Computer Science > Information Theory

Sensing with Optimal Matrices

Hema Kumari Achanta, Soura Dasgupta, Weiyu Xu

(Submitted on 1 Jun 2012)

We consider the problem of designing optimal $M \times N$ ($M \leq N$) sensing matrices which minimize the maximum condition number of all the submatrices of K columns. Such matrices minimize the worst-case estimation errors when only K sensors out of N sensors are available for sensing at a given time. For M=2 and matrices with unit-normed columns, this problem is equivalent to the problem of maximizing the minimum singular value among all the submatrices of K columns. For M=2, we are able to give a closed form formula for the condition number of the submatrices. When M=2 and K=3, for an arbitrary $N\geq3$, we derive the optimal matrices which minimize the maximum condition number of all the submatrices of K columns. Surprisingly, a uniformly distributed design is often \emph{not} the optimal design minimizing the maximum condition number.

Comments:	Authors temporarily listed in alphabetical order
Subjects:	**Information Theory (cs.IT)**; Discrete Mathematics (cs.DM)
MSC classes:	05
Cite as:	**arXiv:1206.0277 [cs.IT]**
	(or **arXiv:1206.0277v1 [cs.IT]** for this version)

Submission history

From: Weiyu Xu [view email]

[v1] Fri, 1 Jun 2012 19:13:22 GMT (13kb)

Which authors of this paper are endorsers?