Ann Arbor, MI

USA

POWELL, OLIVIER

University of Geneva

Geneva Switzerland PRAKASH, AMIT Microsoft, MSN Redmond, WA

USA

PRUHS, KIRK

University of Pittsburgh

Pittsburgh, PA

USA

PRZYTYCKA, TERESA M.

NIH

Bethesda, MD

USA

Pudlák, Pavel

Academy of Science of the Czech Republic

Prague

Czech Republic

RAGHAVACHARI, BALAJI University of Texas at Dallas

Richardson, TX

USA

RAHMAN, NAILA University of Leicester

Leicester UK

RAJARAMAN, RAJMOHAN Northeastern University

Boston, MA USA

RAJSBAUM, SERGIO

National Autonomous University of Mexico

Mexico City Mexico

RAMACHANDRAN, VIJAYA University of Texas at Austin

Austin, TX USA

RAMAN, RAJEEV University of Leicester

Leicester UK

RAMOS, EDGAR

National University of Colombia

Medellín Colombia RAO, SATISH

University of California at Berkeley

Berkeley, CA

USA

RAO, S. SRINIVASA

IT University of Copenhagen

Copenhagen Denmark

RAPTOPOULOS, CHRISTOFOROS

University of Patras

Patras Greece

RASTOGI, RAJEEV Lucent Technologies Murray Hill, NJ

USA

RATSABY, JOEL

Ariel University Center of Samaria

Ariel Israel

RAVINDRAN, KAUSHIK

University of California at Berkeley

Berkeley, CA

USA

RAYNAL, MICHEL University of Rennes 1

Rennes France

REICHARDT, BEN W.

California Institute of Technology

Pasadena, CA

USA

RENNER, RENATO

Institute for Theoretical Physics

Zurich Switzerland

RICCI, ELISA

University of Perugia

Perugia Italy

RICHTER, PETER

Rutgers, The State University of New Jersey

Piscataway, NJ

ROLIM, JOSÉ University of Geneva

Geneva Switzerland

ROSAMOND, FRANCES University of Newcastle Callaghan, NSW Australia

RÖTTELER, MARTIN NEC Laboratories America

Princeton, NJ

USA

RUBINFELD, RONITT

MIT

Cambridge, MA

USA

Rudra, Atri

University at Buffalo, State University of New York

Buffalo, NY USA

RUPPERT, ERIC York University Toronto, ON Canada

RYTTER, WOJCIECH Warsaw University

Warsaw Poland

SAHINALP, S. CENK Simon Fraser University

Burnaby, BC USA

SAKS, MICHAEL

Rutgers, State University of New Jersey

Piscataway, NJ

USA

Schäfer, Guido

Technical University of Berlin

Berlin Germany

SCHIPER, ANDRÉ

EPFL Lausanne Switzerland SCHMIDT, MARKUS University of Freiburg

Freiburg Germany

SCHULTES, DOMINIK University of Karlsruhe

Karlsruhe Germany

SEN, PRANAB

Tata Institute of Fundamental Research

Mumbai India

SEN, SANDEEP IIT Delhi New Delhi India

SERNA, MARIA

Technical University of Catalonia

Barcelona Spain

SERVEDIO, ROCCO Columbia University New York, NY

USA

SETHURAMAN, JAY Columbia University New York, NY

USA

SHALEV-SHWARTZ, SHAI Toyota Technological Institute

Chicago, IL USA

SHARMA, VIKRAM New York University New York, NY

USA

SHI, YAOYUN

University of Michigan Ann Arbor, MI

USA

SHRAGOWITZ, EUGENE University of Minnesota Minneapolis, MN

SITTERS, RENÉ A.

