

On Data Structures and Asymmetric Communication Complexity

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Abstract

In this paper we consider two party communication complexity when the input sizes of the two players differ significantly, the “asymmetric” case. Most of the previous work on communication complexity only considers the total number of bits sent, but we study tradeoffs between the number of bits the first player sends and the number of bits the second sends. These types of questions are closely related to the complexity of static data structure problems in the cell probe model.

We derive two generally applicable methods of proving lower bounds, and obtain several applications. These applications include new lower bounds for data structures in the cell probe model. Of particular interest is our “round elimination” lemma, which is interesting also for the usual symmetric communication case. This lemma generalizes and abstracts in a very clean form the “round reduction” techniques used in many previous lower bound proofs.