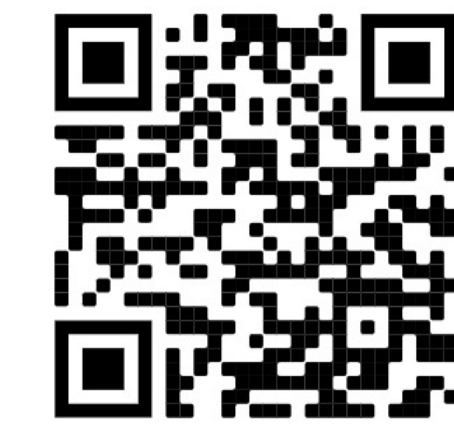




AI Box

CORE: Simple and Effective Session-based Recommendation within Consistent Representation Space

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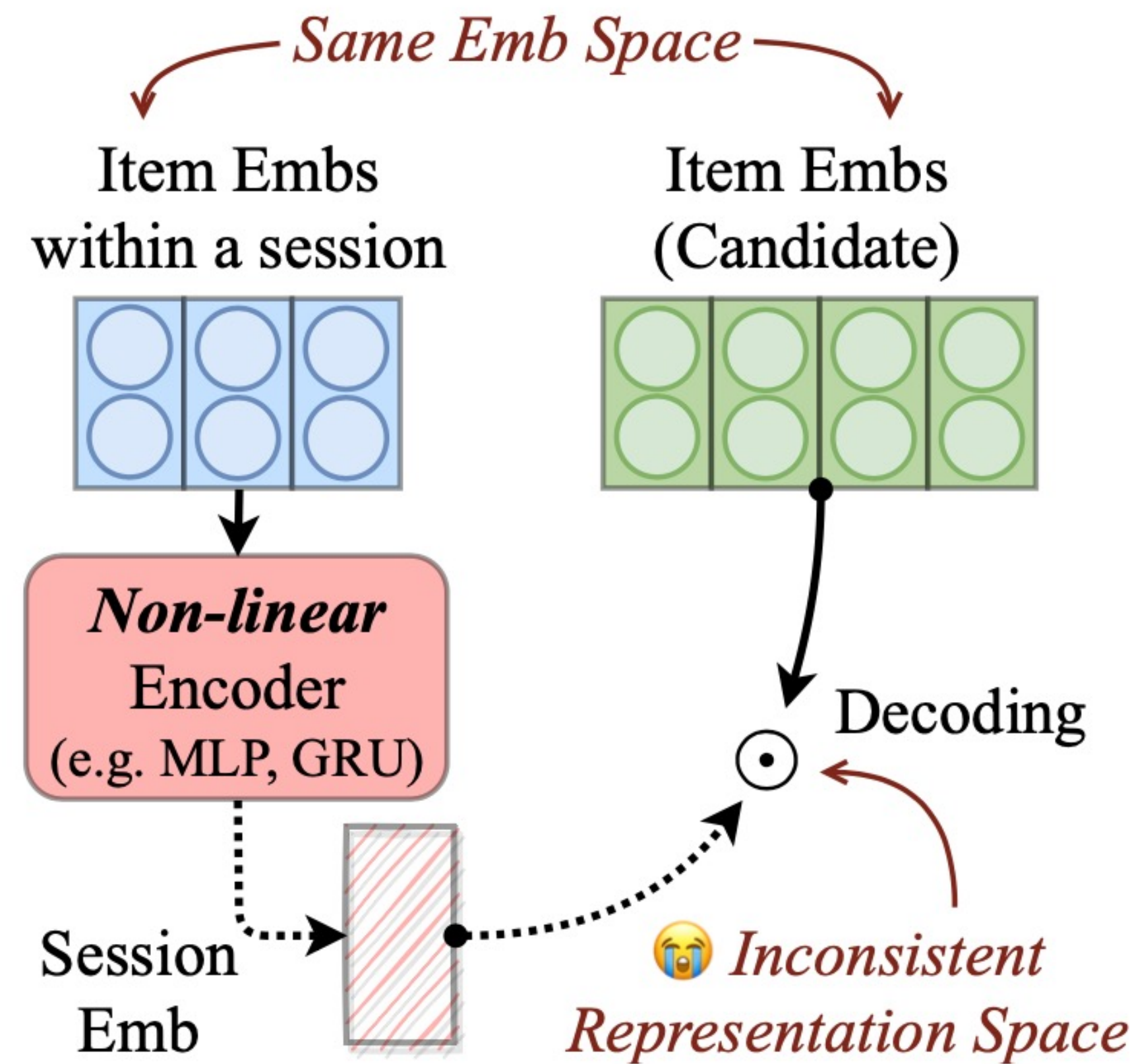
arXiv paper



Inconsistent Representation Space

- **Observation 1:**
Inconsistent rep. space for session embedding & item embeddings.

