CIS 678 Machine Learning

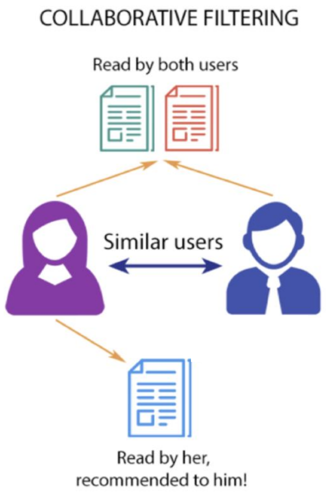
Association Learning

Association Learning

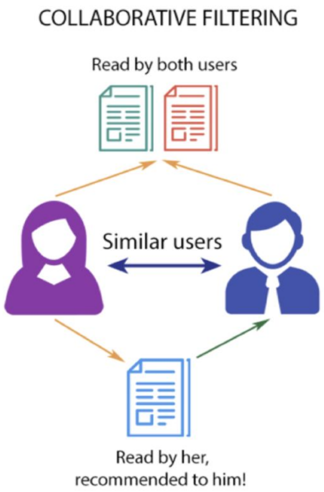
- Market basket analysis
- Collaborative filtering

Recommender Systems

Recommender Systems



Recommender Systems



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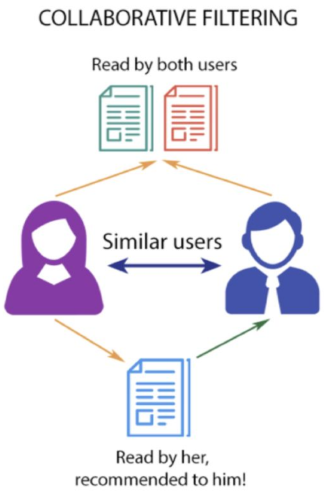

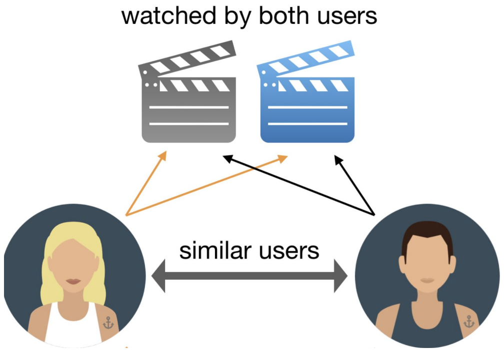

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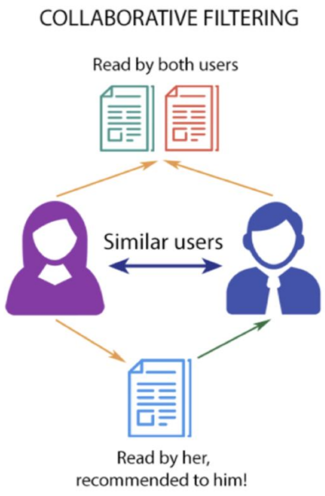

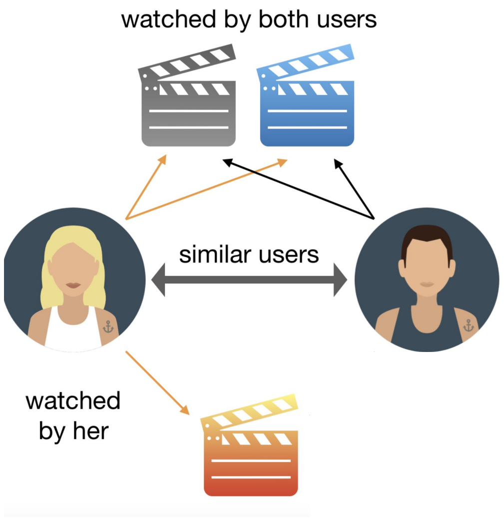

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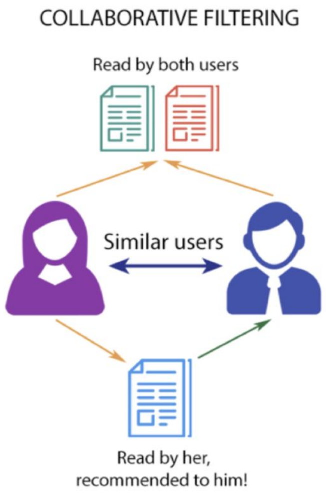

