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MADALGO seminar by Hossein Jowhari, Aarhus University

Fast Protocols for Edit Distance through Locally Consistent Parsing

Abstract:

In this talk, I am going to present two communication protocols for computing edit distance. In the first part, I will show a one-way protocol for the following problem. Given strings *x* to Alice and *y* to Bob, Alice sends a message to Bob so that he learns *x* or reports that the edit distance between *x* and *y* is greater than *k*.
Following that, I will show a simultaneous protocol for edit distance over permutations. Here Alice and Bob both send a message to a third party (the referee) who does not have access to the input strings. Given the messages, the referee decides if the edit distance between *x* and *y* is at most *k* or not.

For both these problems I will show protocols in which the parties run in near-linear time and they transmit at most $O(k \text{ polylog } n)$ bits. These results are obtained through mapping strings to the Hamming cube. For this, I have used the Locally Consistent Parsing method in combination with the Karp-Rabin fingerprints. In addition to yielding non-trivial bounds for the edit distance problem, these results suggest a new conceptual framework and raises a new type of question regarding the embedability of edit distance into the Hamming cube which might be of independent interest.