Session-based Complementary Fashion Recommendations

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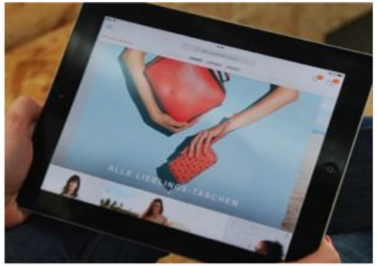
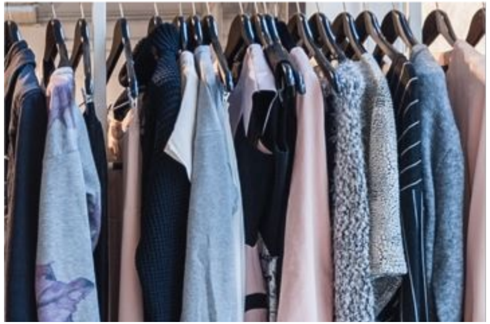
WE OFFER A SUCCESSFUL AND CURATED ASSORTMENT

> 400,000
articles from
> 2,000
international brands



HIGHLY EXPERIENCED
category management



11 private labels

LOCALIZATION
of the assortment

CURATED SHOPPING
with Zalon

About Zalando

Assortment

> 400,000

> 2,000

Brands

Active Customers

> 28 m

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What is Complementary Item Recommendation?

Perfect pairings

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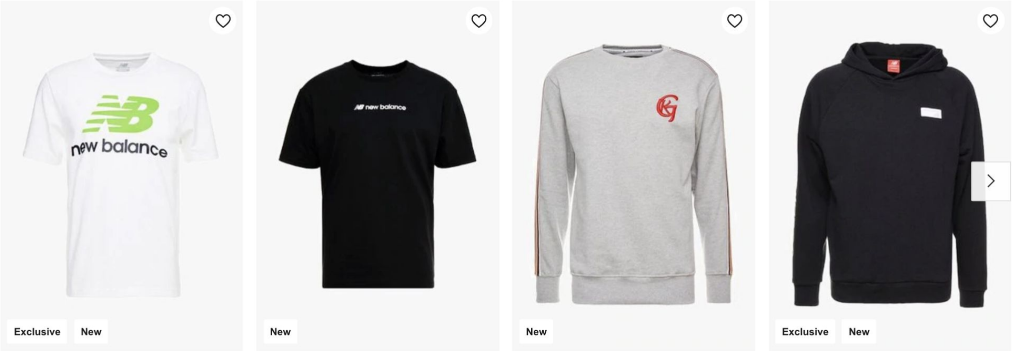

29,95 €	29,95 €	59,95 €	74,95 €
Print T-shirt - white/lime	SPORT STYLE OPTIKS - Print T-shirt - black	OLD SCHOOL - Sweatshirt - grey	Hoodie - black lime
New Balance	New Balance	Gianni Kavanagh	New Balance

Our Baseline

- Based on item-item collaborative filtering
- High score items in different category
- Items similar to high score items if not enough recommendations

Limitations of the Baseline

- Static recommendation for everyone
- Low CTR
- Low conversion rate

Problem Statement

For a given user with an interaction history x_h and the anchor item x_t,
Select a list of complementary items y_1, y_2, ... , y_k from a set of candidates y.

$$y_1, y_2, \cdots y_k \sim p(y \mid x_h, x_t)$$

How We Define Complementary Relationship

Two items x_i and x_j are complementary if they

1. Belong to different categories (shoe v.s. trousers)
2. Belong to two fashion-compatible categories

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Problem Statement

$$\boxed{y_1, y_2, \cdots y_k} \sim p(y \mid x_h, x_t)$$

Complementary of x_t

Whole Catalog

- Learn from the existing user response on the current baseline
- Learn from the re-sampled dataset

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Creating a More Representative Dataset

Training a new model on top of the training data coming from the baseline constraints the capacity of the abstractions learned by the new model.

Solution

Instead of learning from the user behavior we observed on the current product, we sample behaviors from the *user interaction history* that satisfy our definition of complementary.