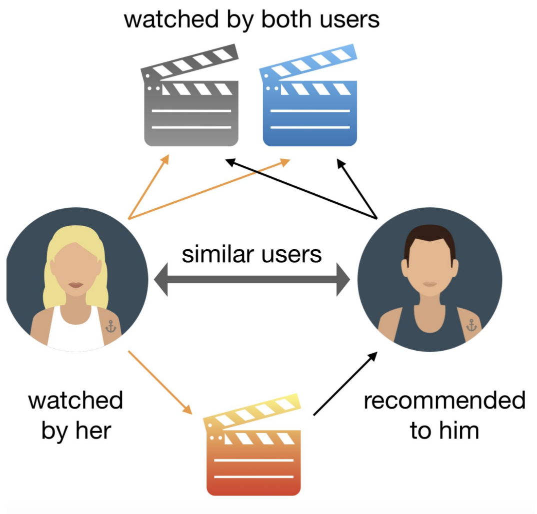

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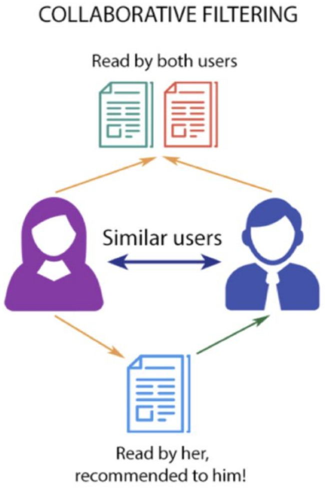
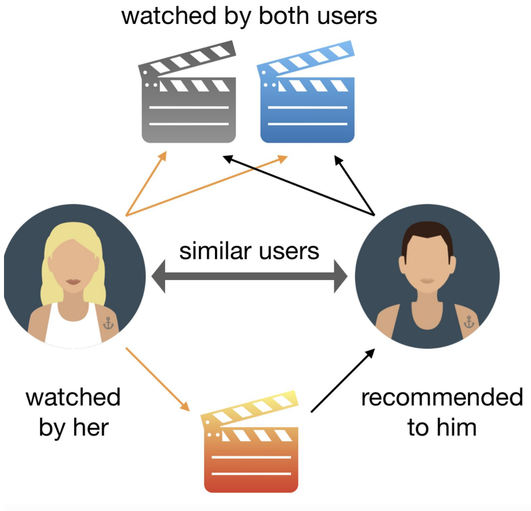
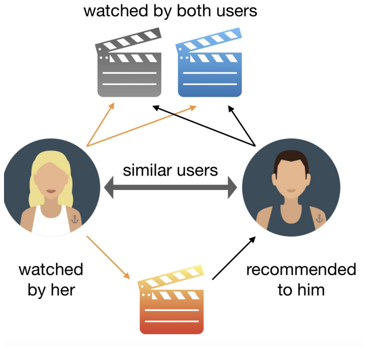


Collaborative filtering



Recommender Systems

Collaborative filtering



Items

Users					
				5	
		5			
			1		3
	1				
			2		2
	2			4	
		2			5

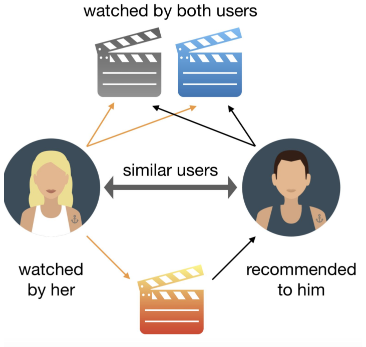
Utility Matrix (m x n)

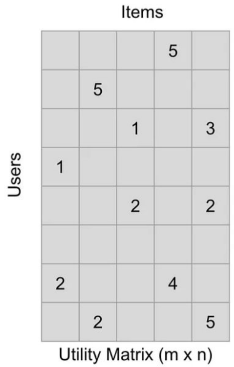
- Our data matrix, sometimes called as utility matrix

Matrix factorization (numbers are random for the sake of illustration) (Image by author)

