

## References

1. Agrawal, M., Kayal, N. and Saxena, N. (2002). PRIMES is in P. Tech. Report Dept. of Computer Science and Engineering. Indian Inst. of Technology Kanpur.
2. Ahuja, R.K., Magnanti, T.L. and Orlin, J.B. (1993). *Network Flows. Theory, Algorithms and Applications*. Prentice-Hall.
3. Alon, N. and Boppana, R.B. (1987). The monotone circuit complexity of Boolean functions. Combinatorica 7, 1–22.
4. Alon, N. and Spencer, J. (1992). *The Probabilistic Method*. Wiley.
5. Arora, S. (1997). Nearly linear time approximation schemes for Euclidean TSP and other geometric problems. Proc. of 38th IEEE Symp. on Foundations of Computer Science, 554–563.
6. Arora, S., Lund, C., Motwani, R., Sudan, M. and Szegedy, M. (1998). Proof verification and the hardness of approximation problems. Journal of the ACM 45, 501–555.
7. Arora, S. and Safra, S. (1998). Probabilistic checking of proofs: A new characterization of NP. Journal of the ACM 45, 70–122.
8. Aspvall, B. and Stone, R.E. (1980). Khachiyan's linear programming algorithm. Journal of Algorithms 1, 1–13.
9. Ausiello, G., Crescenzi, P., Gambosi, G., Kann, V., Marchetti-Spaccamela, A. and Protasi, M. (1999). *Complexity and Approximation*. Springer.
10. Balcázar, J.L., Díaz, J. and Gabarró, J. (1988). *Structural Complexity*. Springer.
11. Beame, P., Saks, M., Sun, X. and Vee, E. (2003). Time-space trade-off lower bounds for randomized computation of decision problems. Journal of the ACM 50, 154–195.
12. Bellare, M., Goldreich, O. and Sudan, M. (1998). Free bits, PCP and non-approximability – towards tight results. SIAM Journal on Computing 27, 804–915.
13. Bernholdt, T., Gülich, A., Hofmeister, T., Schmitt, N. and Wegener, I. (2002). Komplexitätstheorie, effiziente Algorithmen und die Bundesliga. Informatik-Spektrum 25, 488–502.

14. Boppana, R. and Halldórsson, M.M. (1992). Approximating maximum independent sets by excluding subgraphs. *BIT* 32, 180–196.
15. Clote, P. and Kranakis, E. (2002). *Boolean Functions and Computation Models*. Springer.
16. Cook, S.A. (1971). The complexity of theorem proving procedures. Proc. 3rd ACM Symp. on Theory of Computing, 151–158.
17. Dietzfelbinger, M. (2004). *Primality Testing in Polynomial Time*. LNCS 3000. Springer.
18. Feige, U., Goldwasser, S., Lovász, L., Safra, S. and Szegedy, M. (1991). Approximating clique is almost NP-complete. Proc. of 32nd IEEE Symp. on Foundations of Computer Science, 2–12.
19. Garey, M.R. and Johnson, D.B. (1979). *Computers and Intractability. A Guide to the Theory of NP-Completeness*. W.H. Freeman.
20. Goldmann, M. and Karpinski, M. (1993). Simulating threshold circuits by majority circuits. Proc. of the 25th ACM Symp. on Theory of Computing, 551–560.
21. Goldreich, O. (1998). *Modern Cryptography, Probabilistic Proofs and Pseudorandomness*. Algorithms and Combinatorics, Vol.17. Springer.
22. Goldwasser, S., Micali, S. and Rackoff, C. (1989). The knowledge complexity of interactive proof-systems. *SIAM Journal on Computing* 18, 186–208.
23. Håstad, J. (1989). Almost optimal lower bounds for small depth circuits. In: Micali, S. (ed.) *Randomness and Computation*. Advances in Computing Research 5, 143–170. JAI Press.
24. Håstad, J. (1999). Clique is hard to approximate within  $n^{1-\varepsilon}$ . *Acta Mathematica* 182, 105–142.
25. Håstad, J. (2001). Some optimal inapproximability results. *Journal of the ACM* 48, 798–859.
26. Hajnal, A., Maass, W., Pudlák, P., Szegedy, M. and Turán, G. (1987). Threshold circuits of bounded depth. Proc. of 28th IEEE Symp. on Foundations of Computer Science, 99–110.
27. Hemaspaandra, L. and Ogiara, M. (2002). *The Complexity Theory Companion*. Springer.
28. Homer, S. (2001). *Computability and Complexity Theory*. Springer.
29. Hopcroft, J.E., Motwani, R. and Ullman, J.D. (2001). *Introduction to Automata Theory, Languages and Computation*. Addison-Wesley Longman.
30. Hopcroft, J.E. and Ullman, J.D. (1979). *Introduction to Automata Theory, Languages and Computation*. Addison-Wesley.
31. Hromkovič, J. (1997). *Communication Complexity and Parallel Computing*. Springer.
32. Johnson, D.S. (1974). Approximation algorithms for combinatorial problems. *Journal of Computer and System Sciences* 9, 256–278.
33. Kann, V. and Crescenzi, P. (2000). A list of NP-complete optimization problems. [www.nada.kth.se/~viggo/index-en.html](http://www.nada.kth.se/~viggo/index-en.html)

