Review for Final Exam

Wednesday, December 5, 2018 12:07 PM

section 5.4:

for symmetric matrices ($A^T = A$), we can <u>orthogonally diagonalize</u>

to get $A = QDQ^T$ where

Q = orthogonal matrix (orthonormal columns)

D = diagonal matrix

$$D = \begin{bmatrix} \lambda_1 & & & 0 \\ & \lambda_2 & & \\ & & \ddots & \\ 0 & & & \lambda_n \end{bmatrix}$$

where the λ_i are the eigenvalues of A

$$Q = \begin{bmatrix} \vec{q}_1 & \vec{q}_2 & \cdots & \vec{q}_n \end{bmatrix}$$

where $\vec{q}_i$ is an eigenvector for λ_i

and $\{\vec{q}_1, \vec{q}_2 \ldots \vec{q}_n\}$ is orthonormal

- eigenvectors for distinct eigenvalues are $\perp$
- for repeated eigenvalues (alg mult > 1)
  - we use Gram Schmidt to orthogonalize the eigenvectors for that eigenvalue

- scale to get unit vectors

Section 7.3:

For an inconsistent system $A\vec{x} = \vec{b}$

(no solution)

$A\vec{x}_{LS} = \text{proj}_{\text{Col}(A)} \vec{b}$

- $\vec{x}_{LS} = (A^T A)^{-1} A^T \vec{b}$ ← will be given

$\| \vec{b} - A\vec{x}_{LS} \|$ = least squares error