On Communication Complexity of Vector–valued Functions

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Abstract.

New upper and lower bounds on the 2–way communication complexity of abstract functions $g : \mathcal{X} \times \mathcal{Y} \to \mathcal{Z}$ give tight bounds, when applied to vector–valued functions $f^n = (f_1, \dots, f_n) : \mathcal{X}^n \times \mathcal{Y}^n \to \mathcal{Z}^n$, if the alphabets are small. For the set–intersection function an optimal protocol is presented. It is based on a simple new idea applicable also to abstract functions. The 2–way communication complexities of all other Boolean functions are also determined. The results are extended to meets in abstract lattices and to a probabilistic model.

keywords and phrases

2–way communication complexity, vector–valued functions, Kronecker product, prefix codes, correlated sources, rank, alternating partitions.