CSIE 5118: Introduction to communication complexity

(Semester 2, 2017/18)

Website

https://www.csie.ntu.edu.tw/~tonytan/teaching/2017b-comm/2017b-comm.html

Instructor

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Venue and time

Friday, 10:30–13:00, room 546.

Description

The goal of this course is to get acquainted with some basic tools of communication complexity. The focus is the two-party model introduced by *Yao* in 1979. In the setting there are two players *Alice* and *Bob*. Each of them holds some data which are unknown to the other. Suppose they want to compute a function on the data found in both of them. Communication complexity deals with the fundamental question: How many times do *Alice* and *Bob* have to communicate with each other in order to compute the function?

Prerequisite

Some essential prerequisites: basic discrete mathematics, some probability theory and some mathematical maturity, i.e., comfortable with reading and writing mathematical proofs.

Syllabus (tentative)

1. Deterministic protocols, fooling sets, rank lower bound.

2. Nondeterministic protocols, ranks and covers.

3. Randomized protocols, distributional complexity and discrepancy.

4. Asymmetric communication and variable partition model.

5. Applications on networks, VLSI, data structures and computational complexity.

Textbook

Communication complexity by E. Kushilevitz and N. Nissan.

Grading

- Four assignments weigh 20% each.
- Participation in the class weighs 20%.