34. Karmarkar, N. and Karp, R.M. (1982). An efficient approximation scheme for the one-dimensional bin packing problem. Proc. of 23rd IEEE Symp. on Foundations of Computer Science, 312–320.
35. Karp, R.M. (1972). Reducibility among combinatorial problems. In: Miller, R.E. and Thatcher, J.W. (eds.). *Complexity of Computer Computations*, 85–103. Plenum Press.
36. Korte, B. and Schrader, R. (1981). On the existence of fast approximation schemes. In: *Nonlinear Programming*. Academic Press.
37. Kushilevitz, E. and Nisan, N. (1997). *Communication Complexity*. Cambridge University Press.
38. Ladner, R.E. (1975). On the structure of polynomial time reducibility. Journal of the ACM 22, 155–171.
39. Lawler, E.L., Lenstra, J.K., Rinnooy Kan, A.H.G. and Shmoys, D.B. (1985). *The Traveling Salesman Problem. A Guided Tour of Combinatorial Optimization*. Wiley.
40. Lawler, E.L., Lenstra, J.K., Rinnooy Kan, A.H.G. and Shmoys, D.B. (1993). Sequencing and Scheduling: Algorithms and Complexity. In: Graves, S.C., Rinnooy Kan, A.H.G. and Zipkin, P.H. (eds.). *Handbook in Operations Research and Management Science*, Vol. 4, *Logistics of Production and Inventory*, 445–522. North-Holland.
41. Levin, L.A. (1973). Universal sorting problems. Problems of Information Transmission 9, 265–266.
42. Martello, S. and Toth, P. (1990). *Knapsack Problems*. Wiley.
43. Mayr, E., Prömel, H.J. and Steger, A. (1998) (eds.). *Lectures on Proof Verification and Approximation Algorithms*. LNCS 1367. Springer.
44. Miller, G.L. (1976) Riemann's hypothesis and tests for primality. Journal of Computer and System Sciences 13, 300–317.
45. Miltersen, P.B. (2001). Derandomizing complexity classes. In Pardalos, P.M., Rajasekaran, S., Reif, J. and Rolim, J. (eds.). *Handbook of Randomization*. Kluwer.
46. Motwani, R. and Raghavan, P. (1995). *Randomized Algorithms*. Cambridge University Press.
47. Nechiporuk, É.I. (1966) A Boolean function. Soviet Mathematics Doklady 7, 999–1000.
48. Nielsen, M.A. and Chuang, I.L. (2000). *Quantum Computation and Quantum Information*. Cambridge University Press.
49. Owen, G. (1995). *Game Theory*. Academic Press.
50. Papadimitriou, C.M. (1994). *Computational Complexity*. Addison-Wesley.
51. Pinedo, M. (1995). *Scheduling: Theory, Algorithms and Systems*. Prentice-Hall.
52. Razborov, A.A. (1987). Lower bounds on the size of bounded depth networks over a complete basis with logical addition. Math. Notes of the Academy of Sciences of the USSR 41, 333–338.

