Log-Det Heuristic for Matrix Rank Minimization with Applications to Hankel and Euclidean Distance Matrices

M. Fazel, H. Hindi, and S. Boyd

Proceedings American Control Conference, 3:2156-2162, June 2003.

- rank_min_heur_hankel.pdf

We present a heuristic for minimizing the rank of a positive semidefinite matrix over a convex set. We use the logarithm of the determinant as a smooth approximation for rank, and locally minimize this function to obtain a sequence of trace minimization problems. We then present a lemma that relates the rank of any general matrix to that of a corresponding positive semidefinite one. Using this, we readily extend the proposed heuristic to handle general matrices. We examine the vector case as a special case, where the heuristic reduces to an iterative l1-norm minimization technique. As practical applications of the rank minimization problem and our heuristic, we consider two examples: minimum-order system realization with time-domain constraints, and finding lowest-dimension embedding of points in a Euclidean space from noisy distance data.

Page generated 2018-11-24 09:00:15 PST, by jemdoc.