Eindhoven University of Technology

Eindhoven The Netherlands

SMID, MICHIEL Carleton University Ottawa, ON Canada

SOKOL, DINA

Brooklyn College of CUNY

Brooklyn, NY

USA

SONG, WEN-ZHAN

Washington State University

Vancouver, WA

USA

Speckmann, Bettina

Technical University of Eindhoven

Eindhoven The Netherlands

SPIRAKIS, PAUL Patras University

Patras Greece

SRINIVASAN, ARAVIND University of Maryland College Park, MD

USA

SRINIVASAN, VENKATESH University of Victoria

Victoria, BC Canada

STEE, ROB VAN University of Karlsruhe

Karlsruhe Germany

Stølting Brodal, Gerth

University of Aarhus

Århus Denmark

STOYE, JENS

University of Bielefeld

Bielefeld Germany Su, Chang

University of Liverpool

Liverpool UK

SUN, ARIES WEI

City University of Hong Kong

Hong Kong China

SUNDARARAJAN, VIJAY Texas Instruments

Dallas, TX USA

SUNG, WING-KIN

National University of Singapore

Singapore Singapore

Sviridenko, Maxim

IBM

Yorktown Heights, NY

USA

SZEGEDY, MARIO

Rutgers, The State University of New Jersey

Piscataway, NJ

USA

SZEIDER, STEFAN
Durham University

Durham UK

TAKAOKA, TADAO University of Canterbury

Christchurch New Zealand

TAKEDA, MASAYUKI Kyushu University

Fukuoka Japan

TALWAR, KUNAL

Microsoft Research, Silicon Valley Campus

Mountain View, CA

USA

TAMON, CHRISTINO Clarkson University Potsdam, NY

TAMURA, AKIHISA Keio University Yokohama Japan

TANNIER, ERIC University of Lyon

Lyon France

TAPP, ALAIN

University of Montréal

Montreal, QC Canada

Tate, Stephen R.

University of North Carolina at Greensboro

Greensboro, NC

USA

Taubenfeld, Gadi

Interdiciplinary Center Herzlia

Herzliya Israel

TELIKEPALLI, KAVITHA Indian Institute of Science

Bangalore India

TERHAL, BARBARA M. IBM Research

Yorktown Heights, NY

USA

THILIKOS, DIMITRIOS

National and Kapodistrian University of Athens

Athens Greece

TREVISAN, LUCA

University of California at Berkeley

Berkeley, CA USA

TROMP, JOHN

CWI Amsterdam Netherlands

UKKONEN, ESKO University of Helsinki

Helsinki Finland VAHRENHOLD, JAN

Dortmund University of Technology

Dortmund Germany

VARRICCHIO, STEFANO University of Roma

Rome Italy

VIALETTE, STÉPHANE University of Paris-East

Descartes France

VILLANGER, YNGVE University of Bergen

Bergen Norway

VITÁNYI, PAUL

CWI Amsterdam Netherlands

VITTER, JEFFREY SCOTT Purdue University West Lafayette, IN

USA

VÖCKING, BERTHOLD RWTH Aachen University

Aachen Germany

WANG, CHENGWEN CHRIS Carnegie Mellon University

Pittsburgh, PA

USA

WANG, FENG

Arizona State University

Phoenix, AZ USA

Wang, Lusheng

City University of Hong Kong

Hong Kong China

Wang, Weizhao Google Inc. Irvine, CA USA WANG, YU

University of North Carolina at Charlotte

Charlotte, NC

USA

WAN, PENG-JUN

Illinois Institute of Technology

Chicago, IL USA

WERNECK, RENATO F.

Microsoft Research Silicon Valley

La Avenida, CA

USA

WILLIAMS, RYAN

Carnegie Mellon University

Pittsburgh, PA

USA

WONG, MARTIN D. F.

University of Illinois at Urbana-Champaign

Urbana, IL USA

WONG, PRUDENCE University of Liverpool

Liverpool UK

Wu, Weili

University of Texas at Dallas

Richardson, TX

USA

YANG, HONGHUA HANNAH

Intel Corporation

Hillsboro USA

YAP, CHEE K.

New York University New York, NY

....

USA

 Y_{E} , Y_{IN} - Y_{U}

Stanford University

Stanford, CA

USA

YI, CHIH-WEI

National Chiao Tung University

Hsinchu City Taiwan YI, KE

Hong Kong University of Science and Technology

Hong Kong China

YIU, S. M.

The University of Hong Kong

Hong Kong China

YOKOO, MAKOTO Kyushu University

Nishi-ku Japan

Young, Evangeline F. Y.

The Chinese University of Hong Kong

Hong Kong China

YOUNG, NEAL E.

University of California at Riverside

Riverside, CA

USA

YUSTER, RAPHAEL University of Haifa

Haifa Israel

ZANE, FRANCIS Lucent Technologies

Murray Hill, NJ

USA

ZAROLIAGIS, CHRISTOS

University of Patras Patras

Greece

ZEH, NORBERT

Dalhousie University

Halifax, NS Canada

ZHANG, LI HP Labs Palo Alto, CA

USA

ZHANG, LOUXIN

National University of Singapore

Singapore Singapore ZHOU, HAI Northwestern University Evanston, IL USA

ZILLES, SANDRA University of Alberta Edmonton, AB Canada ZOLLINGER, AARON University of California at Berkeley Berkeley, CA USA

ZWICK, URI Tel-Aviv University Tel-Aviv Israel