



RECOMMENDER SYSTEM

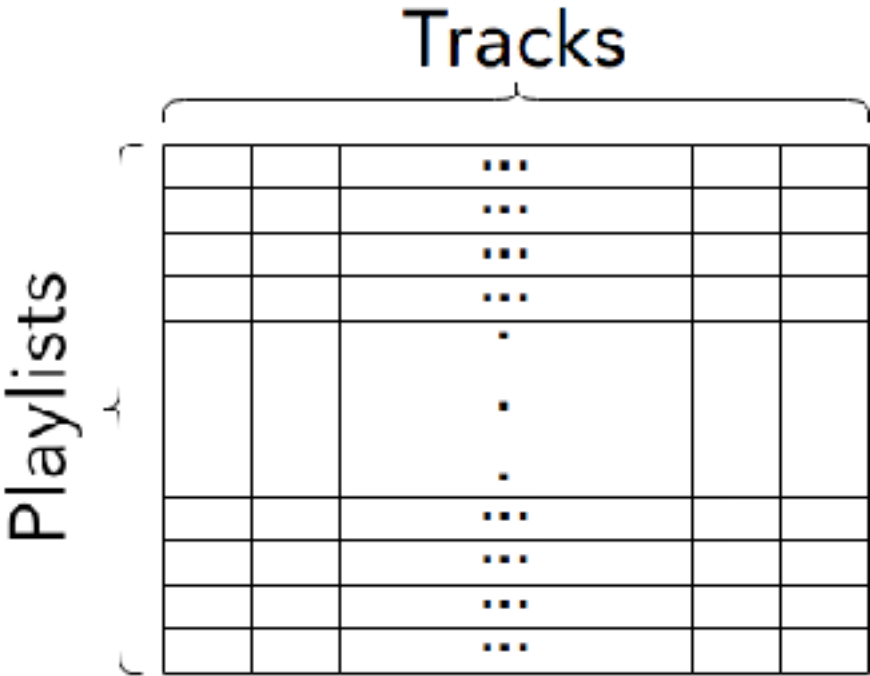
COMPETITION RESULTS

Guglielmo Menchetti
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PROBLEM AND DATA

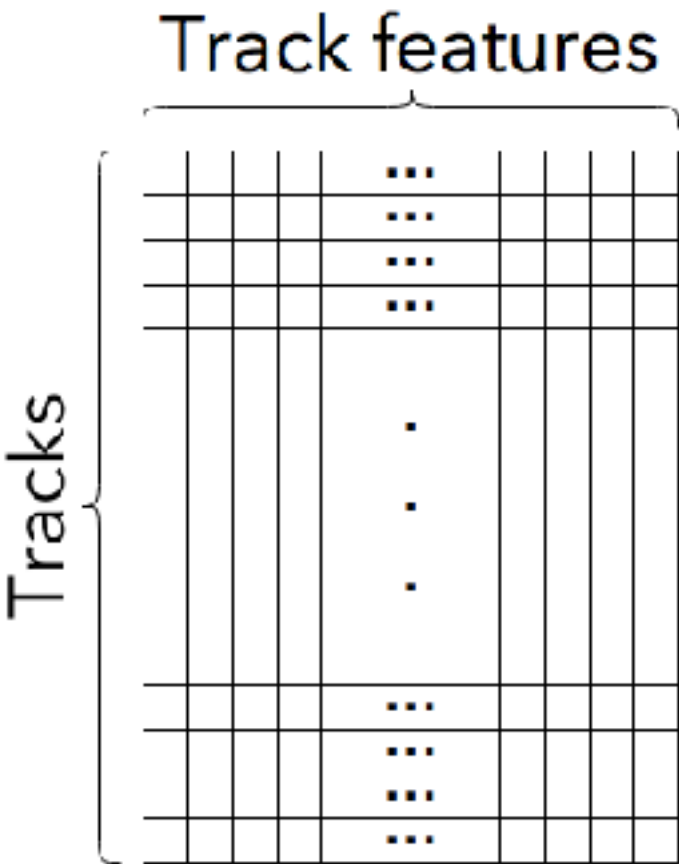
- ▶ **Task:** playlist continuation with implicit feedbacks
- ▶ **Data:**
 - track_id
 - artist_id (One Hot Encoded)
 - album (One Hot Encoded)
 - tags (One Hot Encoded)
 - playlist_id
- ▶ **Evaluation:** MAP@5