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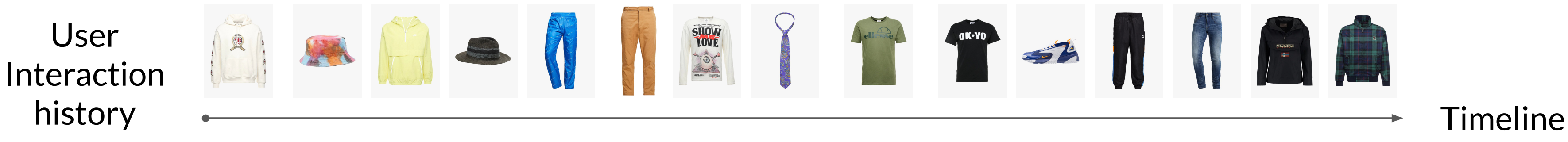
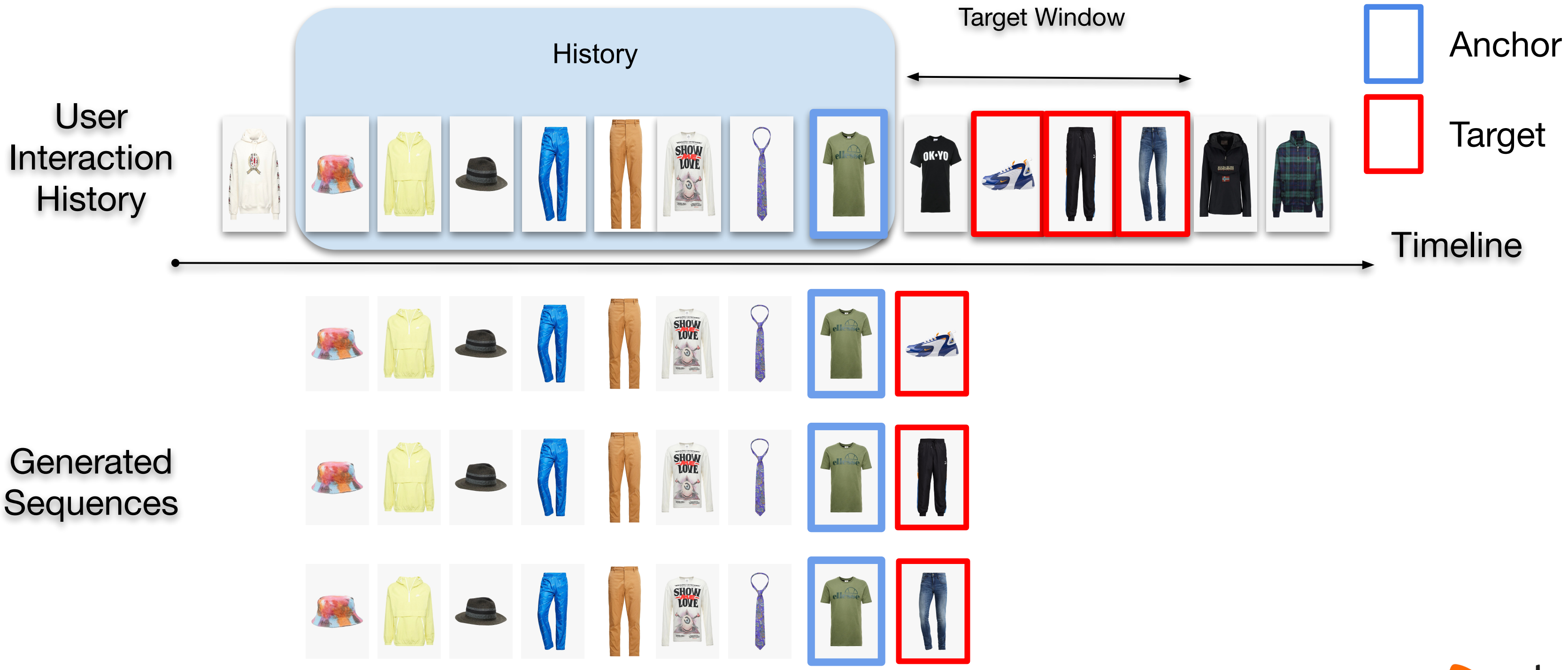
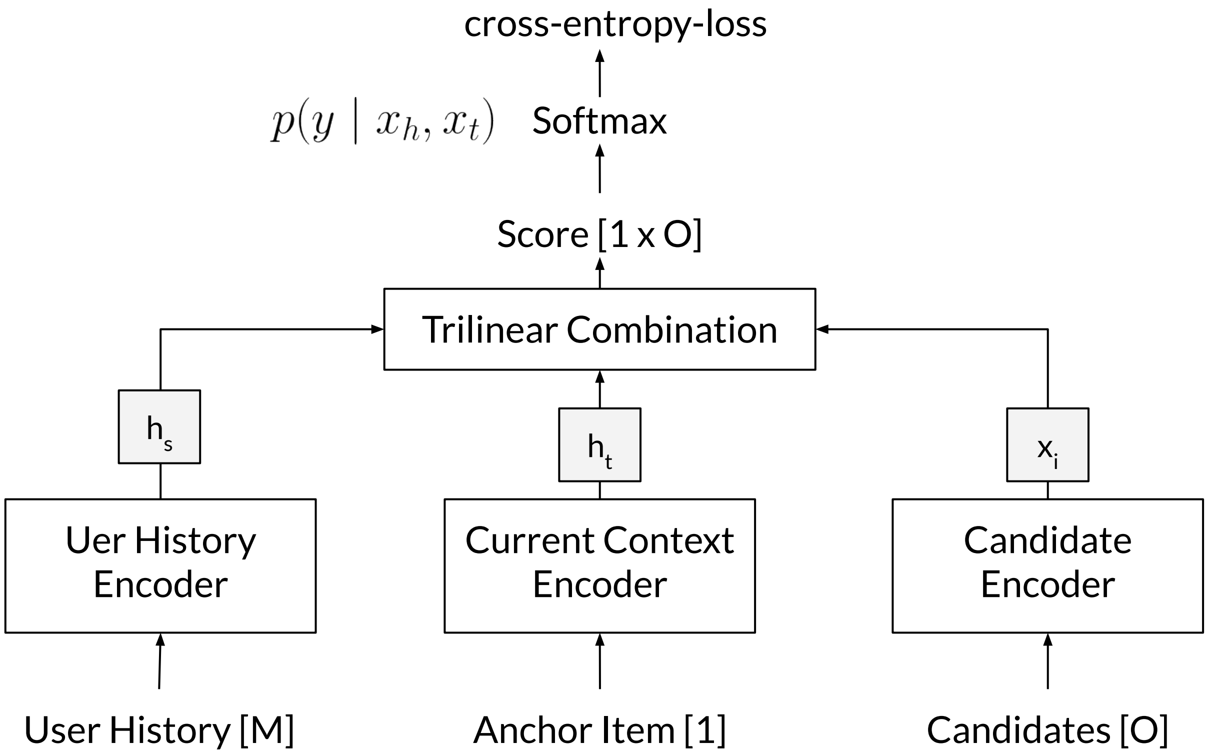
Creating a More Representative Dataset



