

Two-Stage Session-based Recommendations with Candidate Rank Embeddings.

Personalizing the Similar Item Recommendation of Zalando

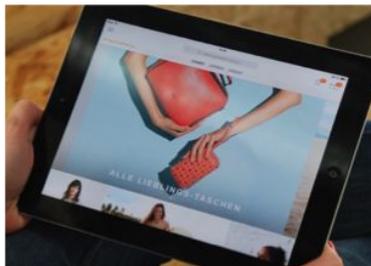
José Antonio Sánchez Rodríguez, Jui-Chieh Wu, Mustafa Khandwawala

> 400,000

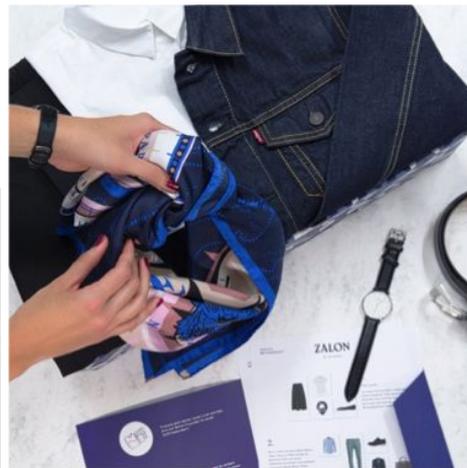
articles from

> 2,000

international brands



**HIGHLY
EXPERIENCED**
category management



11 private labels



LOCALIZATION
of the assortment



**CURATED
SHOPPING**
with Zalono

Introduction

KIDS



ng Shoes Sport Accessories Beauty Premium Brands Sale %

Black Leather Jacket Q

Sort Size Brand Price Sleeve length Specialty sizes Collection Show all filters

6 items



-10%

Anna Field
Faux leather jacket - black

~~59,99 €~~
53,95 €



Bally
Leather jacket - black

1.299,95 €



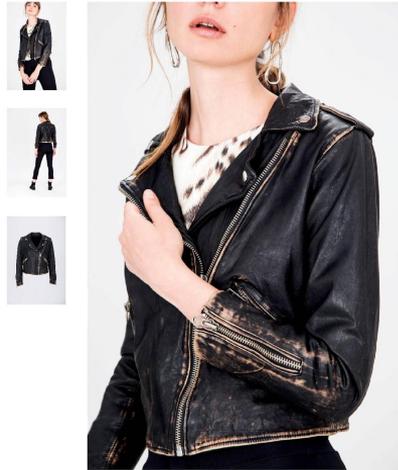
-30%

PETITE

Anna Field Petite
Faux leather jacket - black

~~59,99 €~~
41,95 €

The Product Display Page (PDP)



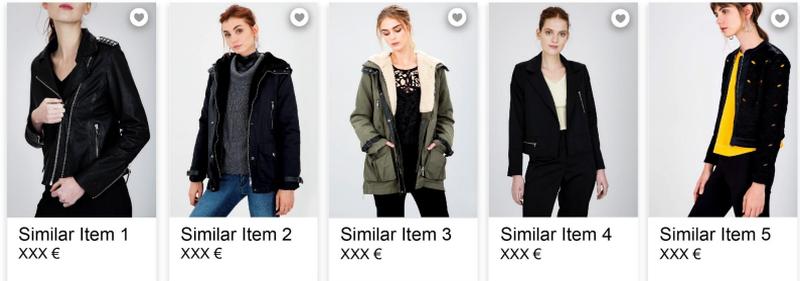
Anchor Item

XXX €

Wish list      

Size >

Add to cart



Similar Items:

One of the most commonly used
Recommendations in Zalando

Baseline: Item-to-Item Collaborative Filtering

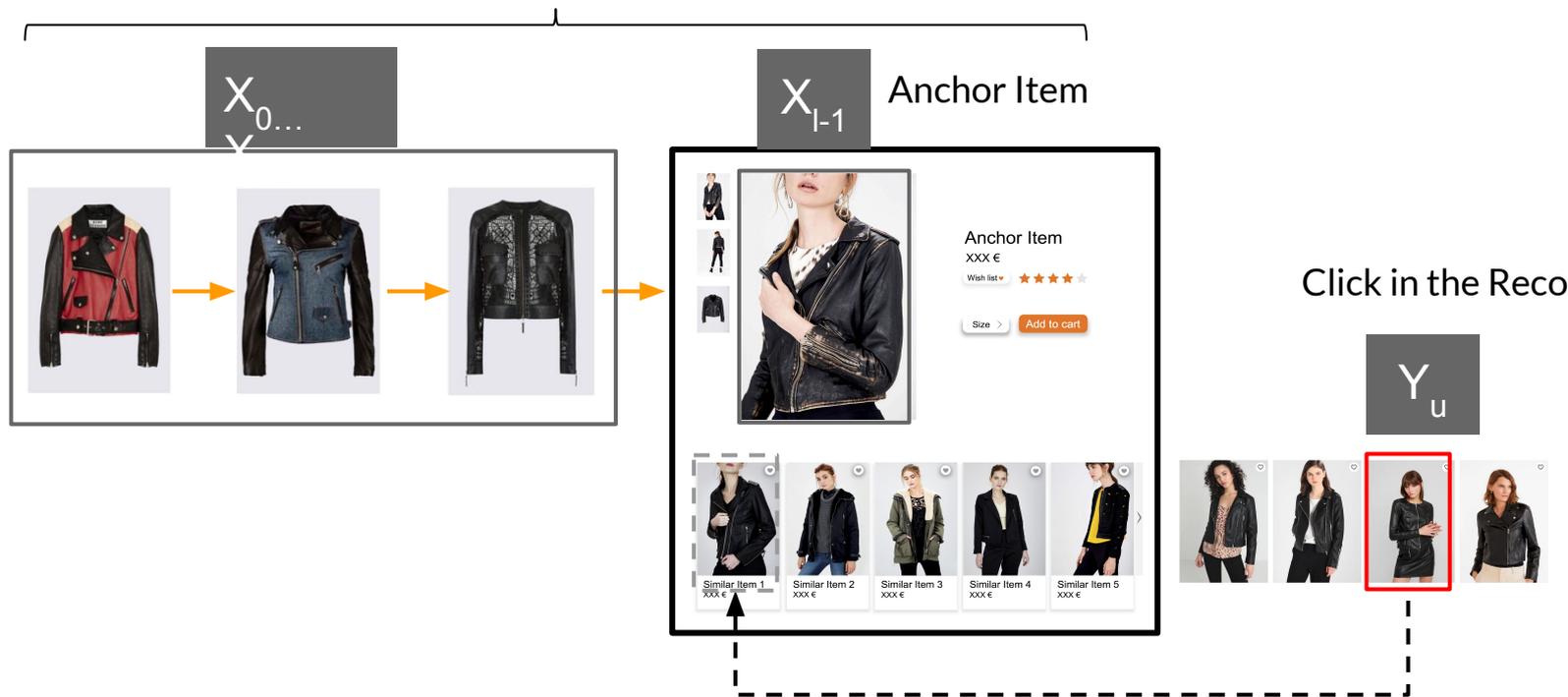
Based on the user-item matrix

		Items			
		U_i		U_j	
Users		0		0	
		0		0	
		1		1	
		1		1	
		1		0	
		0		0	

- Similarity function in terms of the item vectors U_i and U_j for every i and j .
- Static Result for all the users given an anchor item

Using the Session to improve the Similar Reco

Session of the User



We want to predict Y_u given X_0, X_1, \dots, X_{l-1} and push it to the top of the list