53. Razborov, A.A. (1990). Lower bounds for monotone complexity of Boolean functions. American Mathematical Society Translations 147, 75–84.
54. Razborov, A.A. (1995). Bounded arithmetics and lower bounds in Boolean complexity. In: Clote, P. and Remmel, J. (eds.). *Feasible Mathematics II*. Birkhäuser.
55. Schönhage, A., Grotfeld, A.F.W. and Vetter, E. (1999). *Fast Algorithms: A Multitape Turing Machine Implementation*. Spektrum Akademischer Verlag.
56. Shamir, A. (1992). IP=PSPACE. Journal of the ACM 39, 869–877.
57. Shasha, D. and Lazere, C. (1998). *Out of Their Minds. The Lives and Discoveries of 15 Great Computer Scientists*. Copernicus (Springer).
58. Singh, S. (1998). *Fermat's Last Theorem*. Fourth Estate.
59. Sipser, M. (1997). *Introduction to the Theory of Computation*. PWS Publishing Company.
60. Smolensky, R. (1987). Algebraic methods in the theory of lower bounds for Boolean circuit complexity. Proc. of 19th ACM Symp. on Theory of Computing, 77–82.
61. Solovay, R. and Strassen, V. (1977). A fast Monte-Carlo test for primality. SIAM Journal on Computing 6, 84–85.
62. Stinson, D.R. (1995). *Cryptography. Theory and Practice*. CRC Press.
63. Stockmeyer, L.J. (1977). The polynomial time hierarchy. Theoretical Computer Science 3, 1–22.
64. Strassen, V. (1986). The work of Leslie G. Valiant. Proc. of the Int. Congress of Mathematics, Berkeley, Ca.
65. Thompson, C.D. (1979). Area-time complexity for VLSI. Proc. of 11th ACM Symp. on Theory of Computing, 81–88.
66. Valiant, L.G. (1979). The complexity of computing the permanent. Theoretical Computer Science 8, 189–201.
67. van Leeuwen, J. (1990) (ed.). *Handbook of Theoretical Computer Science*. Elsevier, MIT Press.
68. Wagner, K. and Wechsung, G. (1986). *Computational Complexity*. VEB Deutscher Verlag der Wissenschaften.
69. Wegener, I. (1982). Boolean functions whose monotone complexity is of size  $n^2/\log n$ . Theoretical Computer Science 21, 213–224.
70. Wegener, I. (1987). *The Complexity of Boolean Functions*. Wiley. Freely available via <http://ls2-www.cs.uni-dortmund.de/~wegener>.
71. Wegener, I. (2000). *Branching Programs and Binary Decision Diagrams – Theory and Applications*. SIAM Monographs on Discrete Mathematics and Applications.
72. Wegener, I. (2002). Teaching nondeterminism as a special case of randomization. Informatica Didactica 4 (electronic journal).
73. Yao, A.C. (1977). Probabilistic computations: Towards a unified measure of complexity. Proc. of 18th Symp. on Foundations of Computer Science, 222–227.

74. Yao, A.C. (1979). Some complexity questions related to distributed computing. Proc. of 11th ACM Symp. on Theory of Computing, 209–213.
75. Yao, A.C. (2001). Lecture upon receiving the Turing Award. July 8, 2001, Chersonissos, Crete.

## Index

- #P 19  
 #P-complete 199  
 #SAT 198, see also SAT  
 $\#d$ -dom 168  
 $\Delta_1$  see NC<sup>1</sup>-reduction  
 $\Delta_0$  see AC<sup>0</sup>-reduction  
 $\Delta_{\text{proj}}$  see projection  
 $\Delta_{\text{RDP}}$  see read-once promise  
 $\Delta_{\text{log}}$  see logarithmic measure  
 $\Delta_{\text{par}}$  see parity  
 $\Delta_T$  see Turing reduction  
 $\#T$  see Turing condenser  
 $\#n$  see polynomial hierarchy  
 PPTAS see FPTAS-reductions  
 SNC 166  
 rectangular condition  
 $\epsilon$ -optimal 100  
 3-DM 83  
 3-Partition 93  
 3-SAT 51, see also SAT  
 4-Partition 93
- AC<sup>0</sup> 260  
 AC<sup>0</sup>-reduction 271  
 ACC<sup>0(m)</sup> 263  
 AC<sup>1</sup> 272  
 Agrawal 68, 199  
 Amits 16, 49  
 algorithm 18  
 deterministic 30, 68  
 nondeterministic 39  
 pseudo-polynomial time 105  
 randomized 8, 27, 39, 44, 69, 102  
 algorithmic complexity 23, 24  
 Alice 190, 219, 257
- Alon 242, 254, 261  
 alternative counting rule 263  
 AM 191  
 AND-gate 262  
 AND-nondeterminism 263  
 anti-clique 34, see also independent set  
 approximation problem 101  
 approximation ratio 100  
 APCT 102  
 authentication 165  
 Anand 105, 164, 175  
 Arthur-Merlin game 151  
 Aspray 176  
 asymptotic FPTAS 105  
 asymptotic worst-case approximation ratio 101  
 Ausiello 10, 114, 164  
 Aut( $G$ ) see automorphism group  
 automorphism group 149  
 average-case runtime 23, 25
- Bachmann 279  
 Balaban 10  
 baseball 17  
 basketball 17  
 BDD 166  
 BDD 166  
 Bellare 164  
 Bernholdt 17  
 best-fit decreasing 104  
 BPP 166  
 BPP 166  
 big O notation 102, 279  
 bin-packing problem 15, 47, 48, 52, 91,  
 100, 178