Computational Complexity Theory: Course Guidance

Course Title: Computational Complexity Theory 2–0–0
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Course Description:

We study basics of computational complexity theory, and then study some of the advanced but still fundamental topics.

Key Words:

computation model, complexity measure, hierarchy theorem, complexity class, class NP, reduction/reducibility, randomized algorithms, alternation/interactive proof, one-way function and pseudo random generator

Course Plan:

1. several models of computatoin, complexity measures
2. complexity classes: deterministic, randomized, circuit
3. time hierarchy theorem
4. class NP
5. polynomial-time reducibility
6. NP-completeness of SAT
7. Some advanced topics

Main Rererence: (no fixed textbook)

1. M. Sipser, Introduction to the Theory of Computation (2nd edition), Thomson Course Technology, 2006, ISBN:0-534-95097-3. (Note that there is the 3rd edition published in 2012 (paperback version, ISBN:1-133-18781-1), but I am going to refer the 2nd edition in my course note.)

Rererences:

2. D. Du and K. Ko, Theory of Computational Complexity (2nd edition), John Wiley and Sons, Inc., 2000, ISBN:978-1-118-30608-6.
3. M. Garey and D.S. Johnson, Computers and Intractabiity: A Guide to the Theory of NP-Completeness, W.H. Freeman and Company, 1979, ISBN:0716710455.
4. T. Cormen, C. Leiserson, R. Rivest, and C. Stein, Introduction to Algorithms (3rd edition), MIT Press, 2009, ISBN:0262033844.
5. 渡辺治，今度こそわかる P $\neq$ NP 予想，講談社，2014，ISBN:978-4-06-156600-2.

Evaluation:

Based on reports for homework exercises given at (almost) each lecture. (1 point is given to each passed homework report.)

(continue to the back)

For questions:

Questions during the lecture and/or after the lecture are welcome. Questions by email are also recommended.

OCW:

Please check university's OCW (say, every Monday morning) whether there is any change during the week.