Offline Evaluation of Session-based Reco

	Recall@20	MRR@20
STAMP	-10.63%	-6.43%
NARM	-13.78%	-3.87%

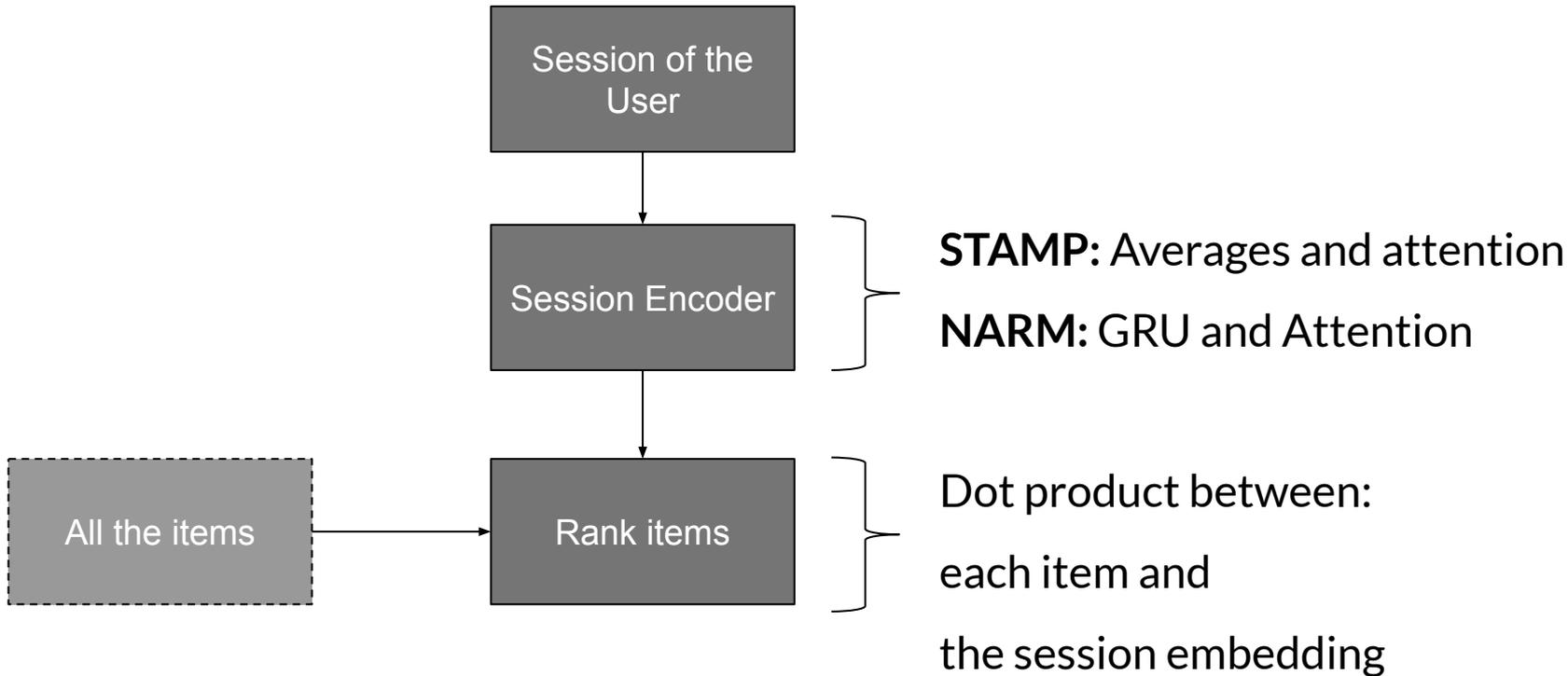


Numbers are the relative difference between the baseline and the given algorithm

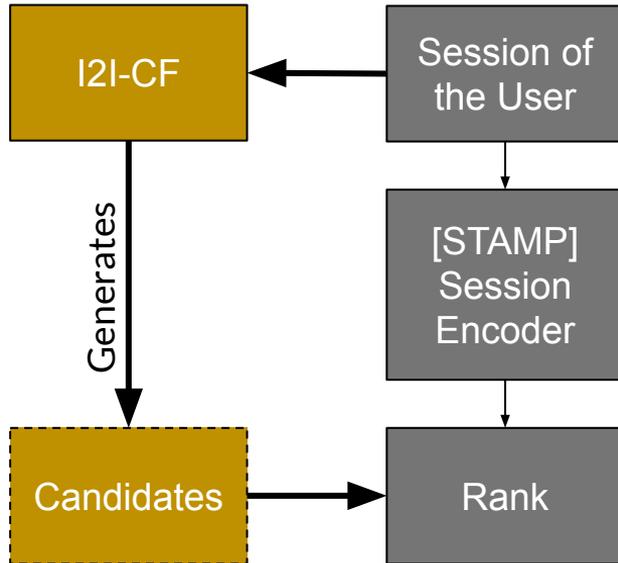
Liu et al. 2018. STAMP: Short-Term Attention/Memory Priority Model for Session-based Recommendation.

