Gaussian Elimination plays a big role in the first chapters...

Gaussian Elimination

Maybe already seen this

fluff

Chapter 2 Matrix Algebra 93

important why it Linear alg works

Spiral method of teaching mathematics...keep switching back and forth between topics to give people a chance to catch up...

Linear algebra works

Chapter 3 Determinants 165

ntents

Chapter 4 Vector Spaces 191

enough more in strange k

We take a break discussing dimension and rank

Catch up with dimension and rank while learning determinant so everyone can continue together in chapter 4...

Learning more about dimension and rank...

Gaussian Elimination

Theory of Determinants

great stuff

Same thing happens here...

Take a break from the eigenvalue eigenvector problem to discuss Gram-Schmidt and least squares...

New algorithm

Stanford engineers

This gives people time to catch up with the eigenvalue and eigenvectors before Chapter 7 which generalizes the eigenvalue eigenvector problem...to create the singular value decomposition...

Finish line

generalization of eigenvector eigenvalue problem

While the spiral method at first looks like someone threw the pages for the book down the stairs and then put them back together in a random order...

The advertising claims that it allows those who fall behind time to catch up while other topics are being discussed while at the same time providing something new each time for people who keep pace with the course...

I'd prefer to cover one topic in depth before going on to the next topic... In either case, the thing to remember is that techniques get used again and again once learned, so it's never useful to forget a topic once the chapter is done...

- The structure and meaning of Matrix-matrix multiplication

$$\begin{cases} g(x) = Ux \\ h(y) = Ly \end{cases}$$

LU is the matrix corresponding to the linear function given by $h \circ g$.

$$U = \begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 1 & 0 & -2 \end{bmatrix} \qquad x = \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix}$$

row interpretation

$$Ux = \begin{bmatrix} x_1 + 2x_2 + 3x_3 \\ 4x_1 + 5x_2 + 6x_3 \\ x_1 + 0x_2 - 2x_3 \end{bmatrix}$$

column interpretation

$$Ux = \begin{bmatrix} 1 \\ 4 \\ 1 \end{bmatrix} x_1 + \begin{bmatrix} 2 \\ 5 \\ 0 \end{bmatrix} x_2 + \begin{bmatrix} 3 \\ 6 \\ -2 \end{bmatrix} x_3$$

Matrix - Matrix Mult

$$A=\begin{bmatrix}1&0&2\\-1&2&3\\2&-1&5\end{bmatrix} \qquad B=\begin{bmatrix}0&2&1\\-2&3&7\\2&1&0\end{bmatrix}$$

Find AB i.e. matrix the gives the composition of the lin. functions for A & B.

row-col method...

$$B=\begin{bmatrix}0&2&1\\-2&3&7\\2&1&0\end{bmatrix}$$

$$A=\begin{bmatrix}1&0&2\\-1&2&3\\2&-1&5\end{bmatrix}\begin{array}{cc} & j \text{ col}\\ \text{row } i & \begin{bmatrix}4&4&1\\2&7&13\\12&\boxed{6}&\boxed{-5}\end{bmatrix}\end{array}=AB$$

$$A=\begin{bmatrix}r_1\\ \hline r_2\\ \hline r_3\end{bmatrix} \qquad B=\left[\begin{array}{c|c|c}c_1&c_2&c_3\end{array}\right]$$

$$(AB)_{ij}=r_i\cdot c_j$$

Matrix-Matrix mult. in terms of Matrix vector mult.

$$AB = A\left[\, c_1 \;\middle|\; c_2 \;\middle|\; c_3 \,\right] = \left[\, Ac_1 \;\middle|\; Ac_2 \;\middle|\; Ac_3 \,\right]$$

a way of writing a whole bunch of Matrix vector operations...