URM



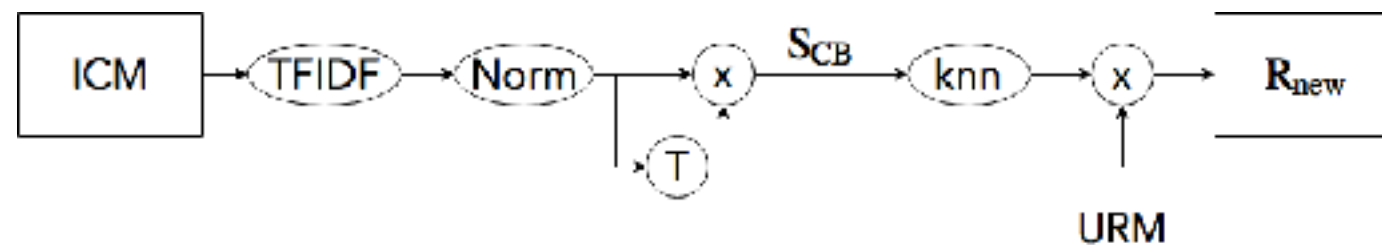
► **Dimension**
45.649x100.000

ICM

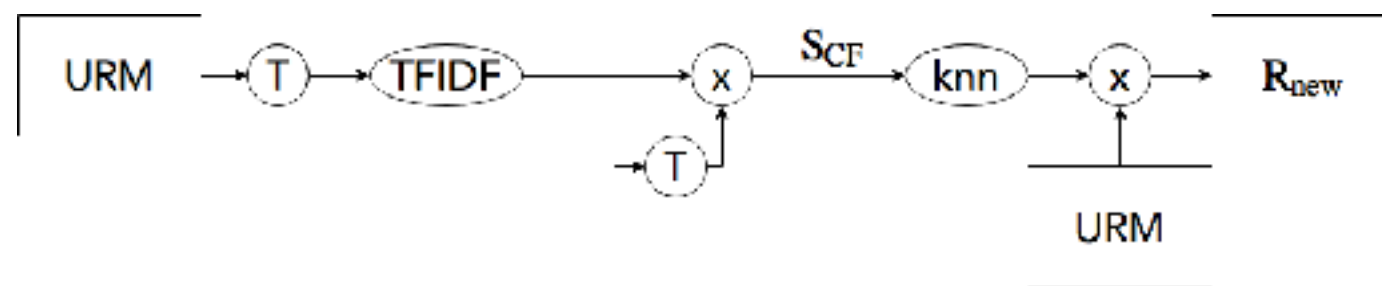


► **Dimension**
100.000x77.041

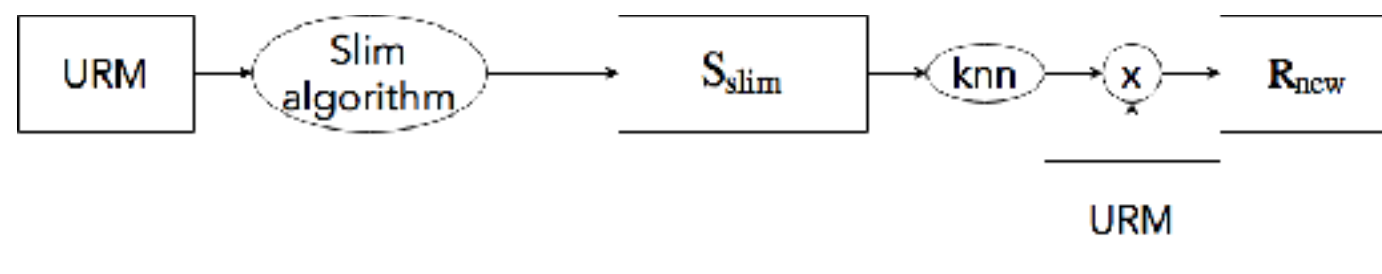
CONTENT BASE FILTERING



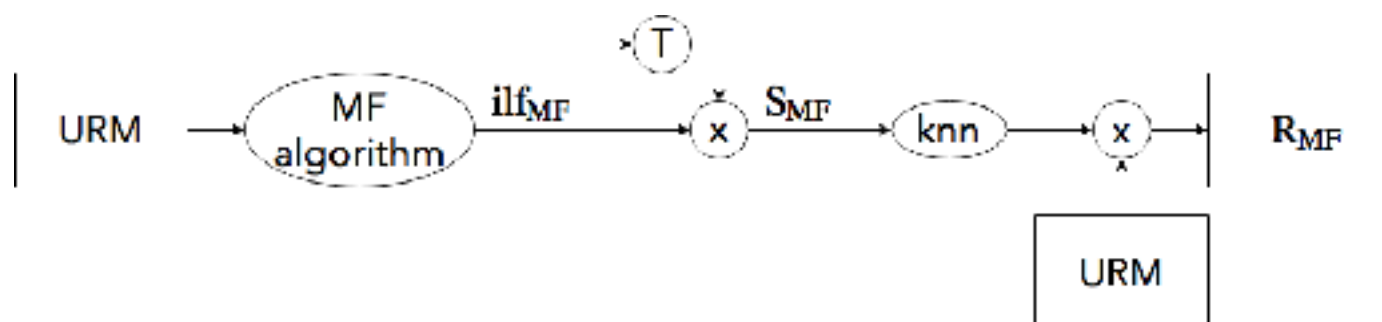
COLLABORATIVE FILTERING



SLIM-BPR



MATRIX FACTORIZATION



T=transpose matrix

Norm=normalize matrix with L2-norm by column

S=similarity matrix

R=new rating matrix

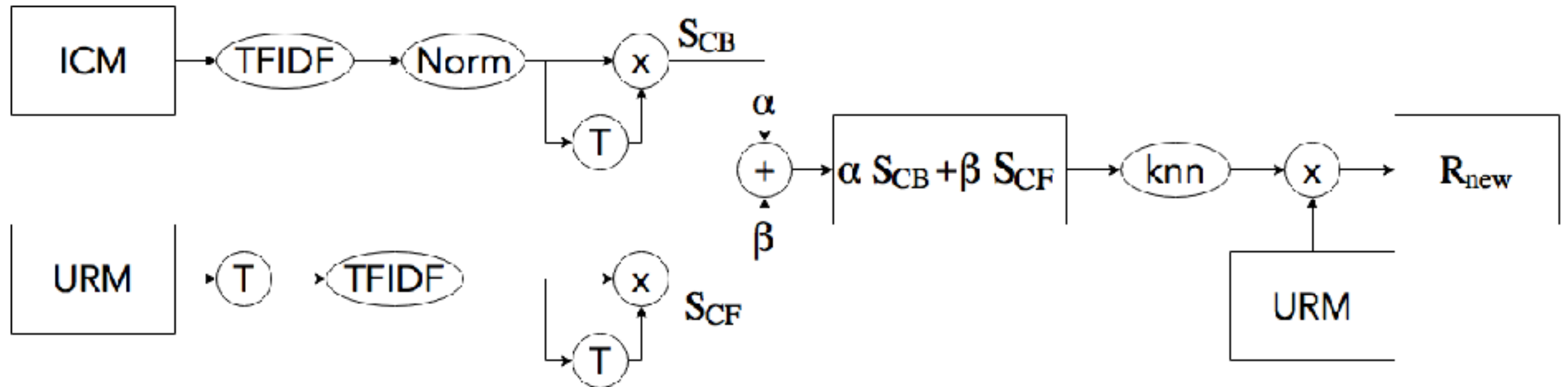
knn=selection of k-nearest neighbours

ilf=item latent factors

RESULTS

CONTENT BASE FILTERING	COLLABORATIVE FILTERING
<ul style="list-style-type: none">▶ Parameters<ul style="list-style-type: none">• knn: 300▶ Results<ul style="list-style-type: none">• Test set: 0.0761 (± 0.0007)• Leaderboard: 0.0804	<ul style="list-style-type: none">▶ Parameters<ul style="list-style-type: none">• knn: 300▶ Results<ul style="list-style-type: none">• Test set: 0.0550 (± 0.0007)
SLIM-BPR	MATRIX FACTORIZATION
<ul style="list-style-type: none">▶ Parameters<ul style="list-style-type: none">• knn: 600• Iterations: 1• Learning rate: 0.01• PIR, NIR: 1▶ Results<ul style="list-style-type: none">• Test set: 0.0462 (± 0.0006)	<ul style="list-style-type: none">▶ Parameters<ul style="list-style-type: none">• knn: 1000• Number factors: 5000▶ Results<ul style="list-style-type: none">• Test set (SVD): 0.0527 (± 0.0003)• Test set (ALS): 0.0453 (± 0.0005)