Li et al. 2017. Neural Attentive Session-based Recommendation.

Structure of Session-based Recommenders

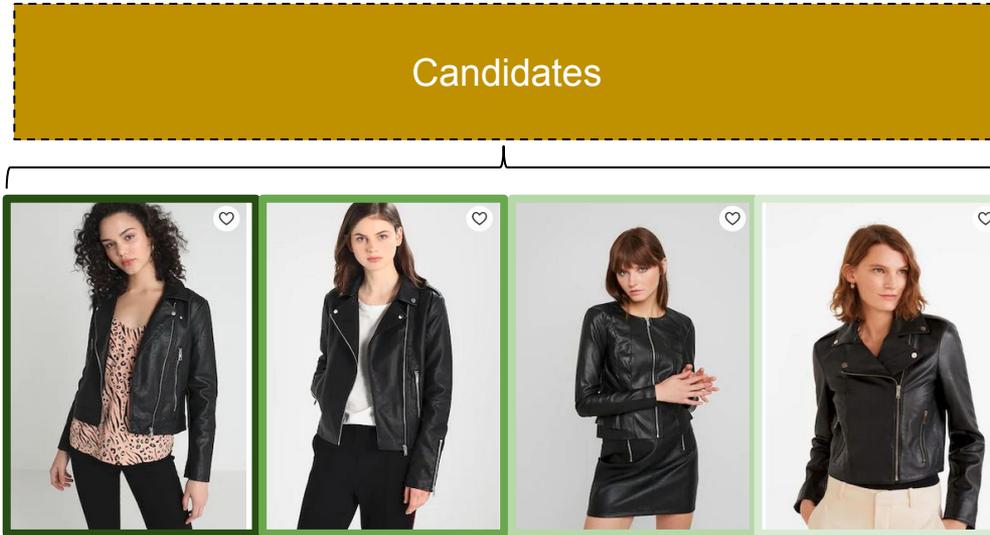


Using STAMP to Re-rank Collaborative Filtering



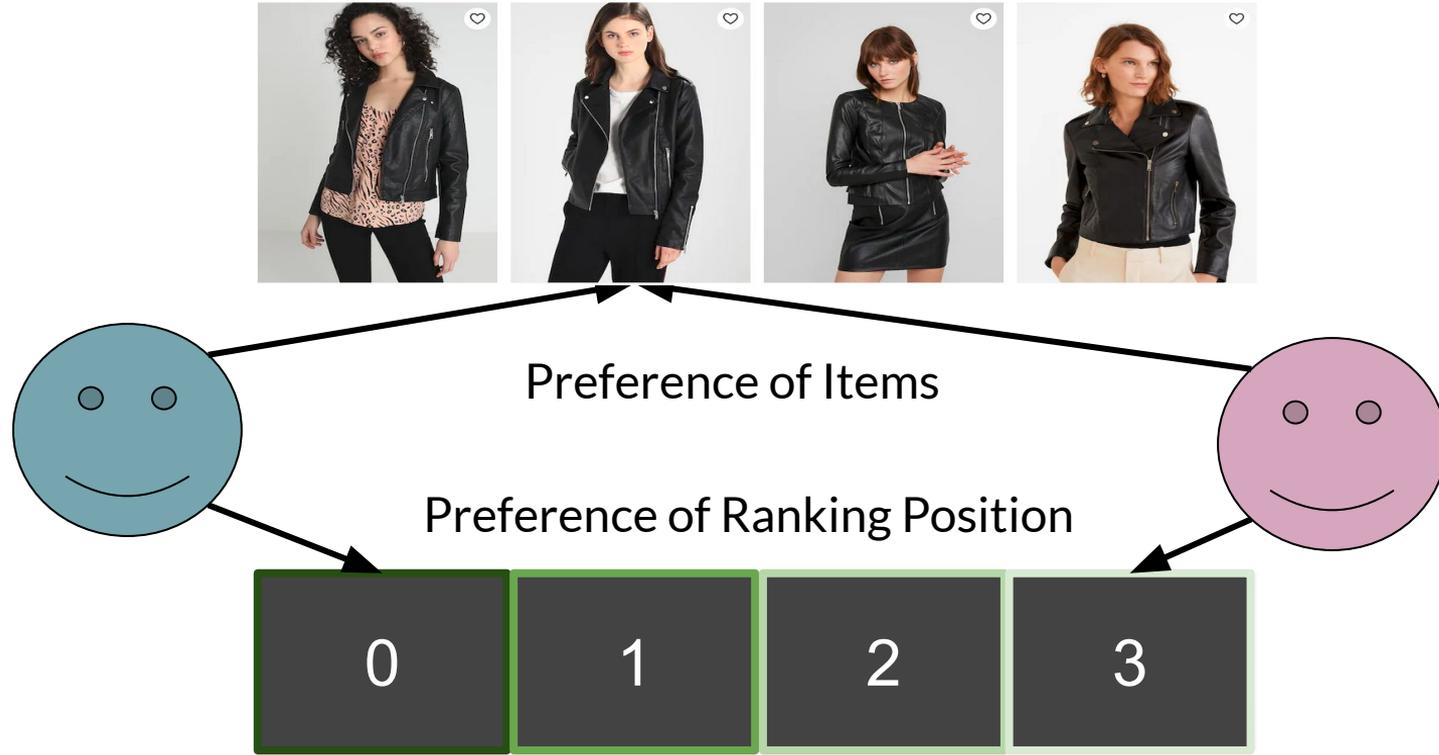
