

环境配置

环境是用了我之前项目的, [github repo link](#), 然后不断pip install下载需要的库即可

Dataset

	user_id	item_asins	item_asin	history_item_id	item_id	history_item_title	item_title	history_rating	rating	history_timestamp	timestamp
0	A1MHFO1841U6X7	['0005164885']	B0000025RJ	[2620]	7320	['Christmas Eve and Other Stories']	Thriller	[5.0]	5.0	[1412121600]	1412121600
1	A1MHFO1841U6X7	['0005164885', 'B0000025RJ']	B000002J2D	[2620, 7320]	9550	['Christmas Eve and Other Stories', 'Thriller']	And Then There Were Three	[5.0, 5.0]	5.0	[1412121600, 1412121600]	1412121600
2	A1MHFO1841U6X7	['0005164885', 'B0000025RJ', 'B000002J2D']	B000002J27	[2620, 7320, 9550]	2934	['Christmas Eve and Other Stories', 'Thriller']	A Trick of the Tail	[5.0, 5.0, 5.0]	5.0	[1412121600, 1412121600, 1412121600]	1412121600
3	A1MHFO1841U6X7	['0005164885', 'B0000025RJ', 'B000002J2D', 'B0...']	B00000AEDW	[2620, 7320, 9550, 2934]	11121	['Christmas Eve and Other Stories', 'Thriller']	Christmas Attic, The	[5.0, 5.0, 5.0, 5.0]	5.0	[1412121600, 1412121600, 1412121600, 1412121600]	1412121600
4	A1MHFO1841U6X7	['0005164885', 'B0000025RJ', 'B000002J2D', 'B0...']	B00000D9TQ	[2620, 7320, 9550, 2934, 11121]	6009	['Christmas Eve and Other Stories', 'Thriller']	Phil Collins - Hits	[5.0, 5.0, 5.0, 5.0, 5.0]	5.0	[1412121600, 1412121600, 1412121600, 1412121600, 1412121600]	1412121600

ASIN是Amazon Standard Identification Number, 给定的数据集与原来的处理方式是一致的, 因此可以直接参考原repo得到加了prompt之后(按照alpaca格式)的dataset。

Model

调参分析

分成几类:

- 1. 数据集
 - 数据集大小
 - 数据集的格式(prompt)
- 2. 训练参数
 - batch_size/micro_batch_size
 - lr
 - warmup_steps/warmup_ratio
 - weight_decay
 - padding_side
 - pad_token_id
 - tokenizer fast
 - prompt format
 - train_on_inputs
 - 数据类型(fp32、bf16)
- 3. 推理参数
 - num_beams
 - max_new_tokens
 - temperature
 - do_sample

目前的sota

参考结果如下

	NDCG					HR				
	1	3	5	10	20	1	3	5	10	20
SASRec	0.0275	0.0411	0.0461	0.0521	0.0571	0.0275	0.0513	0.0634	0.0821	0.1017
qwen0.5b	0.03335844	0.03977377	0.04234107	0.04540214	0.04822863	0.03335844	0.04444205	0.05073711	0.06020661	0.07145163

用与BigRec repo相同的evaluate方式得到的结果如下(其中加popularity的表示利用了popularity info)

learning_rate=0.0003, weight_decay=0.0, warmup_steps=50, per_device_train_batch_size=64, gradient_accumulation_steps=4, [wandb链接](#)

Metric	@1	@3	@5	@10	@20
SASRec_NG	0.0114	0.0252	0.0311	0.0403	0.0478
Qwen_NG	0.0270	0.0327	0.0330	0.0335	0.0341
Qwen_popularity_NG	0.0272	0.0337	0.0346	0.0356	0.0372
SASRec_HR	0.0114	0.0354	0.0498	0.0786	0.1076
Qwen_HR	0.027	0.0364	0.0372	0.0386	0.041
Qwen_popularity_HR	0.0272	0.0378	0.0402	0.0434	0.0498

用与GenRec repo相同的evaluate方式得到的结果如下, 超过了给的参考结果

Metric	@1	@3	@5	@10	@20
Qwen_NG	0.0362	0.0432	0.0453	0.0485	0.0519
Qwen_HR	0.0362	0.0484	0.0536	0.0634	0.077

具体实验结果记录

数据集

数据集大小

训练数据为1024个, 最后一个checkpoint的结果, [wandb链接](#):

learning_rate=0.0003, weight_decay=1.0e-05, warmup_steps=100, per_device_train_batch_size=4, gradient_accumulation_steps=32

Metric	@1	@3	@5	@10	@20
NG	0.0058	0.0082	0.0088	0.0092	0.0103
HR	0.0058	0.0098	0.0114	0.0126	0.017