Creating a More Representative Dataset

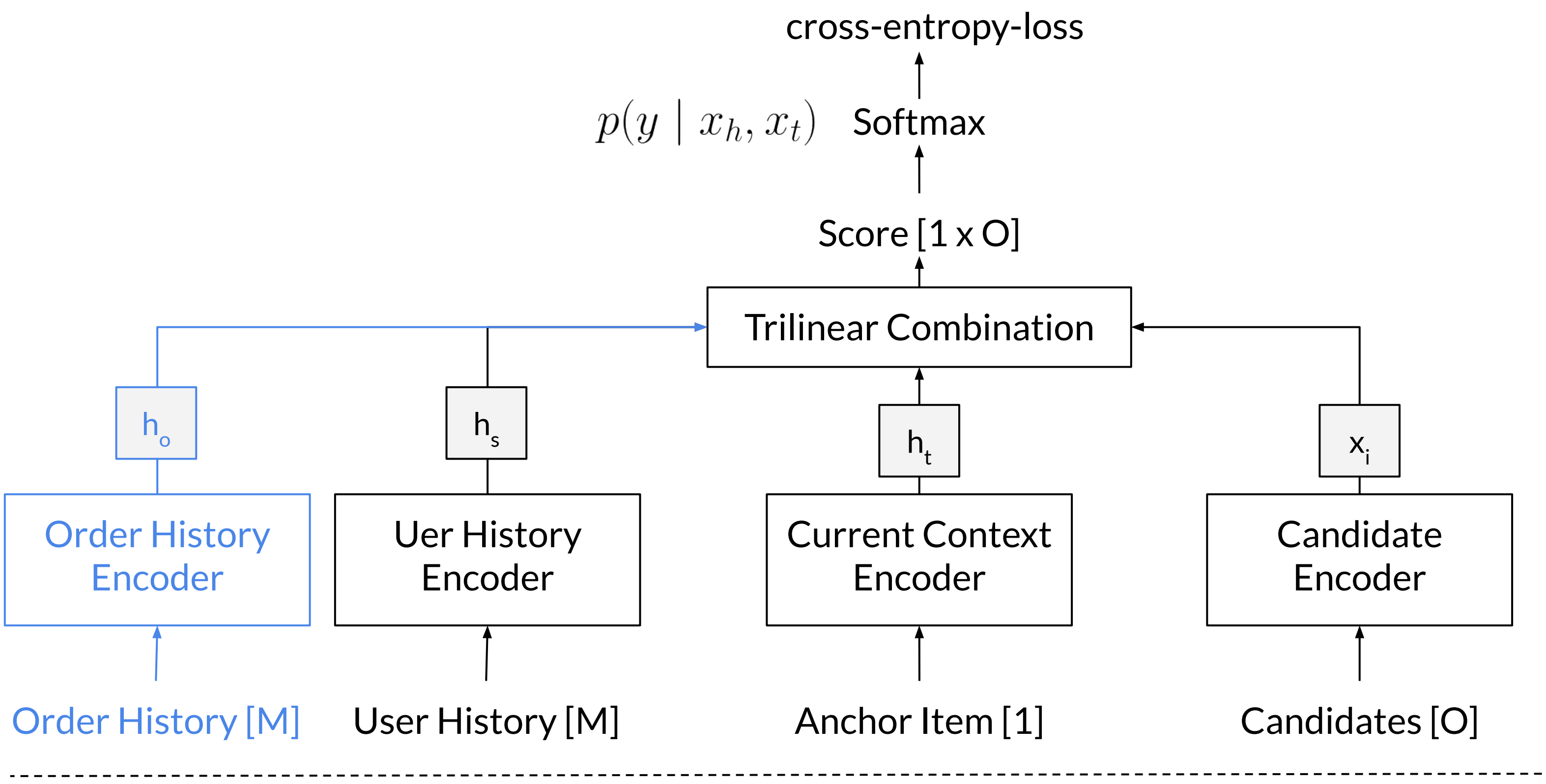


Model Architecture



Liu et. al., STAMP: ShortTerm Aention/Memory Priority Model for Session-based Recommendation. (KDD 2018).

