Matrix Representation

Restaurants

Users

	A	B	C
1	$_1R_A$	$_1R_B$	$_1R_C$
2	$_2R_A$	$_2R_B$	$_2R_C$
3	$_3R_A$	$_3R_B$	$_3R_C$

Ratings

Rating Vectors for A and B

$_1R_A$
$_2R_A$
$_3R_A$

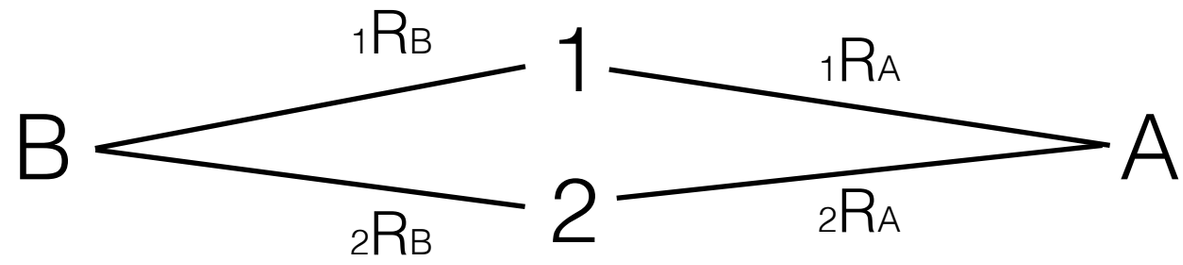
•

$_1R_B$
$_2R_B$
$_3R_B$

= Similarity Score

Graph Representation

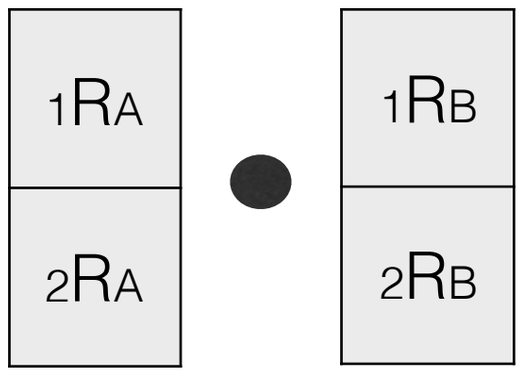
Restaurants Users Restaurants



Rating Vectors formed by finding path from A to B

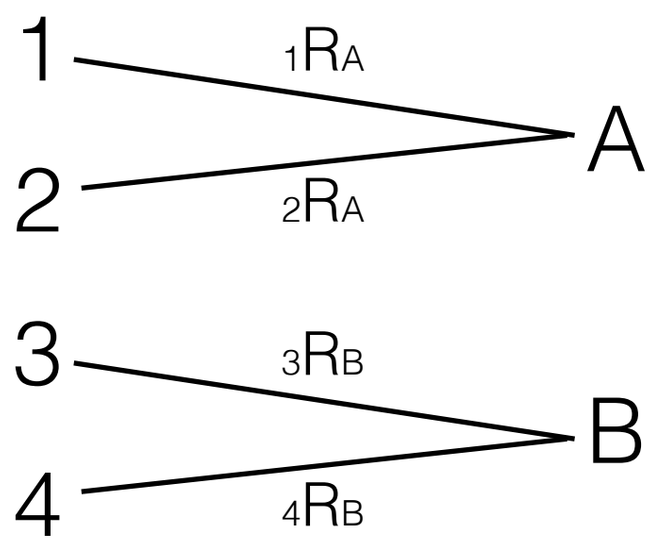
A → 1 → B

A → 2 → B



= Similarity Score

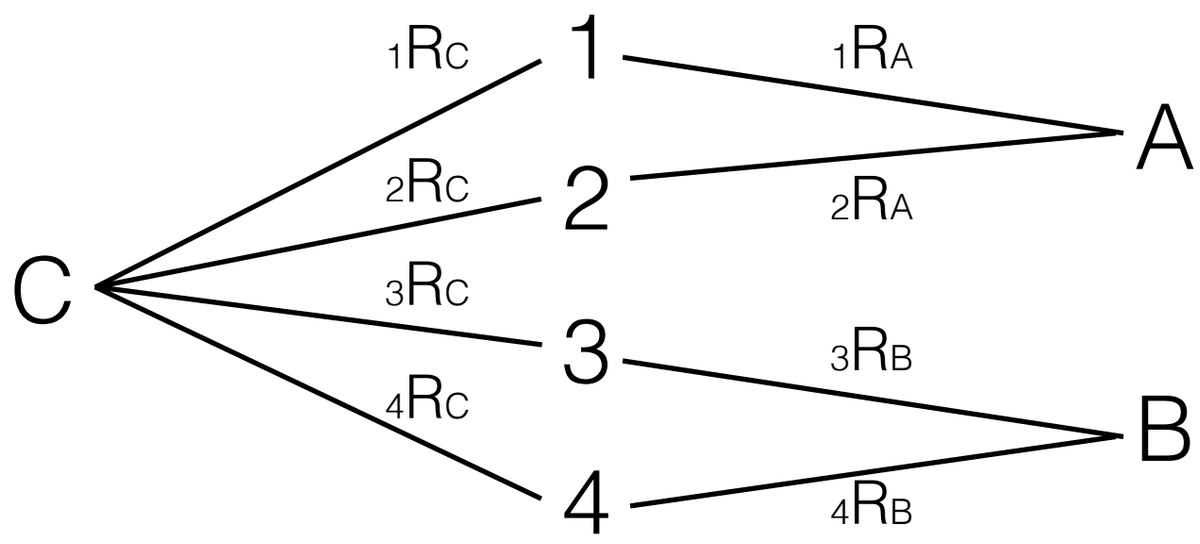
Graph Representation



No overlap in ratings of A and B,
No similarity score

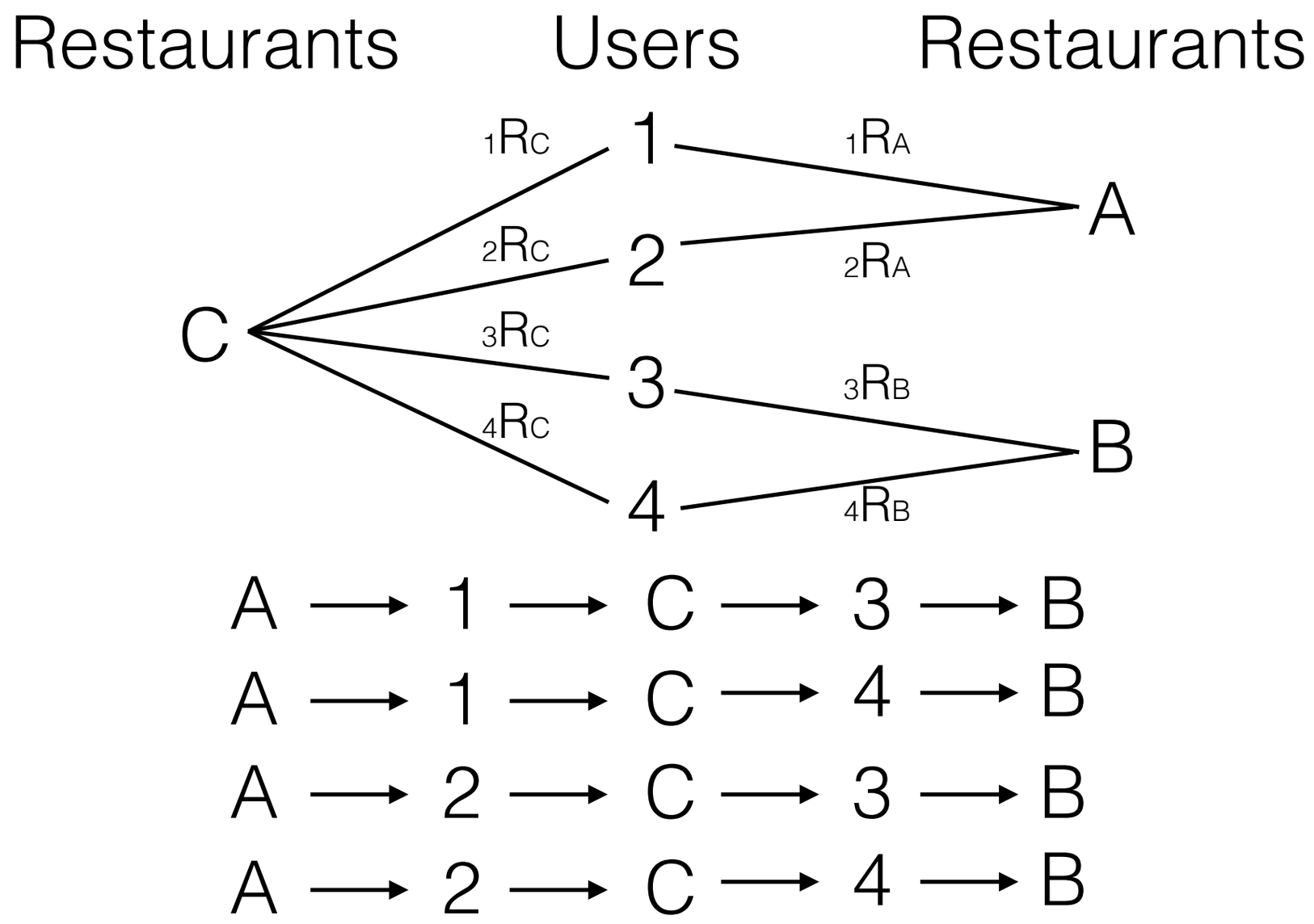
Graph Representation

Restaurants Users Restaurants



Since all Users have rated C we can calculate suer similarity score. If we cannot see how the same users rate A and B, we can see how similar users rate them

Graph Representation



A → 1 → C → 3 → B

A → 2 → C → 3 → B

A → 2 → C → 4 → B

General Case

$$Sim(A, B) = \sum_{(x,y)} {}_xR_{Ay}R_B \sum_r {}_xR_{ry}R_r$$

User Similarity

Graph Representation

First Order Similarity

$$Sim_1(A, B) = \sum_{(x,y)} {}_xR_{Ay}R_B$$

Second Order Similarity

$$Sim_2(A, B) = \sum_{(x,y)} {}_xR_{Ay}R_B \sum_{r} {}_xR_{ry}R_r$$

User Similarity

Higher Orders ⋮

$$Sim(A, B) = Sim_1(A, B) + c_2 Sim_2(A, B) + \ldots$$