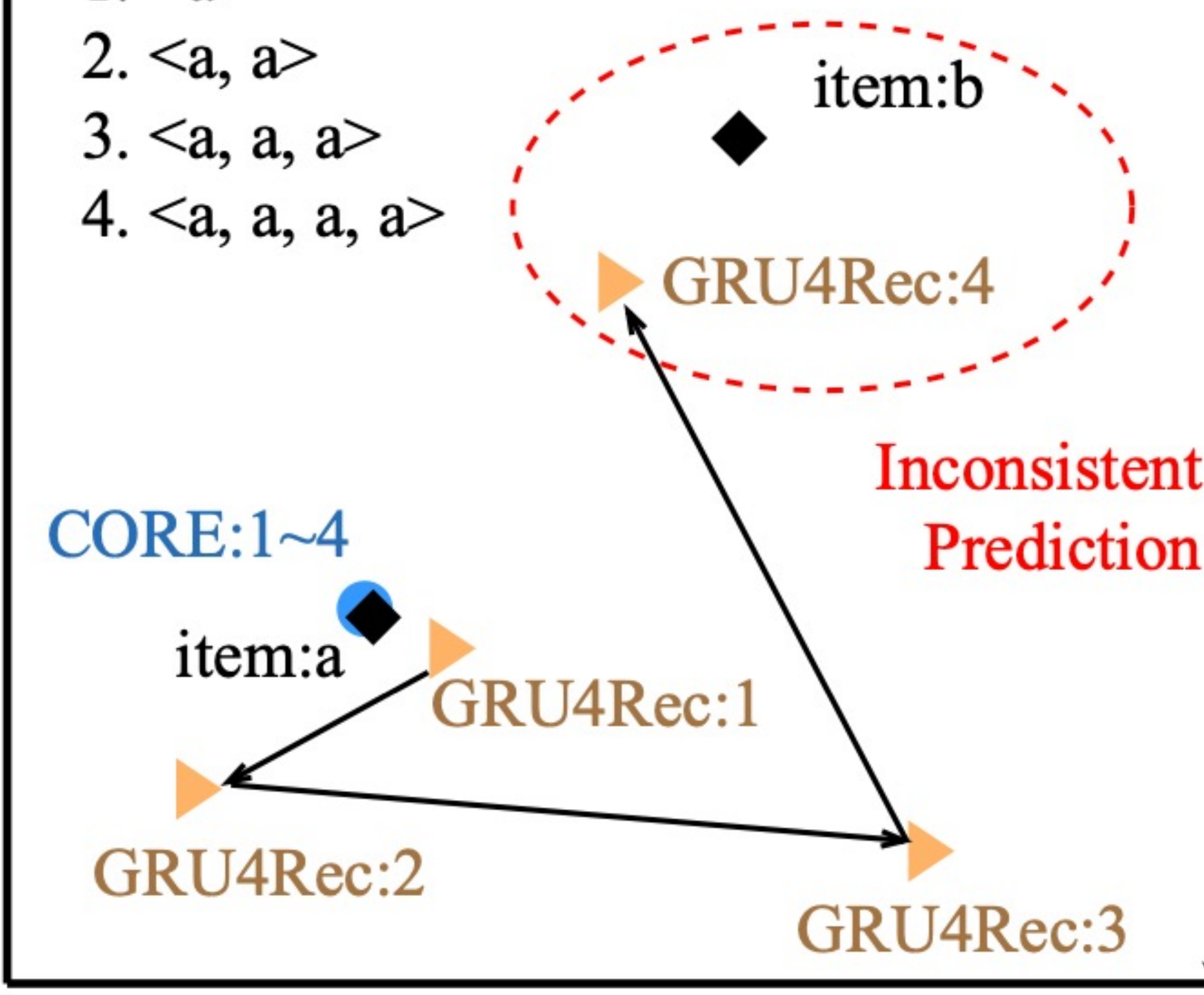
- **The reason:**
Non-linear session encoder over item embeddings.