- Precalculate the Candidates
- Faster Training and Serving
- Used STAMP encoder

Candidate Rank as a feature



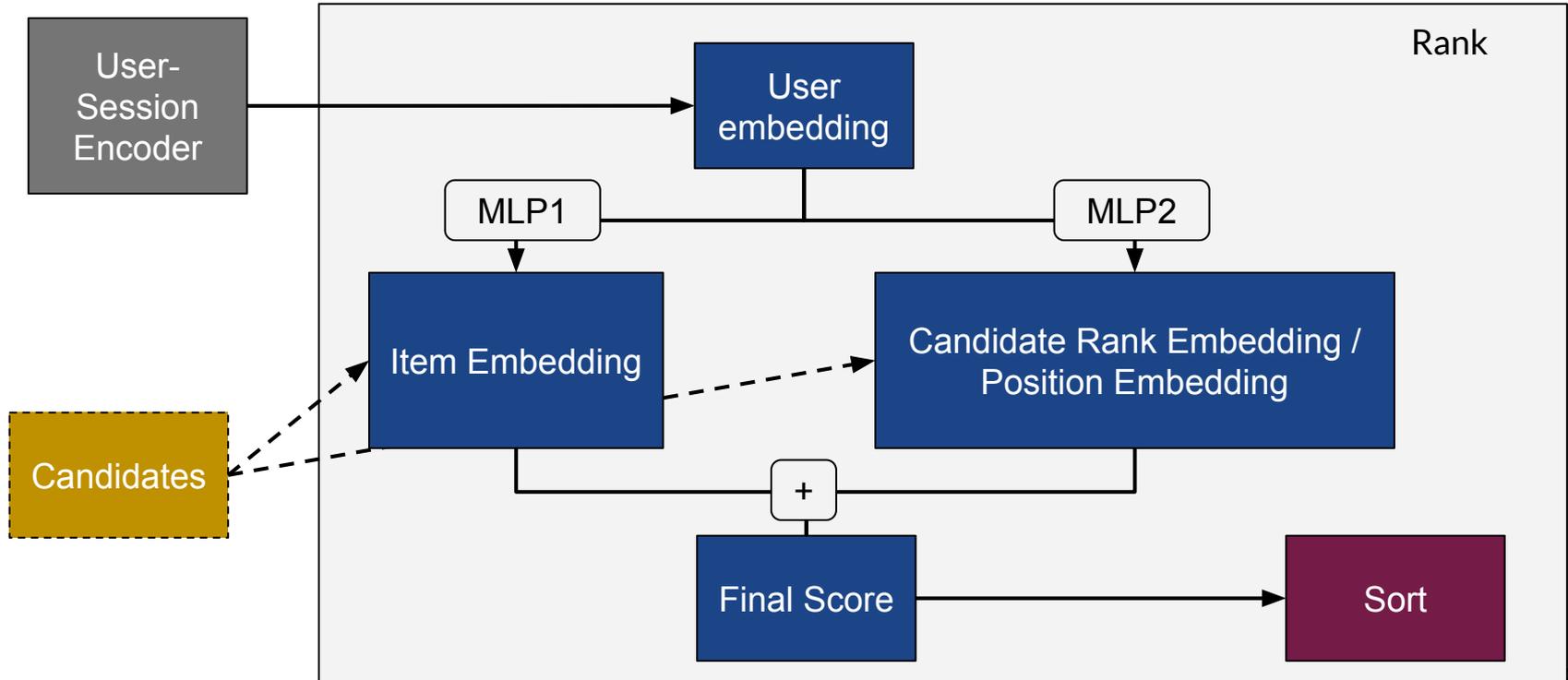
The Rank of the candidates from the baseline is an important feature!