HYBRID - CF+CBF



T=transpose matrix

Norm=normalize matrix with L2-norm by column

S=similarity matrix

α, β =parameters used to weight the similarities

R=new rating matrix

knn=selection of k-nearest neighbours

RESULTS

CF+CBF

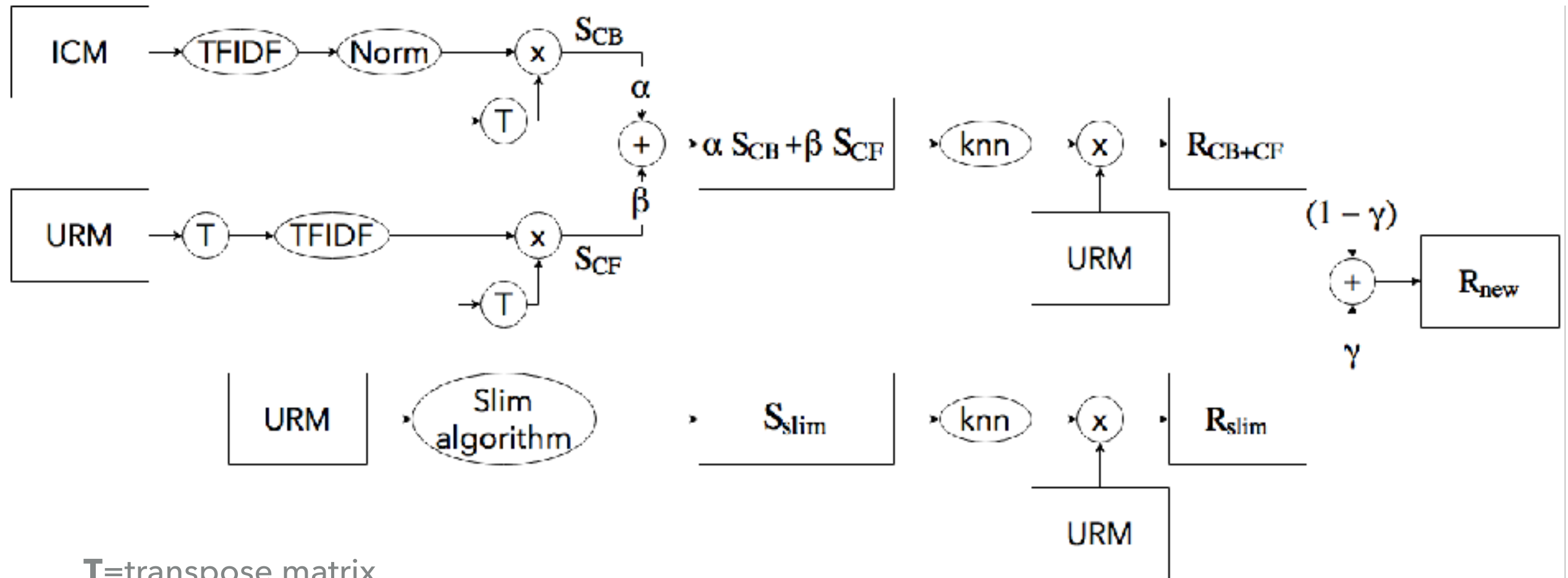
► Parameters

- α : 0.8
- β : 0.2
- **knn**: 300

► Results

- **Test set**: 0.0866 (± 0.0008)
- **Leaderboard**: 0.0917

HYBRID - CF+CBF+SLIM-BPR



T=transpose matrix

Norm=normalize matrix with L2-norm by column

S=similarity matrix

α, β =parameters used to weight the similarities

γ =parameter used to weight recommendations

knn=selection of k-nearest neighbours

RESULTS

CB+CBF+SLIM-BPR

► Parameters

Slim

- α : 0.8
- β : 0.2
- γ : 0.8
- knn (CB+CBF) : 300
- knn (slim-bpr) : 600
- Learning rate: 0.01
- PIR, NIR: 1
- Iterations: 1

