Matrix Algebras

August 20, 2018

- Given a sparse matrix $A \in \mathbb{R}^{n\times n}$ (let us suppose that any matrix-vector product $A\mathbf{x}$ can be computed in kn FLOPS) carefully estimate the number of FLOPS sufficient to compute

$$(U^T AU)_{ii} \;\; i = 1, \ldots, n \;\; \text{(diagonal elemens of the matrix } U^T AU) \tag{1}$$

  being U an orthogonal matrix product of m Householder matrices, i.e.,

$$U = (I - \mathbf{w}_m \mathbf{w}_m^T) \cdots (I - \mathbf{w}_1 \mathbf{w}_1^T)$$

  with $\|\mathbf{w}_i\|_2^2 = 2$.

- How many FLOPS are sufficient to compute $\mathcal{L}_A := \arg\min_{X\in\mathcal{L}} \|A - X\|_F$, being $\mathcal{L} = sd\,U$?