Lecture 12

- Pivot rows/Cols vs. just rows? ✓

- Why $e_i^T v_j = 0$ in $L_i^{-1} L_j^{-1}$ if $i \neq j$ $\overset{\text{or } i < j}{i > j}$ ✓

Exam → Stanley Coulter
☆ SC 239 ~
10/5 @ 8pm

- Use power method to compute other Eigenvectors? ✓ →

- Schur Complement Identities ✓

- why ~~LUE~~ $PA = LDU$ vs.
$PA = LU$ ✓

$y =$

do

$y^{(1)} = AX$

$y^{(2)} = AQ^{(1)}$

Using Power Meth
to get multiple λ-vals

Subspace

Deflation

Let $X \in \mathbb{R}^{n \times k}$

$A^k X$ then

a QR on Y.

$\Rightarrow Q^{(1)} = QR(Y^{(2)})$

)t

$\Rightarrow Q^2 = QR(Y^{(2)})$

find $\lambda_1, \underline{v}$

then build an orthog. matrix Q_λ s.t.

$$Q_\lambda^T A Q_\lambda = \begin{bmatrix} \lambda & 0 \\ 0 & \boxed{B} \end{bmatrix}$$

do Power on B.

~~$Q_\lambda = [I - vv^T]$~~

~~(Something like)~~

~~or $Q_\lambda = (I - 2vv^T)$~~

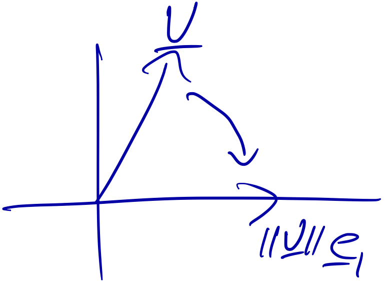
~~$Q_\lambda^T A Q_\lambda =$~~

Q_λ = hous

$Q_\lambda = (I$

when $q =$

(assum $\|\underline{v}\| = 1$



$\{I - vv^T$

eholder Reflector

$- 2qq^T)$

$\underline{e}_1 - \underline{v}$

L

L

L_j

$L_2 L$

$_i = I + \underline{v}_i e_i^T$

$\underline{v}$ is

$$\begin{array}{r c}
 & \begin{bmatrix} 0 \\ 0 \\ 0 \\ 0 \\ \boxed{z} \end{bmatrix} \\
\rightarrow i &
\end{array}$$

$^{-1}$

$_i = I - v_i e_i^T$

$PA =$

$PA =$

$_1 A = U_2$

$A = \overset{n}{L_1^{-1}} L_2^{-1} U_2$

$L_i^{-1} L_j^{-1}$

$\forall\, i < j$

$e_i^T v_j = 0 \;\forall$

$j > i$.

by constr.

LDU vs. L, U have unit diag.

LU. Does L have unit diag?

Pivot Rows, cols

$$PAQ = LU$$

2 pivot matrices!

Q: Pivoting ~

$$\left\{ \begin{array}{l} A_1 \\ A_2 \\ A_3 \end{array} \right.$$

Use matrix

$\|A_3\|$.

Block Matrices

$$\begin{matrix} A_4 & A_7 \\ A_5 & A_8 \\ A_6 & A_9 \end{matrix}\Bigg]$$

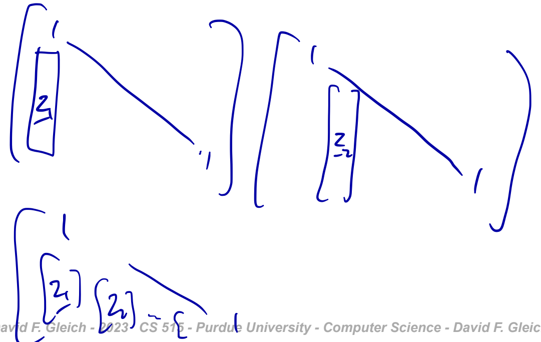
norm

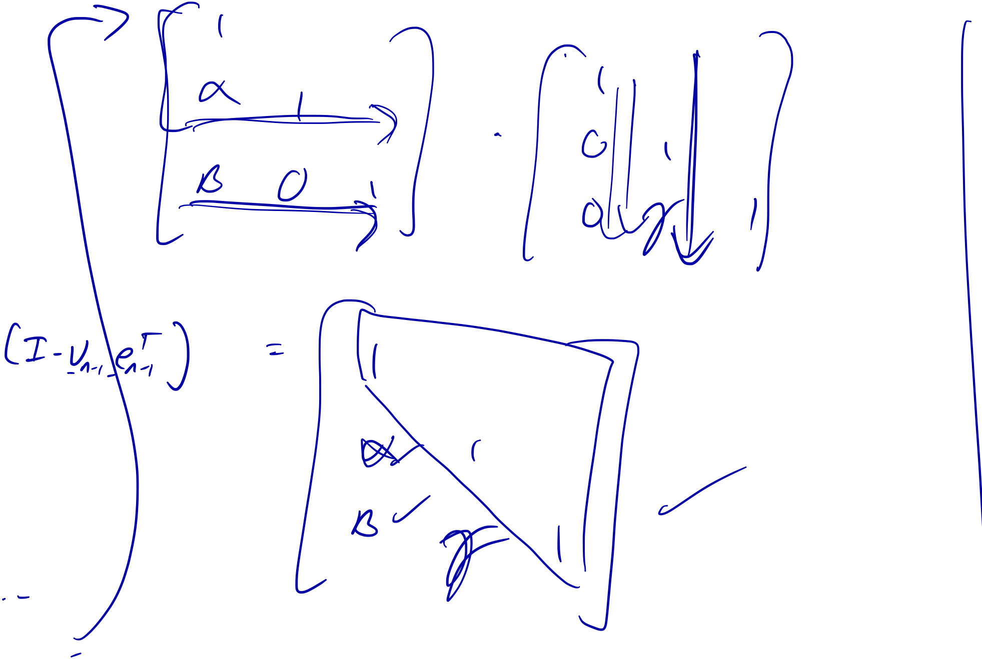
vs. $\|A_2\|$ vs. $\|A_1\|$.

Product of L inverses in LU

$$L = L_1^{-1} L_2^{-1} L_3^{-1} \cdots L_{n-1}^{-1}$$

$$L_1 = (I - \underline{v}_1 e_1^T)(I - \underline{v}_2 e_2^T) \cdots$$





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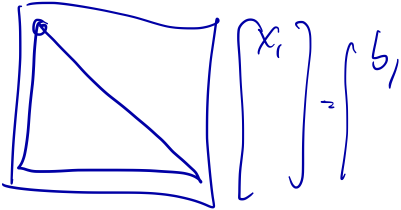
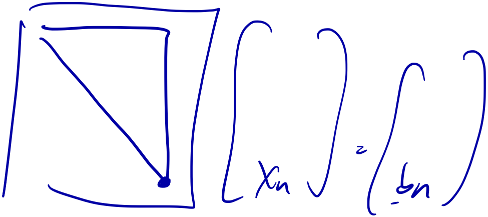
L, U solver



forward solv



Back solve.