训练数据为8192个, [wandb链接](#):

learning_rate=0.0001, weight_decay=0.0, warmup_ratio=0.1, per_device_train_batch_size=4, gradient_accumulation_steps=16

第一个checkpoint的结果为

Metric	@1	@3	@5	@10	@20
NG	0.0024	0.0065	0.0073	0.0080	0.0087

Metric	@1	@3	@5	@10	@20
HR	0.0024	0.009	0.011	0.013	0.016

第二个checkpoint的结果为

Metric	@1	@3	@5	@10	@20
NG	0.0042	0.0083	0.0088	0.0095	0.0100
HR	0.0042	0.011	0.0122	0.0144	0.0164

第三个checkpoint的结果为

Metric	@1	@3	@5	@10	@20
NG	0.0092	0.0139	0.0144	0.0150	0.0157
HR	0.0092	0.0168	0.018	0.02	0.0226

第四个checkpoint的结果为

Metric	@1	@3	@5	@10	@20
NG	0.0122	0.0173	0.0180	0.0184	0.0193
HR	0.0122	0.0206	0.0222	0.0232	0.027

第五个checkpoint的结果为

Metric	@1	@3	@5	@10	@20
NG	0.0152	0.0197	0.0201	0.0206	0.0219
HR	0.0152	0.0226	0.0236	0.025	0.0274

第六个checkpoint的结果为

Metric	@1	@3	@5	@10	@20
NG	0.0122	0.0167	0.0173	0.0177	0.0182
HR	0.0122	0.0196	0.021	0.0222	0.0242

第七个checkpoint的结果为

Metric	@1	@3	@5	@10	@20
NG	0.0112	0.0145	0.0148	0.0153	0.0156
HR	0.0112	0.0168	0.0174	0.019	0.0202

第八个checkpoint的结果为

Metric	@1	@3	@5	@10	@20
NG	0.0134	0.0168	0.0170	0.0175	0.0179
HR	0.0134	0.0192	0.0196	0.0212	0.0228

第九个checkpoint的结果为

Metric	@1	@3	@5	@10	@20
NG	0.0136	0.0168	0.0169	0.0171	0.0175
HR	0.0136	0.019	0.0192	0.02	0.0216

第十个checkpoint的结果为

Metric	@1	@3	@5	@10	@20
NG	0.0140	0.0175	0.0178	0.0181	0.0184
HR	0.014	0.0198	0.0204	0.0214	0.0228

训练数据为50000个, [wandb链接](#):

learning_rate=0.0003, weight_decay=1.0e-05, warmup_steps=100,
per_device_train_batch_size=4, gradient_accumulation_steps=64

第一个checkpoint的结果为

Metric	@1	@3	@5	@10	@20
NG	0.0114	0.0163	0.0169	0.0174	0.0182
HR	0.0114	0.0194	0.021	0.0224	0.0258

第二个checkpoint的结果为

Metric	@1	@3	@5	@10	@20
NG	0.0214	0.0259	0.0264	0.0268	0.0276
HR	0.0214	0.0288	0.03	0.0312	0.0344

第三个checkpoint的结果为

Metric	@1	@3	@5	@10	@20
NG	0.0216	0.0258	0.0262	0.0269	0.0277
HR	0.0216	0.0284	0.0294	0.0316	0.0346

第四个checkpoint的结果为

Metric	@1	@3	@5	@10	@20
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Metric	@1	@3	@5	@10	@20
NG	0.0212	0.0249	0.0253	0.0258	0.0264
HR	0.0212	0.0272	0.0282	0.0298	0.0324

第五个checkpoint的结果为

Metric	@1	@3	@5	@10	@20
NG	0.0222	0.0249	0.0253	0.0259	0.0261
HR	0.0222	0.0266	0.0274	0.0292	0.0302

训练数据为65536个, [wandb链接](#):

learning_rate=0.0001, weight_decay=0.0, warmup_steps=50, per_device_train_batch_size=4, gradient_accumulation_steps=32

第一个checkpoint的结果为

Metric	@1	@3	@5	@10	@20
NG	0.02	0.0261	0.0267	0.0274	0.0282
HR	0.02	0.03	0.0314	0.0336	0.0366

第二个checkpoint的结果为

Metric	@1	@3	@5	@10	@20
NG	0.0234	0.0287	0.0291	0.0294	0.0299
HR	0.0234	0.032	0.033	0.034	0.036

第三个checkpoint的结果为

Metric	@1	@3	@5	@10	@20
NG	0.0244	0.0291	0.0294	0.0298	0.0303
HR	0.0244	0.0322	0.033	0.034	0.036

训练数据为131072个, [wandb链接](#):

learning_rate=0.0003, weight_decay=0.0, warmup_steps=200, per_device_train_batch_size=64, gradient_accumulation_steps=4