Recommender Systems

Collaborative filtering



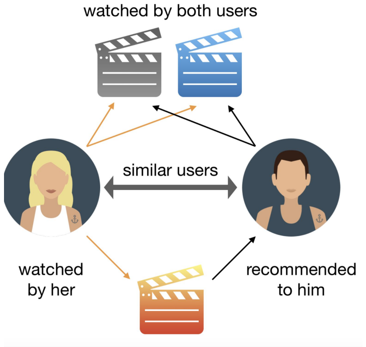


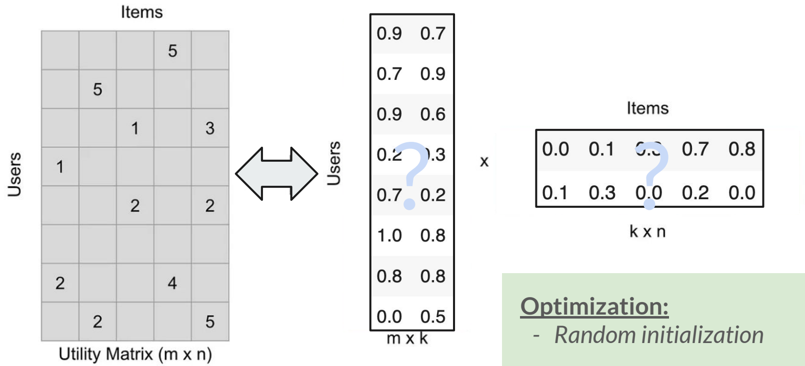
Matrix factorization (numbers are random for the sake of illustration) (Image by author)

- Our data matrix, sometimes called as utility matrix
- **We will talk about a matrix factorization collaborative filtering technique**

Recommender Systems

Collaborative filtering





Optimization:

- *Random initialization*

Matrix factorization (numbers are random for the sake of illustration) (Image by author)

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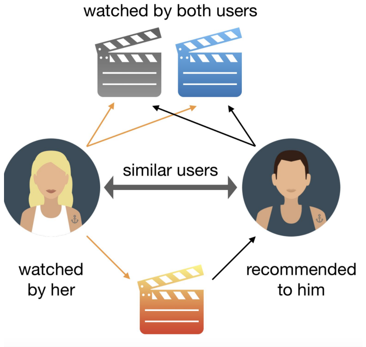
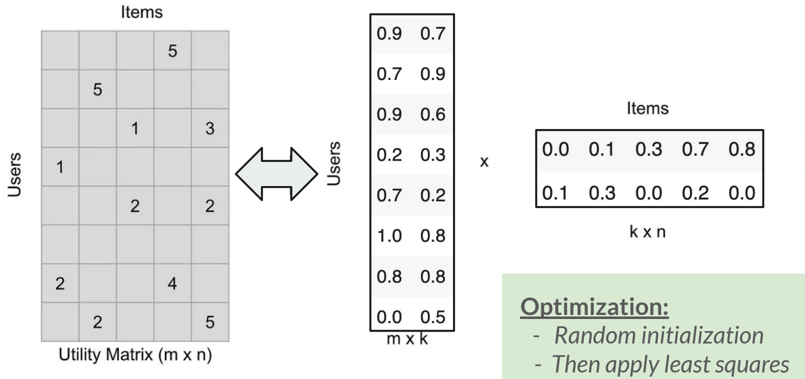
Collaborative filtering





Optimization:
- *Random initialization*
- *Then apply least squares*

Matrix factorization (numbers are random for the sake of illustration) (Image by author)

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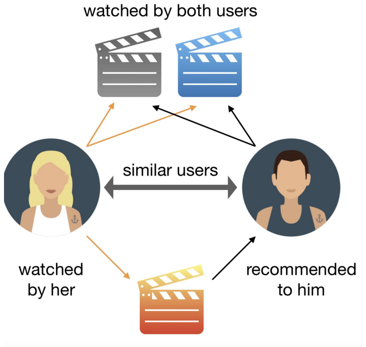

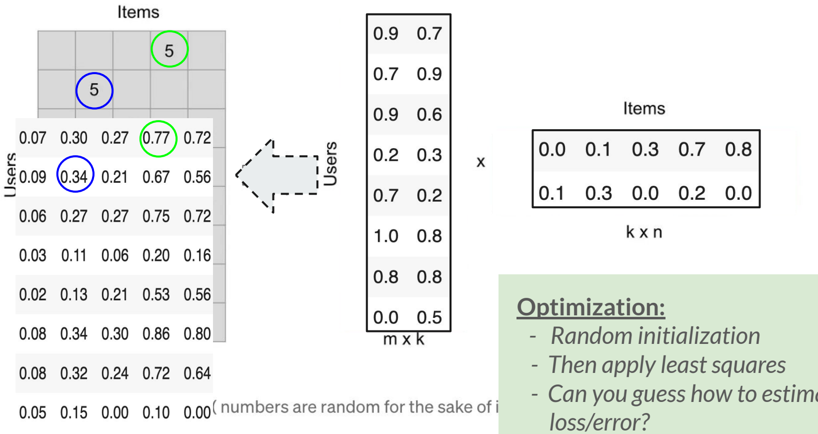

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Optimization:
- *Random initialization*
- *Then apply least squares*
- *Can you guess how to estimate loss/error?*

