Week 3 Homework

Ben Arancibia

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2.5.1

What is the communication cost of each of the following algorithms, as a function of the size of the relations, matrices, or vectors to which they are applied?

(a) The matrix-vector multiplication algorithm

Communication cost: $O(r * c)$

The matrix-vector multiplication algorithm $(M \cdot v)$ produces a key value pair for each entry in the matirx M. The communication cost is $O(r * c)$ where r and c are the number of rows and columns of M.

(b) The union algorithm

Communication cost: $O(r + s)$

In the union of R and S, the mapper funtion passes key value pairs for each entry in R and S. The communication cost is the total number of entries in r plus the total number of entries in s or $O(r + s)$.

(c) The aggregation algorithm of Section 2.3.8.