

February 28, 2009

Here are more type A and B problems.

- A8.** (Primal-dual interior-point method for SDP). Find explicit formulas for the AHO direction when applied to the SDP relaxation of the MaxCut problem. Estimate the work in computing this direction.
- A9.** For the MaxCut SDP relaxation, find an $(X, Y, \mu, \epsilon) \in \mathcal{N}_{\text{wide}}(\gamma)$ ($0 < \gamma < 1$) with $\epsilon = \frac{\langle X, Y \rangle}{n}$.
- B6.** (commutative MZ directions). For $X, Y \succ 0$ and $P \in \mathbb{R}^{n \times n}$ invertible, let $\hat{X} = PXP$ and $\hat{Y} = P^{-1}YP^{-1}$.
- (a) For $P = (X^{-1/2}(X \circ Y)^{1/2}X^{-1/2})^{1/2}$ (NT direction), verify that $\hat{X}\hat{Y}$ is symmetric and that $\text{cond}(G_{\hat{X}, \hat{Y}}) = 1$.
- (b) For $P = X^{-1/2}$ (HRVW/KSH/M direction), verify that $\hat{X}\hat{Y}$ is symmetric and that $\text{cond}(G_{\hat{X}, \hat{Y}}) \leq \frac{n}{\gamma}$ when in addition $\frac{\langle X, Y \rangle}{n} = \epsilon$ and $\lambda_{\min}(X \circ Y) \geq \gamma\epsilon$.