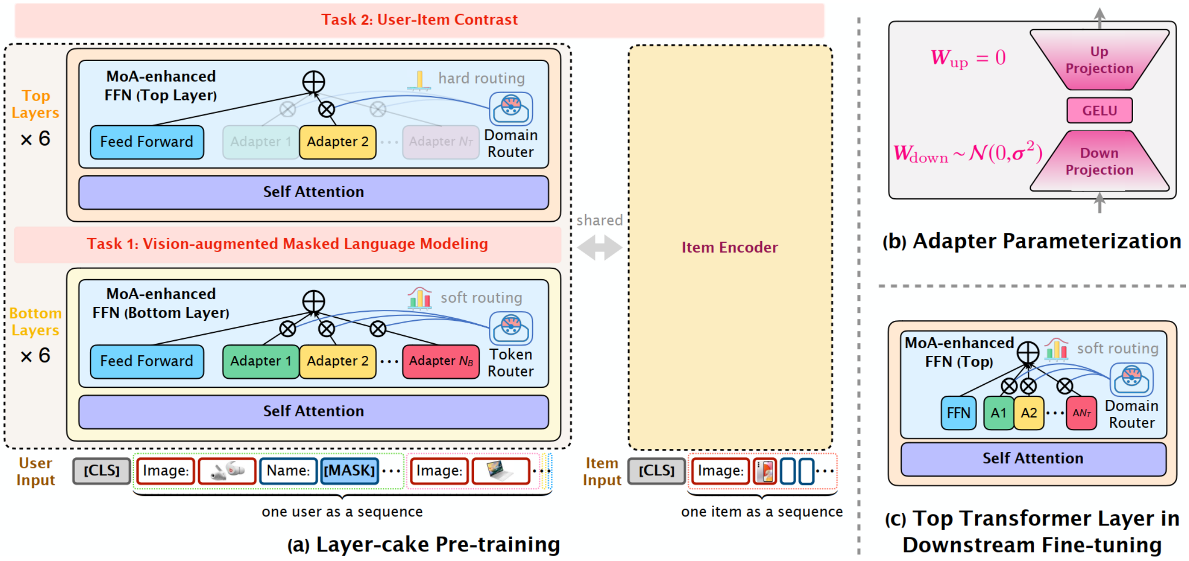
Reo-LM

This is the official Pytorch implementation for the paper:

> Recommendation-oriented Pre-training for Universal Multi-modal Sequence Representation with Language Models

Method Overview



(a) Layer-cake Pre-training

(b) Adapter Parameterization

(c) Top Transformer Layer in Downstream Fine-tuning

Requirements

```
python>=3.9.13
cudatoolkit>=12.0
torch>=1.13.1
pytorch-lightning>=2.0.2
transformers>=4.36.2
tqdm>=4.64.1
numpy>=1.23.1
```

Dataset Description

Our experiments are conducted on one assembled upstream pre-training datasets and six downstream fine-tuning datasets.

Datasets	#Users	#Items	#Img.(Cover./%)	#Inters	Avg.SL.
Pre-training	3,608,532	1,022,309	724,562(70.88%)	33,572,032	9.30
Scientific	11,041	5,327	3,490(65.52%)	76,896	6.96
Instruments	27,530	10,611	6,289(59.27%)	231,312	8.40
Pet	47,569	37,970	30,611(80.62%)	420,662	8.84
Arts	56,210	22,855	13,418(58.71%)	492,492	8.76
Games	55,223	17,389	14,967(86.07%)	496,315	8.99

Datasets	#Users	#Items	#Img.(Cover./%)	#Inters	Avg.SL.
Office	101,501	27,932	20,542(73.54%)	798,914	7.87

Quick Start

Considering the requirement of anonymity and the size limitation, we provide the data of the *Scientific* domain and a Reo-LM checkpoint fine-tuned on it for review.

Our supplementary materials include a directory named `Scientific` and a checkpoint file named `Scientific.ckpt`, please unzip them and put them in the same directory as `test.sh`, then you can run

