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12-6-17
MW 5-6

KEKA HW 12

(1) Method Gram-Schmidt

(1) $v_1 = v_1$ $= [1\ 0\ 0\ 0\ 0]^t$

$u_2 = v_2 - \langle v_2, u_1 \rangle u_1$ $u_2 = [0\ 1/\sqrt{2}\ 1/\sqrt{2}\ 0\ 0]^t$

$u_3 = v_3 - \langle v_3, u_1 \rangle u_1 - \langle v_3, u_2 \rangle u_2$ $u_3 = [0, 0\ 1/\sqrt{2}\ 1/\sqrt{2}]^T$

$$U = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1/\sqrt{2} & 0 \\ 0 & 1/\sqrt{2} & 0 \\ 0 & 0 & 1/\sqrt{2} \\ 0 & 0 & 1/\sqrt{2} \end{bmatrix}$$

$$V(V^TV)^{-1}V^tb = \begin{bmatrix} 1 & 1 & 1 \\ 0 & 1 & -1 \\ 1 & 0 & 0 \\ 1 & -1 & 1 \\ 0 & -1 & 1 \end{bmatrix} \begin{bmatrix} 1 & 1 & 1 \\ 1 & 3 & 5 \\ 1 & 3 & 5 \end{bmatrix}^{-1} \begin{bmatrix} 1 & 0 & 0 & 0 & 0 \\ 1 & 1 & 1 & 0 & 0 \\ 1 & 1 & 1 & 1 & 1 \end{bmatrix} \begin{bmatrix} 1 \\ -1 \\ 0 \\ -1 \\ 0 \end{bmatrix}$$

$$= \begin{bmatrix} 1 \\ -1/2 \\ -1/2 \\ -1/2 \\ -1/2 \end{bmatrix}$$

(B) $u_2 = \begin{bmatrix} 1 \\ 1 \\ 0 \\ -1 \\ -1 \end{bmatrix} - \left(\begin{bmatrix} 1 \\ 1 \\ 0 \\ -1 \\ -1 \end{bmatrix}^T \begin{bmatrix} 1+\sqrt{3} \\ 0 \\ \sqrt{5} \\ 1+\sqrt{3} \\ 0 \end{bmatrix} \right) \begin{bmatrix} 1 \\ 1 \\ 0 \\ -1 \\ -1 \end{bmatrix}$ $u_2 = \begin{bmatrix} 1/2 \\ 1/2 \\ 0 \\ -1/2 \\ -1/2 \end{bmatrix}$

Projection $= \begin{bmatrix} -1/4 \\ 0 \\ -1/4 \\ -1/4 \end{bmatrix}$

C $D = \begin{bmatrix} 1/\sqrt{3} & 0 & 1/\sqrt{3} & 1/\sqrt{3} & 0 \\ 1/2 & 1/2 & 0 & -1/2 & -1/2 \end{bmatrix} \begin{bmatrix} 1 & 1 & -1 \\ 0 & 1 & -1 \\ 1 & -1 & 1 \\ 0 & -1 & 1 \end{bmatrix} = \begin{bmatrix} \sqrt{3} & 0 & 0 \\ 0 & 2 & -2 \end{bmatrix}$

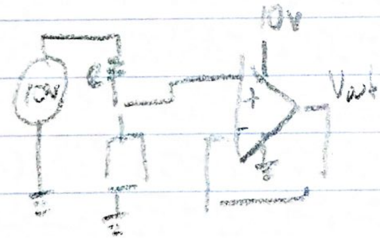
2 How Much is Too much
- See IPython

3 Sparse Imaging
- See IPython

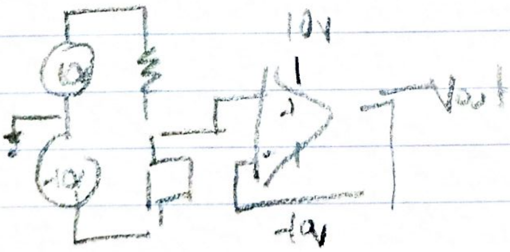
4 Speeding Up OMP
- See Ipython

5 Pet Fish Design

A



B



6 Is EE16A fun
yes, mostly fun, though not so much :)

7 I worked on this homework alone