

Re: Minimizing the Frobenius norm

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In article <1169162070.659648.204840@xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx>, "svlad" <madvlad@xxxxxxxx> writes:

Hi,

I need to minimize the following:

$$E(v_1 \dots v_n) = \sum_{i=1}^L \left(\sum_{j \in \text{adj}(i)} \|T_i - T_j\|^2 \right)$$

where $\| \cdot \|$ is the Frobenius norm.

Each of the T matrices are defined in terms of the $v_1 \dots v_n$ variables. A subset of the $v_1 \dots v_n$ variables are known in advanced.

Each matrix T is dependent on exactly four of the n variables. $\text{adj}(i)$ is the subset of T that are adjacent to the current T_i . Adjacency is defined as having two of the n variables in common.

Any help would be greatly appreciated.

Thanks.

the frobenius norm squared is the sum of the squares of the elements of the matrix. hence you have here a typical "least squares" problem.

now it depends on the kind how your variables v_i enter the matrices T_i
what to do: should each of the elements of these matrices be an affine linear function of the v_i , then you have a simple linear least squares problem and can use one of the well established linear least squares solvers, for example the one from LAPACK. (DGELSS)

Otherwise you have a nonlinear least squares problem and need a corresponding code. there exist several good codes for this , for example ELSUNC is such , or , should the optimal sum of differences not be small,

port/n2f or port/n2g

anything in

<http://www.netlib.org>

or look here

<http://plato.asu.edu/sub/nonlsq.html#lsqnres>

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hth
peter
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