Preference of the user on items and position

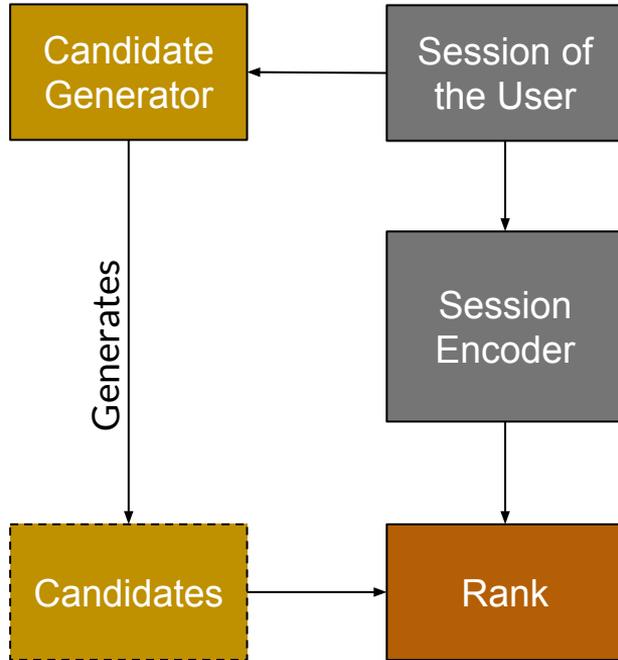


How to model the Rank of the Candidates

Using the information from the Ranking



Summary of the model used



- Used STAMP encoder
- Precalculate the Candidates
- Rank based on the **item** and the **position of the candidate in the ranking**

Results - Proposed Method

Offline Results

	Recall@20	MRR@20
RRCRE-CF	+3.39%	+14.17%

A/B test Results

	CTR
RRCRE-CF	+2.84 (p-value ≤ 0.05)

The number is the relative difference between the proposed method and the CF baseline

Next-Click-Prediction Results

when ranking STAMP and NARM
On public datasets

Datasets	YooChoose ¼ (Recsys 15)		Diginetica	
Algorithm \ Metrics	R@5	R@20	R@5	R@20
RRCRE-STAMP	+3.90%	+1.48%	+6.91%	+4.39%
RRCRE-NARM	+3.40%	+0.80%	+4.55%	+2.01%

relative improvements to the reranked algorithm

Summary

- Planned to use the Session to improve the Similar item Recommendation
- Proposed Modifications:
 - Using the baseline as Candidate Generator for STAMP
 - model the rank of the candidates with **CR Embeddings**
- Improvements:
 - In the similar item problem
 - STAMP and NARM on Public Datasets



QUESTIONS?