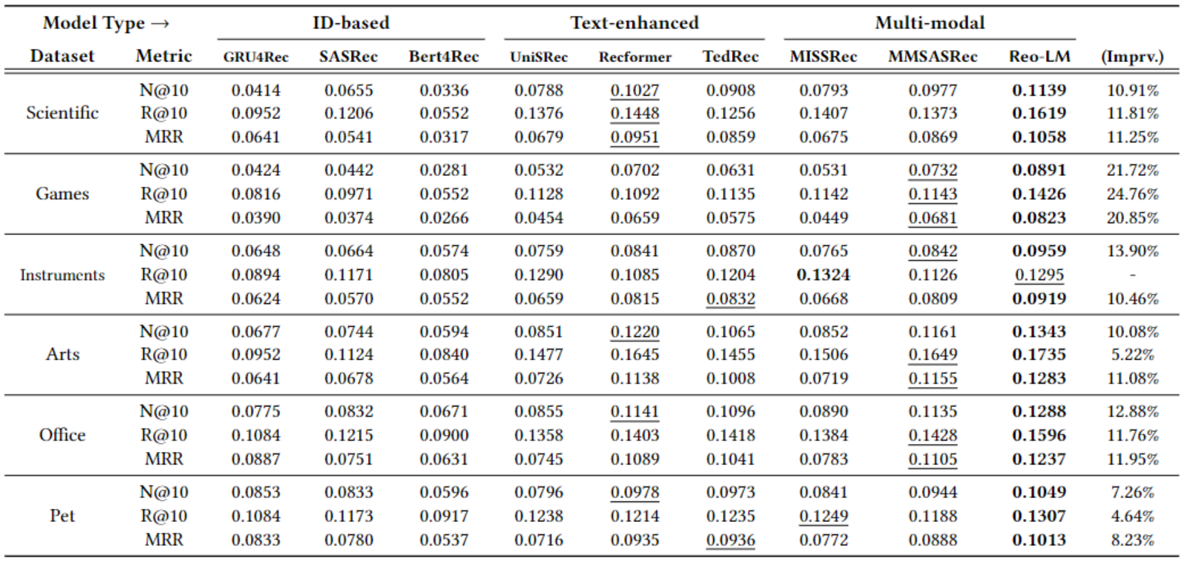
```
bash test.sh
```

to check our experimental result on `Scientific` domain.

Further validation and open-source implementation will be available after peer review.

Overall performance of all methods

Table 2: Performance comparison of Reo-LM and other baselines."R@K" is short for "*Recall*@K" and "N@K" is short for "*NDCG*@K". Optimal and sub-optimal performance is denoted in bold and underlined fonts, respectively.



Model Type →		ID-based			Text-enhanced			Multi-modal			
Dataset	Metric	GRU4Rec	SASRec	Bert4Rec	UniSRec	Recformer	TedRec	MISSRec	MMSASRec	Reo-LM	(Imprv.)
Scientific	N@10	0.0414	0.0655	0.0336	0.0788	0.1027	0.0908	0.0793	0.0977	**0.1139**	10.91%
	R@10	0.0952	0.1206	0.0552	0.1376	0.1448	0.1256	0.1407	0.1373	**0.1619**	11.81%
	MRR	0.0641	0.0541	0.0317	0.0679	0.0951	0.0859	0.0675	0.0869	**0.1058**	11.25%
Games	N@10	0.0424	0.0442	0.0281	0.0532	0.0702	0.0631	0.0531	0.0732	**0.0891**	21.72%
	R@10	0.0816	0.0971	0.0552	0.1128	0.1092	0.1135	0.1142	0.1143	**0.1426**	24.76%
	MRR	0.0390	0.0374	0.0266	0.0454	0.0659	0.0575	0.0449	0.0681	**0.0823**	20.85%
Instruments	N@10	0.0648	0.0664	0.0574	0.0759	0.0841	0.0870	0.0765	0.0842	**0.0959**	13.90%
	R@10	0.0894	0.1171	0.0805	0.1290	0.1085	0.1204	**0.1324**	0.1126	0.1295	-
	MRR	0.0624	0.0570	0.0552	0.0659	0.0815	0.0832	0.0668	0.0809	**0.0919**	10.46%
Arts	N@10	0.0677	0.0744	0.0594	0.0851	0.1220	0.1065	0.0852	0.1161	**0.1343**	10.08%
	R@10	0.0952	0.1124	0.0840	0.1477	0.1645	0.1455	0.1506	0.1649	**0.1735**	5.22%
	MRR	0.0641	0.0678	0.0564	0.0726	0.1138	0.1008	0.0719	0.1155	**0.1283**	11.08%
Office	N@10	0.0775	0.0832	0.0671	0.0855	0.1141	0.1096	0.0890	0.1135	**0.1288**	12.88%
	R@10	0.1084	0.1215	0.0900	0.1358	0.1403	0.1418	0.1384	0.1428	**0.1596**	11.76%
	MRR	0.0887	0.0751	0.0631	0.0745	0.1089	0.1041	0.0783	0.1105	**0.1237**	11.95%
Pet	N@10	0.0853	0.0833	0.0596	0.0796	0.0978	0.0973	0.0841	0.0944	**0.1049**	7.26%
	R@10	0.1084	0.1173	0.0917	0.1238	0.1214	0.1235	0.1249	0.1188	**0.1307**	4.64%
	MRR	0.0833	0.0780	0.0537	0.0716	0.0935	0.0936	0.0772	0.0888	**0.1013**	8.23%

Acknowledgement

- If you have any questions, please feel free to give me your advice.
- Thank you for your reading and guidance.