第一个checkpoint的结果为

Metric	@1	@3	@5	@10	@20
NG	0.0204	0.0260	0.0267	0.0272	0.0279
HR	0.0204	0.0296	0.031	0.0328	0.0354

第二个checkpoint的结果为

Metric	@1	@3	@5	@10	@20
NG	0.0220	0.0274	0.0281	0.0284	0.0288
HR	0.022	0.031	0.0326	0.0336	0.0352

第三个checkpoint的结果为

Metric	@1	@3	@5	@10	@20
NG	0.0244	0.0288	0.0292	0.0294	0.0301
HR	0.0244	0.0316	0.0326	0.0334	0.0358

训练数据为140000个, [wandb链接](#):

learning_rate=0.0001, weight_decay=1.0e-05, warmup_steps=100,
per_device_train_batch_size=4, gradient_accumulation_steps=32

第一个checkpoint的结果为

Metric	@1	@3	@5	@10	@20
NG	0.0242	0.0284	0.0288	0.0295	0.0302
HR	0.0242	0.031	0.032	0.0342	0.0372

第二个checkpoint的结果为

Metric	@1	@3	@5	@10	@20
NG	0.0268	0.0302	0.0310	0.0313	0.0317
HR	0.0268	0.0324	0.0342	0.0352	0.037

第三个checkpoint的结果为

Metric	@1	@3	@5	@10	@20
NG	0.0258	0.0292	0.0297	0.0300	0.0305
HR	0.0258	0.0314	0.0326	0.0336	0.0354

第四个checkpoint的结果为

Metric	@1	@3	@5	@10	@20
NG	0.0254	0.0289	0.0294	0.0297	0.0302
HR	0.0258	0.0314	0.0326	0.0336	0.0354

训练数据为140000个, [wandb链接](#):

learning_rate=0.0001, weight_decay=1.0e-05, warmup_ratio=0.1,
per_device_train_batch_size=32, gradient_accumulation_steps=8

第一个checkpoint的结果为

Metric	@1	@3	@5	@10	@20
NG	0.0158	0.0228	0.0232	0.0240	0.0244
HR	0.0158	0.0272	0.0282	0.0306	0.0324

第二个checkpoint的结果为

Metric	@1	@3	@5	@10	@20
NG	0.0232	0.0283	0.0288	0.0291	0.0297
HR	0.0232	0.0316	0.0328	0.0336	0.0362

第三个checkpoint的结果为

Metric	@1	@3	@5	@10	@20
NG	0.0218	0.0264	0.0269	0.0273	0.0279
HR	0.0218	0.0292	0.0304	0.032	0.0344

第四个checkpoint的结果为

Metric	@1	@3	@5	@10	@20
NG	0.0202	0.0242	0.0246	0.0249	0.0256
HR	0.0202	0.0268	0.0278	0.0286	0.0314

第五个checkpoint的结果为

Metric	@1	@3	@5	@10	@20
NG	0.0224	0.0261	0.0266	0.0270	0.0276
HR	0.0224	0.0284	0.0296	0.031	0.0332

训练数据为148000个, [wandb链接](#):

learning_rate=0.0003, weight_decay=0.0, warmup_steps=200, per_device_train_batch_size=64,
gradient_accumulation_steps=16

第一个checkpoint的结果为

Metric	@1	@3	@5	@10	@20
NG	0.0120	0.0188	0.0192	0.0196	0.0202
HR	0.012	0.023	0.024	0.0252	0.0276

