Logdet-0 – a MATLAB software for solving log-determinant optimization problems

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The software was first released on 5 April 2010. The software is designed to solve log-determinant optimization problems of the form:

$$\min_X \{\langle C,\, X\rangle - \mu \log\det X \;:\; \mathcal{A}(X) = b,\;\; X \succeq 0\},$$

where $C \in \mathcal{S}^n$, $b \in \mathcal{R}^m$, $\mu \geq 0$ is a given parameter, $\mathcal{A} : \mathcal{S}^n \to \mathcal{R}^m$ is a linear map. Note that the linear map $\mathcal{A}$ can be expressed as

$$\mathcal{A}(X) \;= \Big[\langle A_1,\, X\rangle, \ldots, \langle A_m,\, X\rangle\Big]^T,$$

where $A_k,\; k = 1, \cdots, m$ are given matrices in $\mathcal{S}^n$. For more details, one may see [2].

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• **Logdet-0.zip**

Please read. Welcome to Logdet-0! The software requires a few Mex files for execution. You can generate (only need to be done once) these Mex files as follows:

- ◦ Firstly, unpack the software:
  unzip Logdet-0.zip
- ◦ Run Matlab in the directory Logdet-0
- ◦ In the Matlab command window, type:
  >> Installmex
- ◦ After that, to see whether you have installed Logdet-0 correctly, type:
  >> startup
  >> runrandom
- ◦ By now, Logdet-0 is ready for you to use.

• The following example shows how to call the main function to solve problems

>> [obj,X,y,Z,runhist,W] = sdpNALsmooth (blk,At,C,b,mu,OPTIONS);

One may input the data according to specific real problems. As for the restoration mode of the data, it is the same as that in the software SDPT3. One may refer to [1].

Note: by setting OPTIONS. smoothing = 0, Logdet-0 can also be applied to solve general semidefinite programming problems.

References

[1] K. C. Toh, R. H. Tütüncü and M. J. Todd, *On the implementation of SDPT3 (version 3.1) – a Matlab software package for semidefinite-quadratic-linear programming*, IEEE Conference on Computer-Aided Control System Design, September 2004, Invited Paper.

[2] C. J. Wang, D. F. Sun and K. C. Toh, *Solving log-determinant optimization problems by a Newton-CG primal proximal point algorithm*, preprint, National University of Singapore, March 2010.