► Results

- Test set: 0.0936 (± 0.0009)
- Leaderboard: 0.1017

HYBRID - CF+CBF+SLIM-BPR+MATRIX FACTORIZATION

T =transpose matrix

Norm=normalize matrix with L2-norm by column

S=similarity matrix

α, β =parameters used to weight the similarities

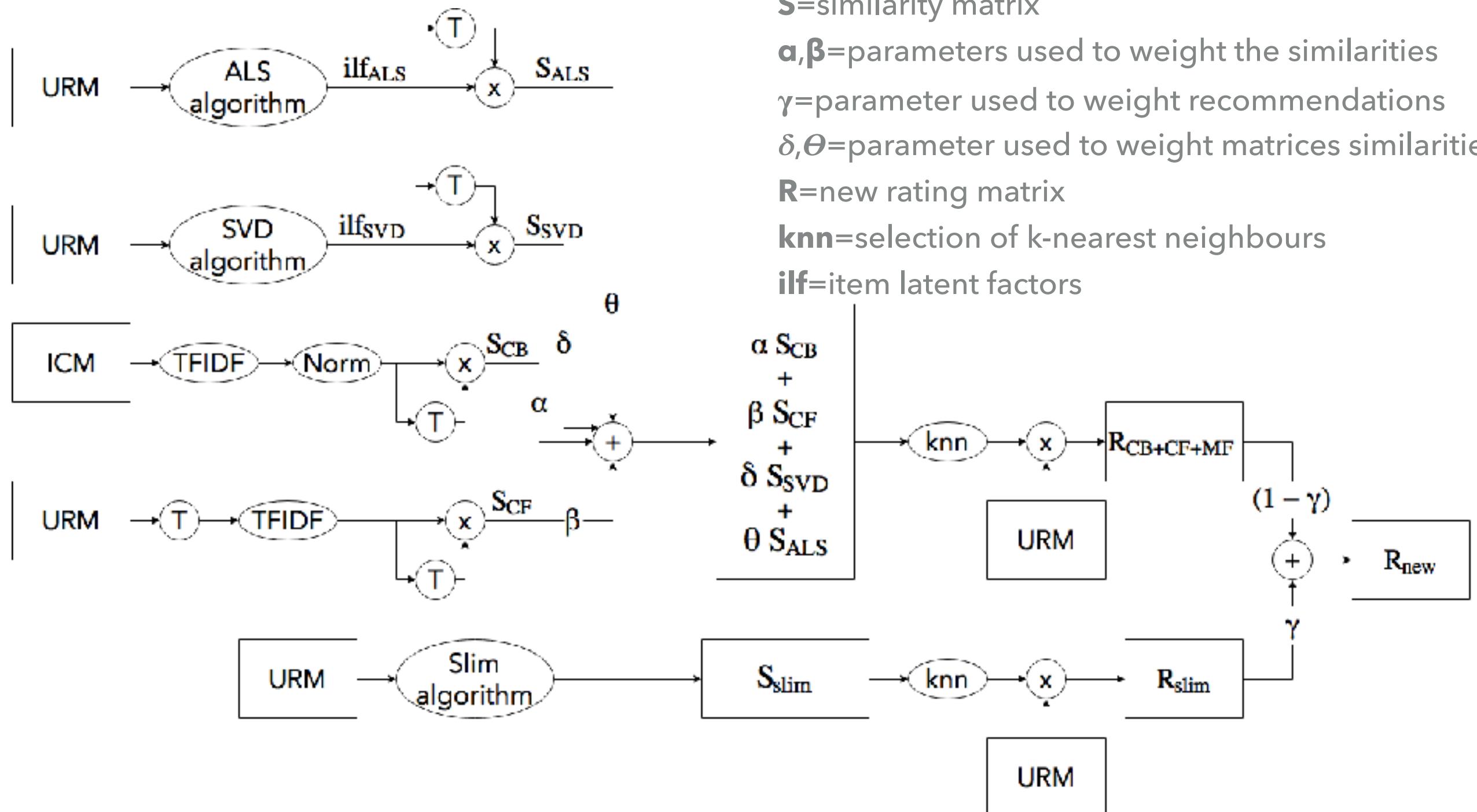
γ =parameter used to weight recommendations

δ, θ =parameter used to weight matrices similarities

R=new rating matrix

knn=selection of k-nearest neighbours

ilf=item latent factors



RESULTS

CB+CBF+SLIM-BPR+MF

► Parameters

- | | Slim | SVD |
|----------------------------|------------------------------|----------------------------------|
| • α : 0.8 | • knn (slim-bpr): 600 | • Number of factors: 5000 |
| • β : 0.2 | • Learning rate: 0.01 | ALS |
| • γ : 0.8 | • PIR, NIR: 1 | • Number of factors: 5000 |
| • δ : 0.7 | • Iterations: 1 | • Iterations: 15 |
| • θ : 0.07 | | • Regularization: 1 |
| • knn (CB+CBF): 300 | | |

► Results

- **Test set:** 0.0980 (± 0.0011)
- **Leaderboard:** 0.1028

RESULTS OVERVIEW

TEST EXECUTION

- ▶ URM split
 - Test set - 20%
 - Train set - 80%
- ▶ Factorization matrices creation
 - Offline
 - Fixed split set
- ▶ Grid search for parameters optimization

