Towards Universal Sequence Representation Learning for Recommender Systems

Yupeng Hou[1†], Shanlei Mu[1†], Wayne Xin Zhao[1], Yaliang Li[2], Bolin Ding[2], Ji-Rong Wen[1]
[1]Renmin University of China & [2]Alibaba Group

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Alibaba Group

arXiv paper

Most Recommenders are not Transferable

**** Cold-Start Items***

ID-based Sequential Models → cannot recommend → New items

**** New Domains / Platforms***

Model on an **Existing** Domain → cannot help → Model on a **New** Domain

w/ different item IDs

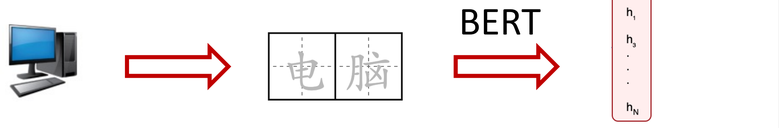
How to develop transferable recommendation models? 🤔

Inspired by Large Pre-trained Models

Pre-trained Sequential Recommender?

- ✅ Same data format;
- ✅ Large corpus;
- ❌ Different dictionaries (item IDs)
- ❓ …, but what if we obtain universal item representations?

Describe Items via Natural Language



Item ID → Item Text (e.g. Title, Brand, Description) → Textual Representations (Universal)

Challenges

* Textual representations are not directly suitable for recommendation tasks;

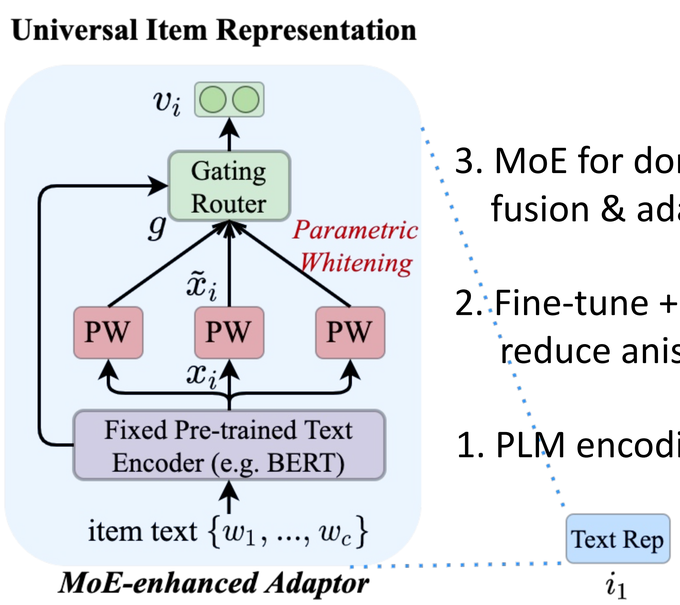
Pre-trained Language Model, e.g., BERT → { Need fine-tuned; Anisotropy }

* How to learn from multiple domains?

Overall Framework of UniSRec

Universal Sequential Recommender

1 *Single Item Encoding*



2 *Sequence Encoding & Multi-Domain Pre-training*

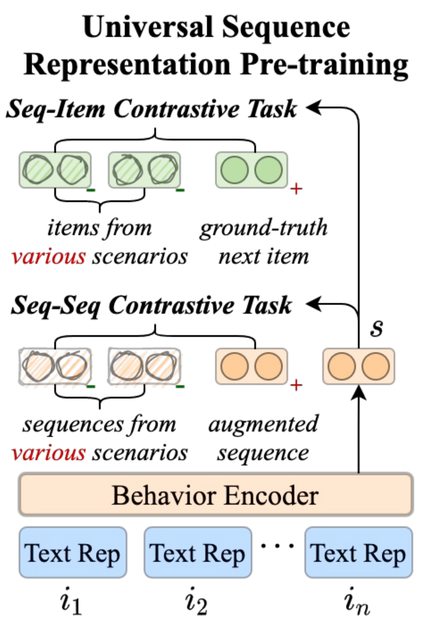
T1: next-item prediction

T2: augmented CL

💡 Negative instances are from multiple domains for fusion & adaptation.

Same as SASRec →

From 1 →



3 *Fine-tuning on Target Domains / Platforms*

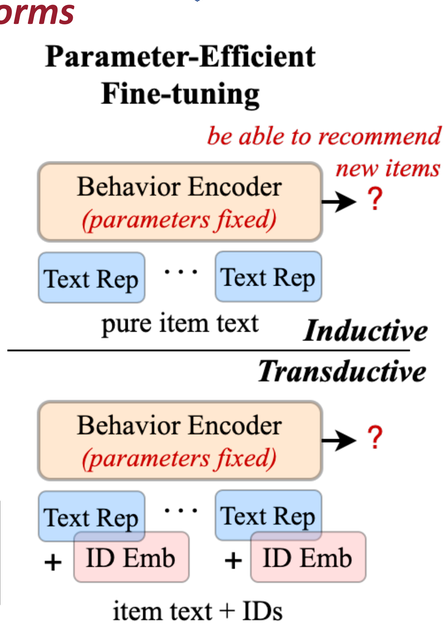
Inductive:

- Many new items;
- Do not use item IDs;

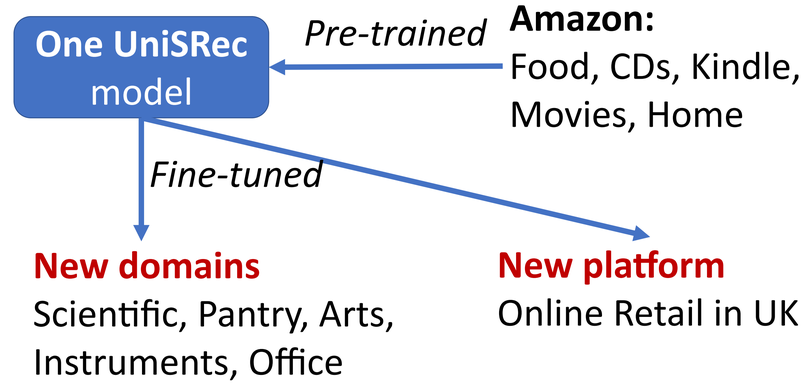
Transductive:

- Few new Items;
- Can use item IDs;

💡 Only tune parameters in item encoding module.



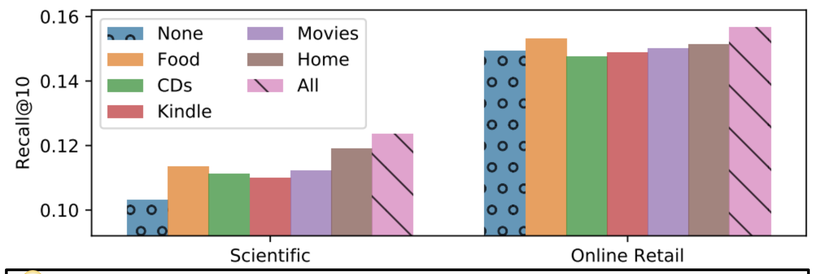
Benchmark for Pre-trained Recommenders



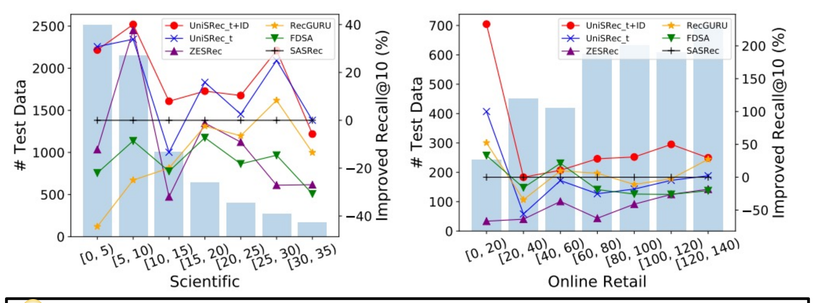
Experiments

Dataset	Metric	SASRec	FDSA	UniSRec$_t$	UniSRec$_{t+ID}$
Online Retail	Recall@10	0.1460	0.1490	0.1449	**0.1537***
	NDCG@10	0.0675	0.0719	0.0677	**0.0724**
	Recall@50	0.3872	0.3802	0.3604	**0.3885**
	NDCG@50	0.1201	0.1223	0.1149	**0.1239***

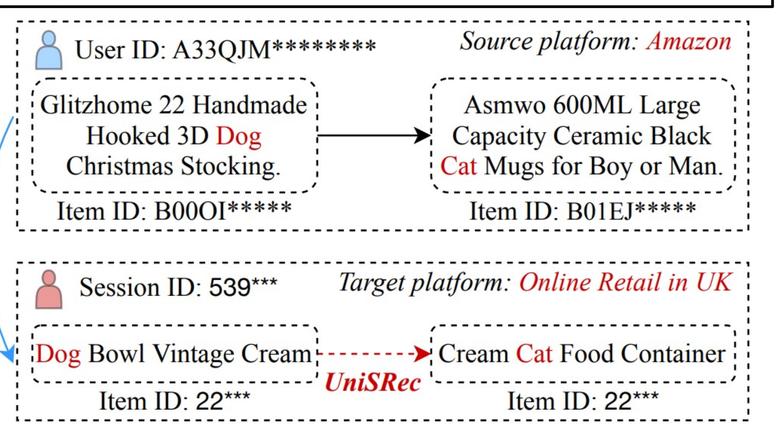
💡 Performances improv. w/o any shared users or items between the pre-training (*Amazon*) & downstream (*Online Retail in UK*) platforms.



💡 Pre-training on 5 domains > any 1 domain.



💡 Significant improvements on cold-start items.



💡 Capture and transfer semantic patterns.

Code implemented by RecBole ***are publicly available:***

github.com/RUCAIBox/UniSRec