abstract

Computer Science/Discrete Mathematics Seminar I
Topic:

Speaker:

Affiliation:

Date:

Time/Room:

Proving superpolylogarithmic lower bounds for dynamic data structures has remained an open problem despite years of research. Recently, Patrascu proposed an exciting new approach for breaking this barrier via a two player communication model in which one player gets private advice at the beginning of the protocol. He gave reductions from the problem of solving an asymmetric version of set-disjointness in his model to a diverse collection of natural dynamic data structure problems in the cell probe model. He also conjectured that, for any hard problem in the standard two-party communication model, the asymmetric version of the problem is hard in his model, provided not too much advice is given.

We prove several surprising results about his model. We show that there exist Boolean functions requiring linear randomized communication complexity in the two-party model, for which the asymmetric versions in Patrascu□s model have deterministic protocols with exponentially smaller complexity. For set-disjointness, which also requires linear randomized communication complexity in the two-party model, we give a deterministic protocol for the asymmetric version in his model with a quadratic improvement in complexity. These results demonstrate that Patrascu□s conjecture, as stated, is false. In addition, we show that the randomized and deterministic communication complexities of problems in his model differ by no more than a logarithmic multiplicative factor.

We also prove lower bounds in some restricted versions of this model for natural functions such as set-disjointness and inner product. All of our upper bounds conform to these restrictions.

This is joint work with Jeff Edmonds, Faith Ellen and Toniann Pitass