Our Adjustments - Add Long Term Signals



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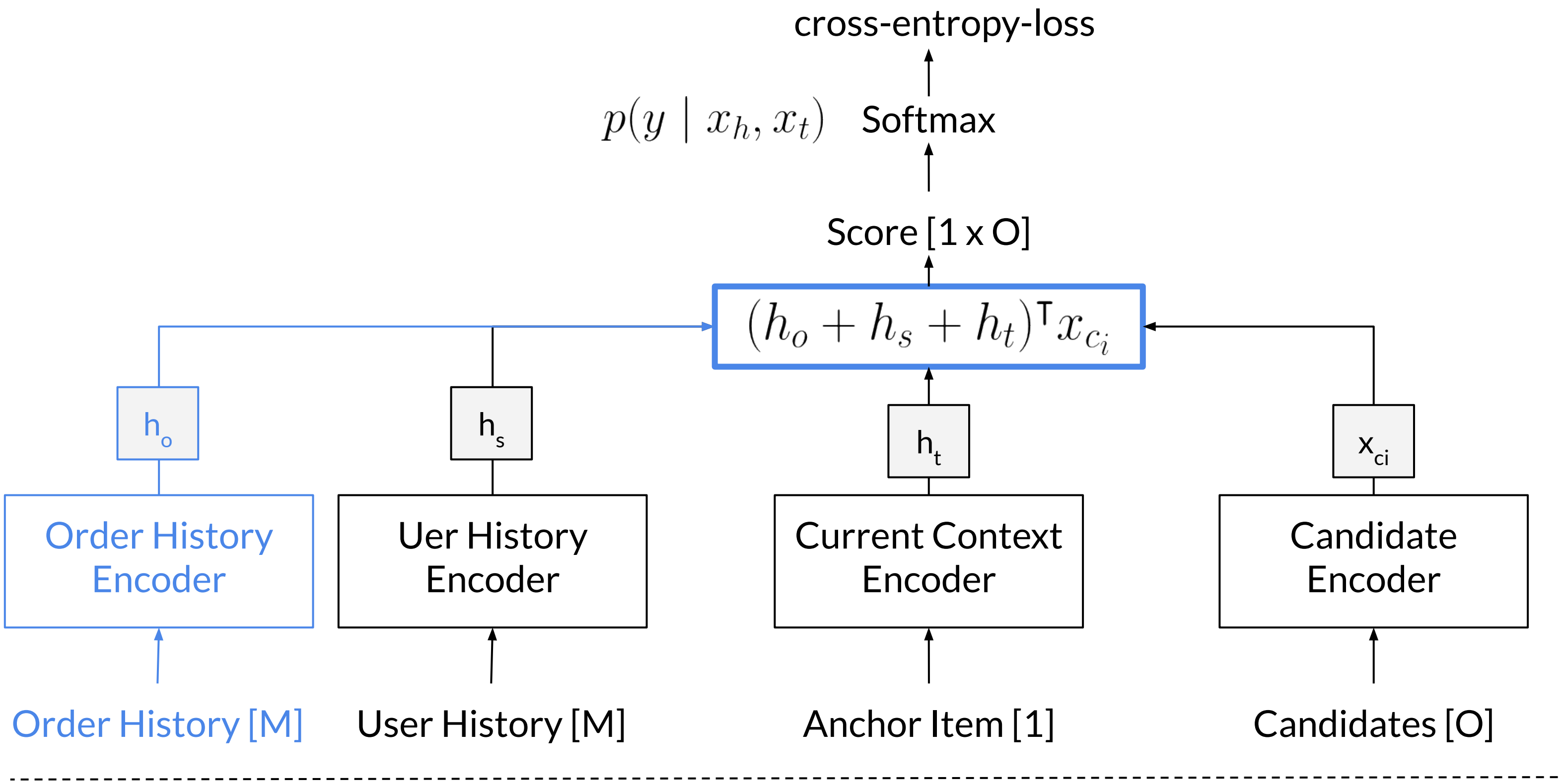
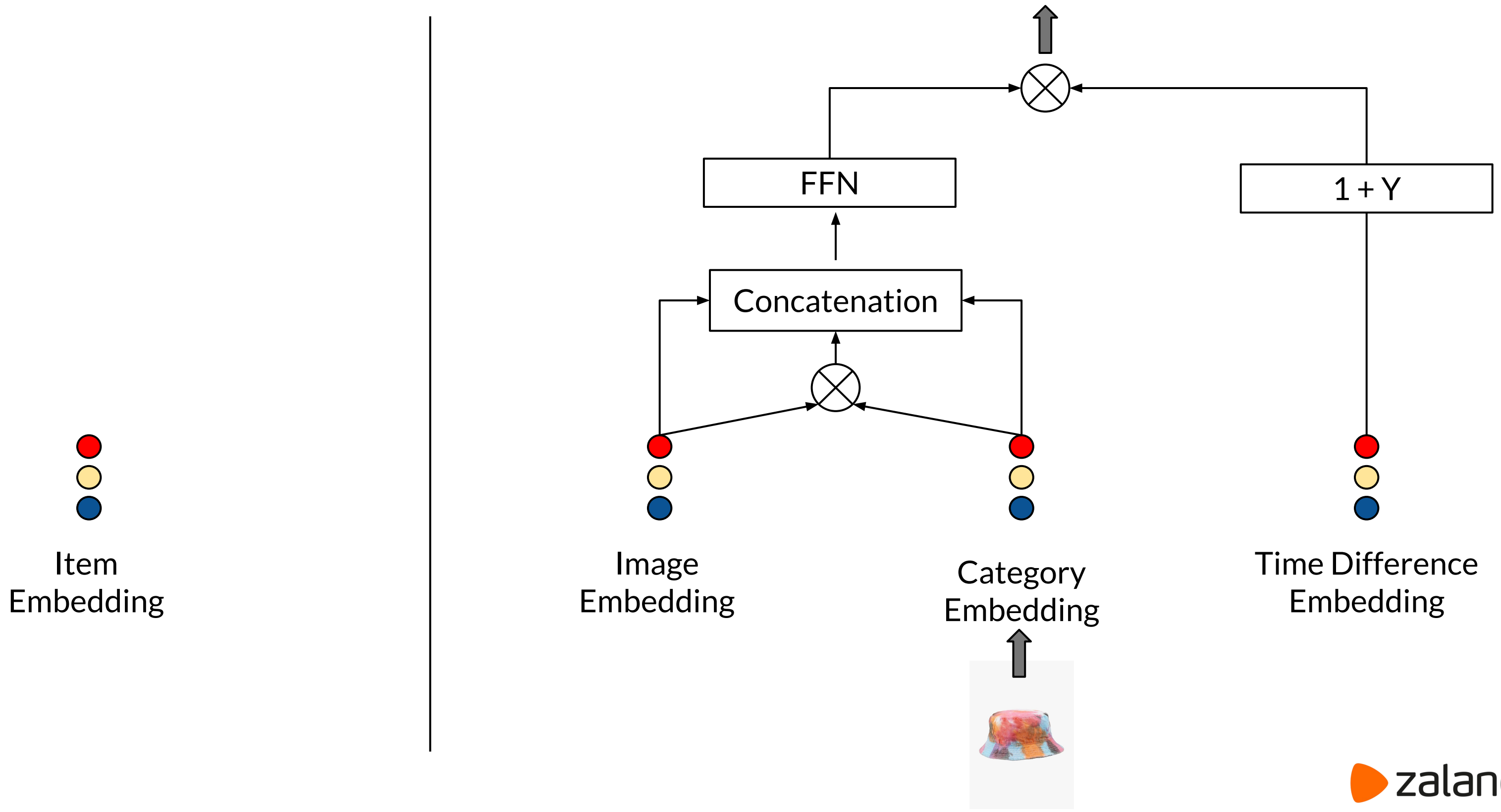
Our Adjustments - Additive Combination Function



Our Adjustments - Context Information Added

STAMP v.s. Our Model



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Evaluation Results - Offline

	Recall@5	Order Recall@5
Our Method	0.26	0.26
Collaborative Filtering	0.29	0.24

Evaluation Results - Online A/B Test

	CTR	# Items Ordered
Our Method	**+6.23%**	**+3.24%**

Evaluation Results - Offline Ablation Test

	Recall@5	Order Recall@5
STAMP	0.221	0.206
STAMP + Long Term Signal	0.241	0.223
STAMP + Context Information	0.258	0.255
STAMP + Image Feature	0.264	0.240
Our Method	**0.264**	**0.267**

Conclusion

- We devised a personalized complementary fashion recommender that outperformed the baseline in an A/B test.

- We tailored STAMP, one of the state-of-the-art session recommenders, and yields better performance on our dataset.

- Through the ablation test, we assures the efficacy of the model improvements

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