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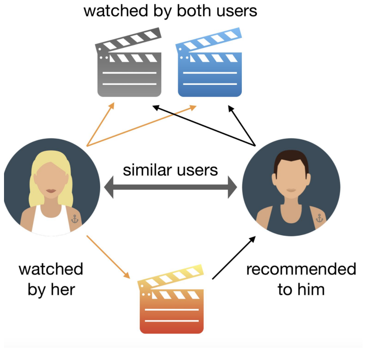
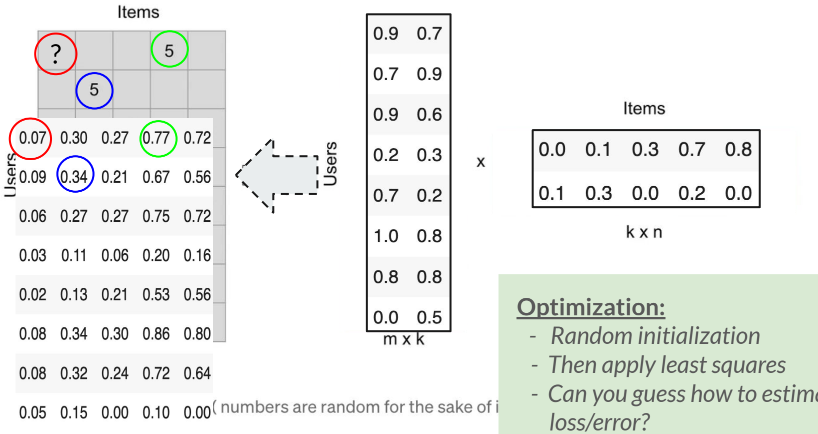
Collaborative filtering





Optimization:
- *Random initialization*
- *Then apply least squares*
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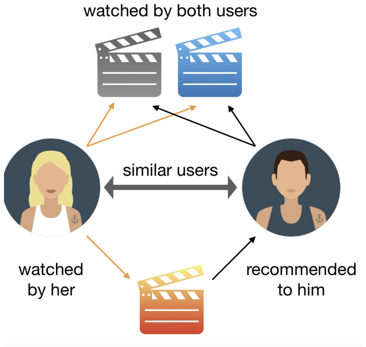
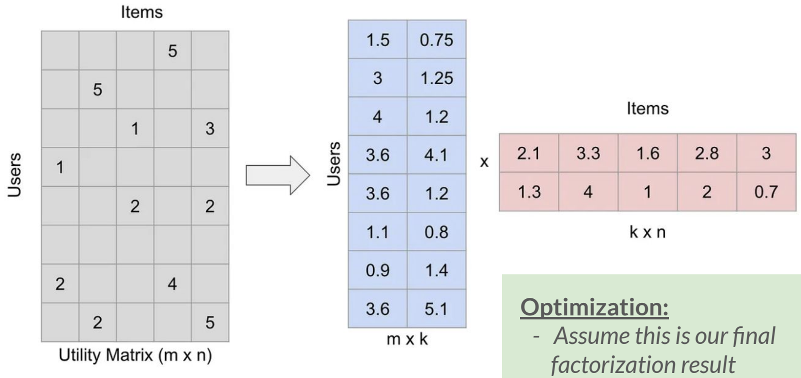




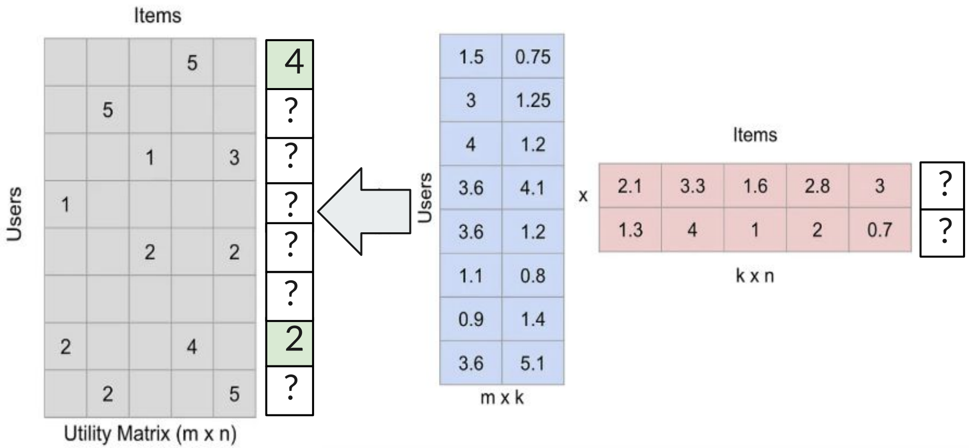
Matrix factorization (numbers are random for the sake of i

Optimization:
- *Assume this is our final factorization result*

A new movie, lets rated by 2 users

Optimize for new ratings of an item

- Given by 2 users
- And for previously learned users and items
- What item values {=(?, ?) can explain the two new ratings given that users are fixed (learned).