TESTING

CB+CBF+SLIM-BPR

► Results

- **Test set:** 0.0866 (± 0.0008)
- **Leaderboard:** 0.0917

CB+CBF+SLIM-BPR

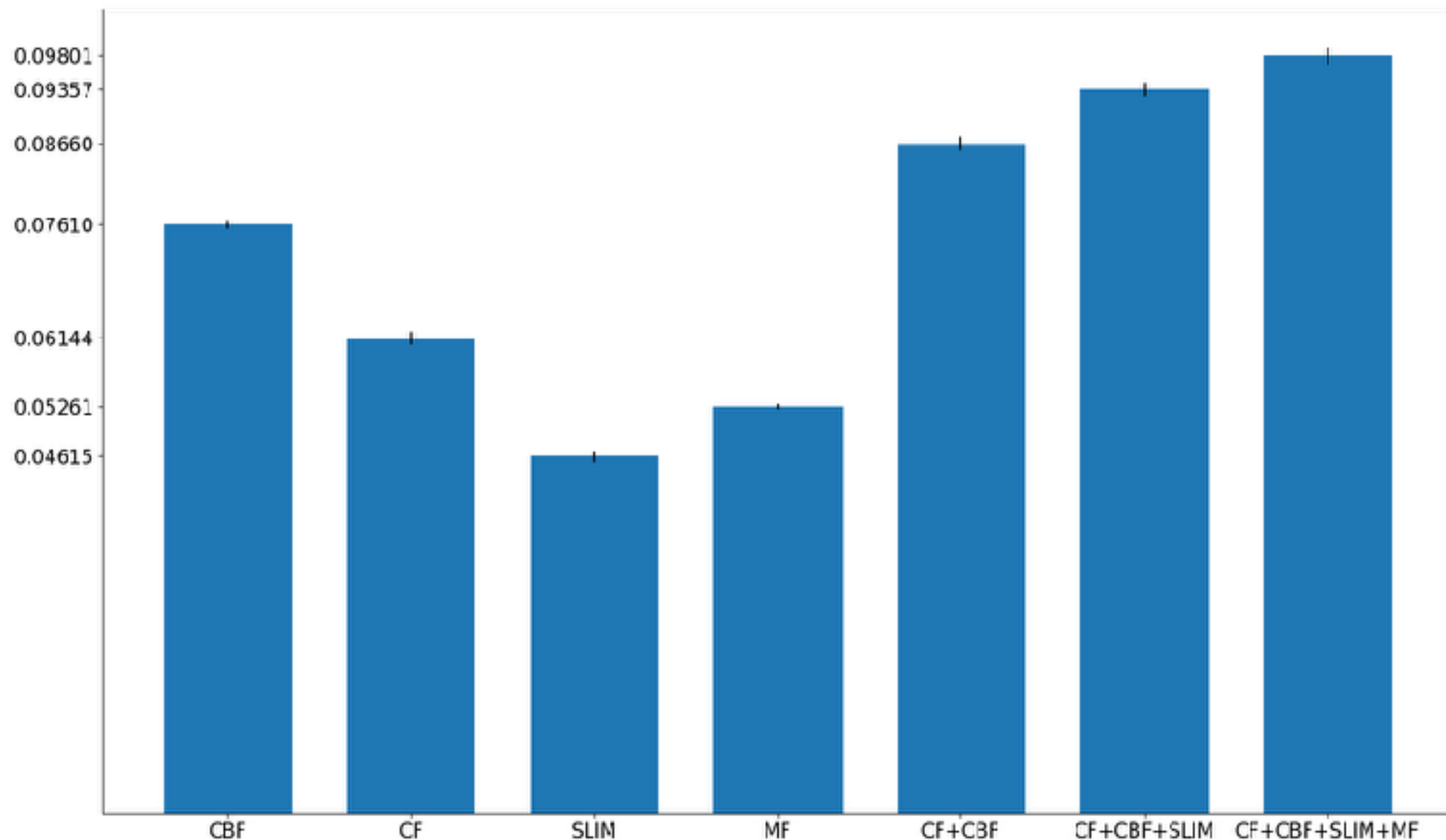
► Results

- **Test set:** 0.0936 (± 0.0009)
- **Leaderboard:** 0.1017

CB+CBF+SLIM-BPR+MF

► Results

- **Test set:** 0.0980 (± 0.0011)
- **Leaderboard:** 0.1028





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COMPETITION RESULTS

THANK YOU FOR THE ATTENTION

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