

CS/ECE/ME 532

Activity 3

- Unit 1 Quiz Tuesday
 - 25 minutes, at start of class
 - Open notes
 - No interaction with anyone besides instructors
 - Additional practice problems (end of Week 2 module)
- In-class activity
 - Check your group – new students added
 - Time estimates at top of Activity
 - Ask for help, don't spend a lot of time

Correct!

Question 1

1 / 1 pts

Let $\mathbf{A} = [\mathbf{a}_1 \quad \mathbf{a}_2 \quad \cdots \quad \mathbf{a}_M]$ where $\mathbf{a}_i, i = 1, 2, \dots, M$ are K -by-1 column vectors.

What is true about $\mathbf{c} = \mathbf{A}\mathbf{b}$ where \mathbf{b} is M -by-1?

- ☐ \mathbf{c} is a row vector
- ☐ \mathbf{c} is a weighted sum of the rows of \mathbf{A}
- ☒ \mathbf{c} is a weighted sum of the columns of \mathbf{A}

inner product

$$\mathbf{x}^T \mathbf{y}$$

outer product

$$\mathbf{x} \mathbf{y}^T$$



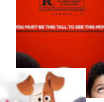


orthogonal if

$$\mathbf{x}^T \mathbf{y} = 0$$

Matrix Completion



- Users rate movies with 1-5 stars
★★★★☆
- How can we predict if a user will like a movie they haven't rated?
- Assumption: users have similar 'tastes'

		Users →							
Movies ↓		?	1	5	?	3	?	...	?
		2	?	2	?	?	?	...	5
		?	?	?	?	?	?	...	?
		3	?	5	?	?	3	...	?
		1	1	?	2	?	?	...	2
		?	?	4	?	?	?	...	?
		5	?	?	?	1	?	...	?
		:	:	:	:	:	:
		?	3	1	?	?	4	...	?

Matrix Completion – Toy Example

- Students rate classes from 0-100
- How can we predict if a student will like a class they haven't rated?
- Assumption

$$X = tw^T$$

Multiplying block matrices

$$AB =$$

$$\begin{bmatrix} A_{1,1} & A_{1,2} \\ A_{2,1} & A_{2,2} \end{bmatrix} \begin{bmatrix} B_{1,1} & B_{1,2} \\ B_{2,1} & B_{2,2} \end{bmatrix} = \begin{bmatrix} A_{1,1}B_{1,1} + A_{1,2}B_{2,1} & \text{blah} \\ \text{blah} & \text{blah} \end{bmatrix}$$

$$\begin{bmatrix} | & & | \\ \mathbf{a}_1 & \cdots & \mathbf{a}_n \\ | & & | \end{bmatrix} \begin{bmatrix} - & \mathbf{b}_1^T & - \\ & \vdots & \\ - & \mathbf{b}_n^T & - \end{bmatrix} = \mathbf{a}_1 \mathbf{b}_1^T + \cdots + \mathbf{a}_n \mathbf{b}_n^T$$