A new movie rated by 2 users

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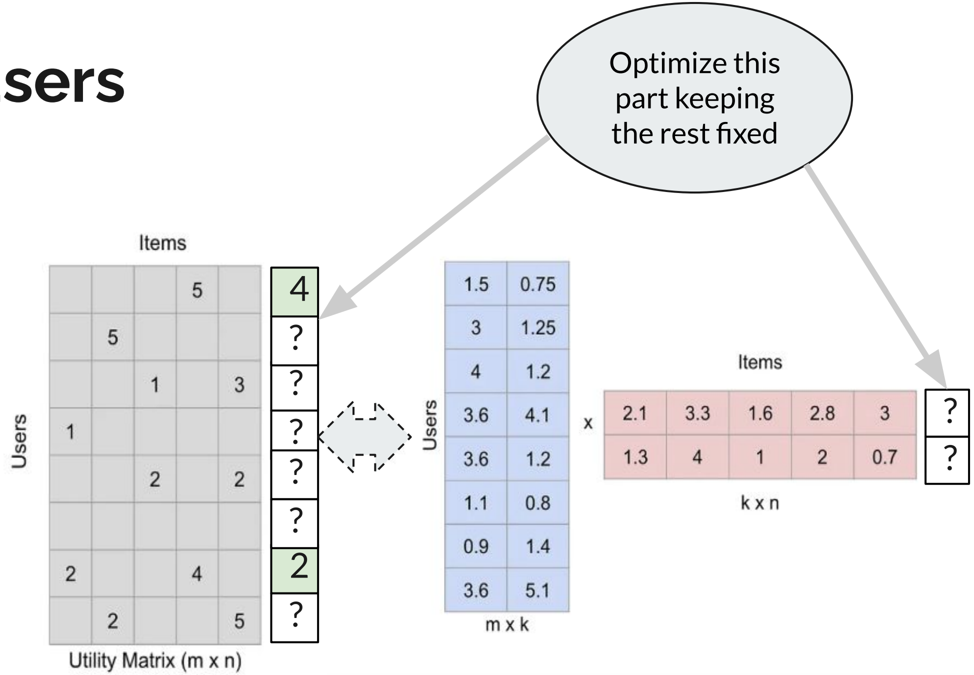
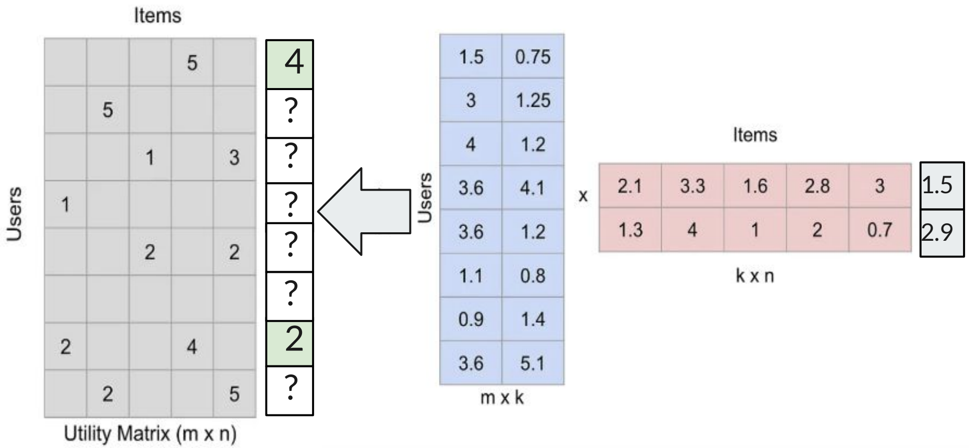


A new movie rated by 2 users

Optimize for new ratings of an item

- Given by 2 users
- And for previously learned users and items
- What item values {=(?, ?) can explain the two new ratings given that users are fixed (learned).
- Then fill the ?? is in the utility matrix.



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