Inconsistent Prediction Issue

sessions share a common objective

1. $\langle a \rangle$
2. $\langle a, a \rangle$
3. $\langle a, a, a \rangle$
4. $\langle a, a, a, a \rangle$



- **Observation 2**
Different recommendation for sessions sharing a common objective (e.g., for GRU4Rec).

- **The reason:**
Non-linear session encoder is unstable.

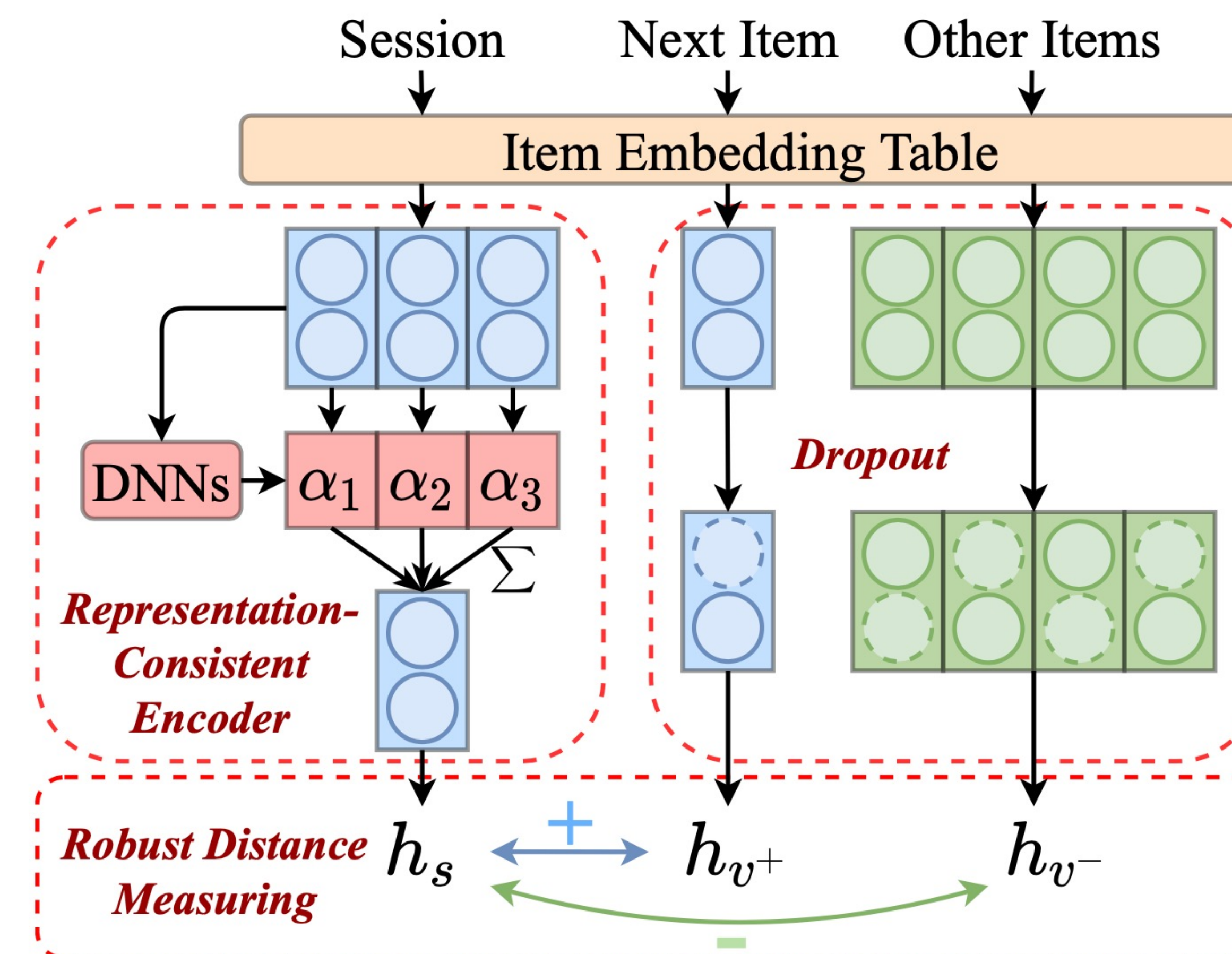
Our contribution:

- Emphasize the inconsistent representation space issue;
- Surprisingly effective with simple architectures;
- The proposed modules generally improve existing modes like NARM, SR-GNN et al.;

Overall Framework for CORE

Representation Consistent Encoder, RCE

- Linear combination;
- Weights are learned via DNNs, e.g., Transformers or simple Mean Pooling.



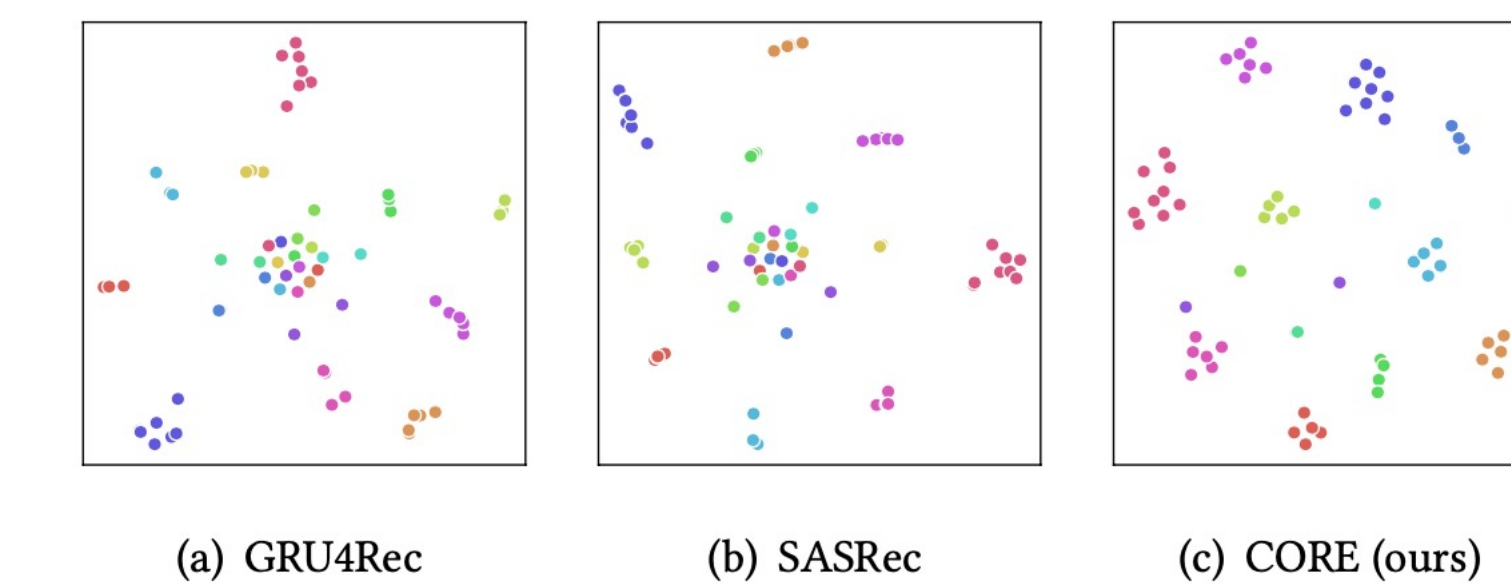
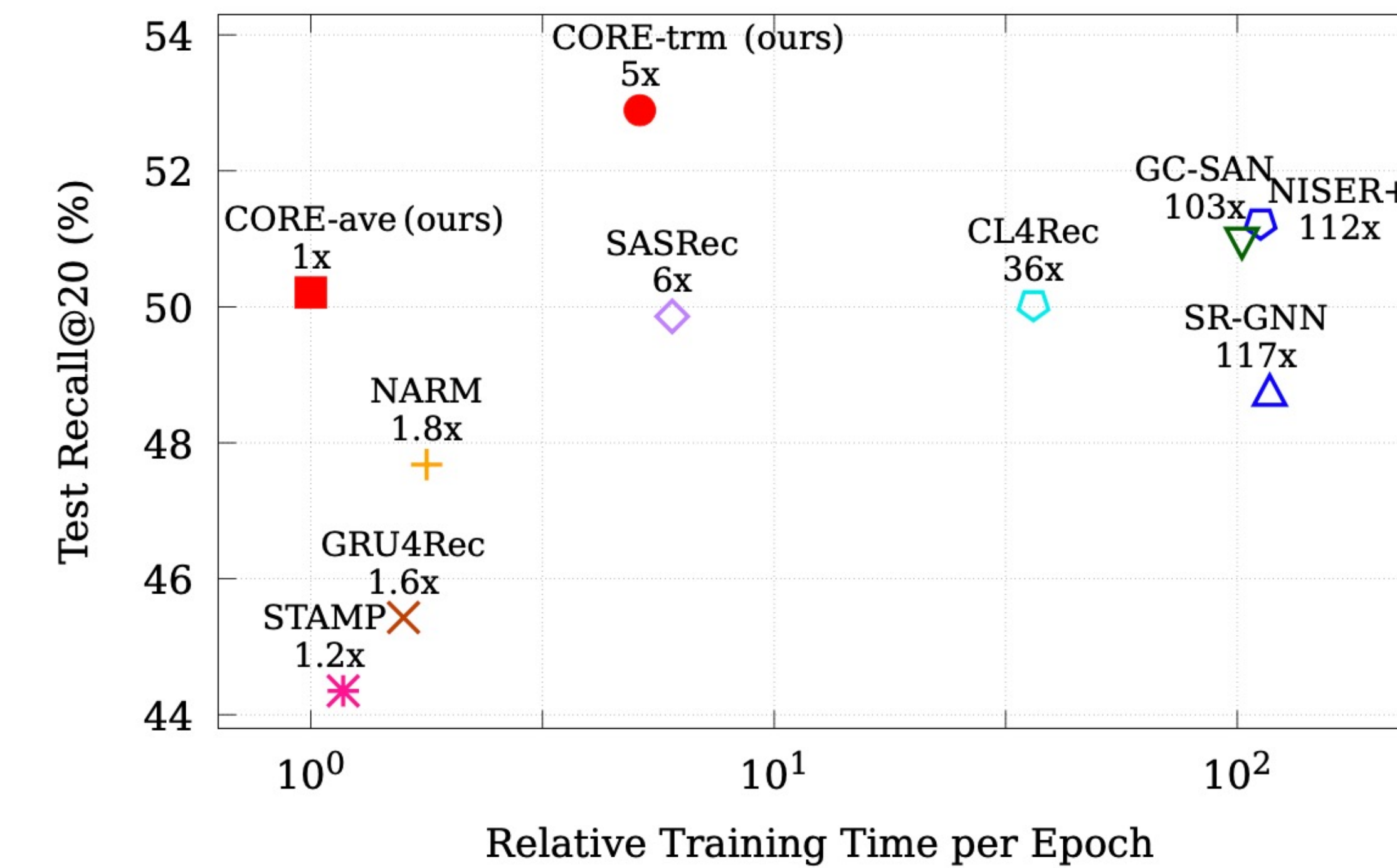
Robust Distance Measuring, RDM

- Contrastive loss, between sessions & the next items;
- Dropout over item embeddings;

Performance & Efficiency

- **CORE-trm:** Transformers as DNNs, the best performance, efficient as SASRec.

- **CORE-ave:** Mean Pooling as DNNs, competitive performance, the most efficient.



Session embeddings with the same next item are well separated.

Method	Diginetica		RetailRocket	
	R@20	M@20	R@20	M@20
NARM	47.68	15.58	58.65	34.69
+ RCE	51.86	18.27	60.77	37.01
+ RDM	51.62	17.79	61.33	37.11
+ All	52.51	18.58	62.19	38.84
SR-GNN	48.76	16.93	58.71	36.42
+ RCE	49.51	17.53	57.05	35.70
+ RDM	51.36	18.57	61.41	38.27
+ All	52.38	18.95	61.43	38.38

RCE & RDM generally raise performances of existing models to SOTA results.

Code implemented by RecBole are publicly available:

github.com/RUCAIBox/CORE

Try on your own model today!

What if we enforce the session embeddings fall into the space spanned by item embeddings?