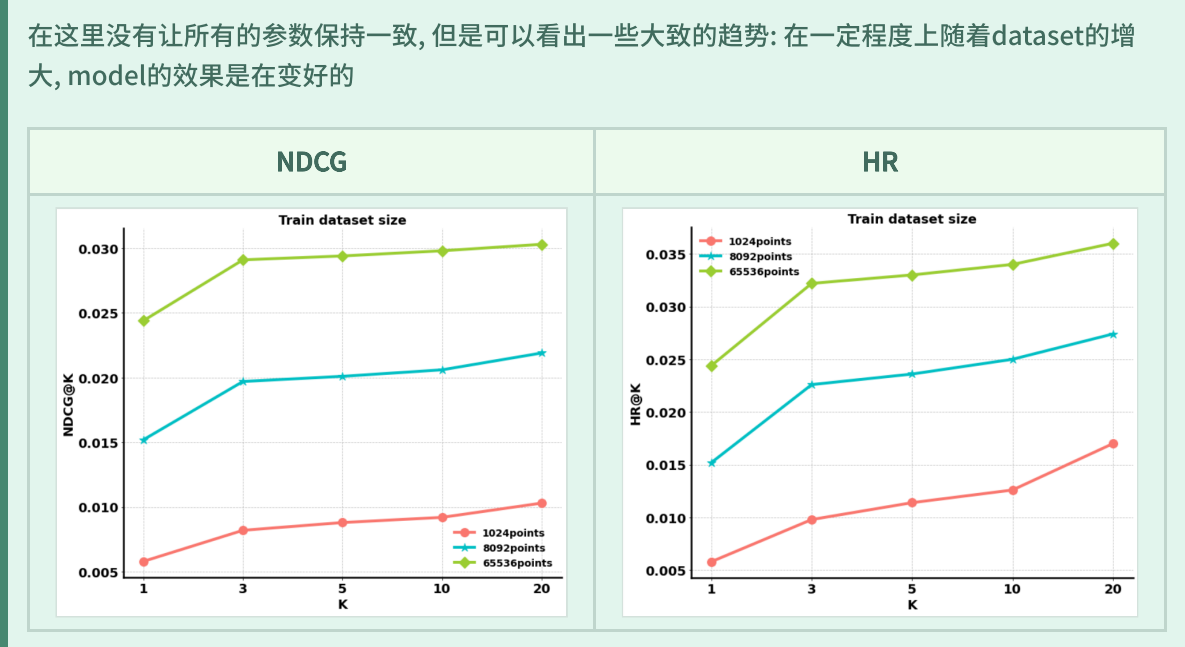
第二个checkpoint的结果为

Metric	@1	@3	@5	@10	@20
NG	0.0242	0.0301	0.0307	0.0312	0.0317
HR	0.0242	0.034	0.0352	0.0368	0.039

训练数据为148480个, [wandb链接](#):

learning_rate=0.0001, weight_decay=0.0, warmup_ratio=0.1, per_device_train_batch_size=64, gradient_accumulation_steps=4

Metric	@1	@3	@5	@10	@20
NG	0.0232	0.0296	0.0301	0.0305	0.0309
HR	0.0232	0.0336	0.0348	0.0362	0.0376



数据集的格式(prompt)

训练数据为140000个, 修改原数据集的prompt

<p>Old dataset:</p> <p>"instruction": "Given a list of CDs and Vinyl the user has listened to before, please recommend a new CD or Vinyl that the user likes to the user."</p> <p>"input": "The user has listened to the following CDs and Vinyl before: 'Christmas Eve and Other Stories'"</p> <p>"output": "'Thriller'"</p> <p>New dataset:</p> <p>"instruction": "Please think carefully and think step by step, given a list of CDs and Vinyl the user has listened to before, please recommend a new CD or Vinyl which you think suitable for the user."</p> <p>"input": "The user has listened to the following CDs and Vinyl before: 'Christmas Eve and Other Stories'"</p> <p>"output": "'Thriller'"</p>
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learning_rate=0.0001, weight_decay=1.0e-05, warmup_ratio=0.1, per_device_train_batch_size=64, gradient_accumulation_steps=4

第一个checkpoint的结果为

Metric	@1	@3	@5	@10	@20
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Metric	@1	@3	@5	@10	@20
NG	0.0196	0.0253	0.0257	0.0262	0.0265
HR	0.0196	0.029	0.0298	0.0314	0.0328

第二个checkpoint的结果为

Metric	@1	@3	@5	@10	@20
NG	0.0224	0.0276	0.0279	0.0284	0.0289
HR	0.0224	0.031	0.0318	0.0332	0.0354

第三个checkpoint的结果为

Metric	@1	@3	@5	@10	@20
NG	0.0238	0.0292	0.0294	0.0299	0.0305
HR	0.0238	0.0326	0.0332	0.0346	0.0372

第四个checkpoint的结果为

Metric	@1	@3	@5	@10	@20
NG	0.0212	0.0260	0.0264	0.0269	0.0273
HR	0.0212	0.029	0.0298	0.0314	0.033

第五个checkpoint的结果为

Metric	@1	@3	@5	@10	@20
NG	0.0220	0.0267	0.0270	0.0274	0.0280
HR	0.022	0.0296	0.0304	0.0316	0.034

第六个checkpoint的结果为

Metric	@1	@3	@5	@10	@20
NG	0.0212	0.0256	0.0260	0.0264	0.0269
HR	0.0212	0.0284	0.0294	0.0308	0.0328

修改数据集的格式并没有带来很大的影响

训练参数

batch_size/micro_batch_size

训练数据为131072个, [wandb链接](#):

learning_rate=0.0001, weight_decay=0.0, warmup_ratio=0.1, per_device_train_batch_size=64, gradient_accumulation_steps=16

Metric	@1	@3	@5	@10	@20
NG	0.0110	0.0181	0.0187	0.0194	0.0201
HR	0.011	0.0226	0.024	0.0264	0.029

训练数据为131072个, [wandb链接](#):

learning_rate=0.0001, weight_decay=0.0, warmup_ratio=0.1, per_device_train_batch_size=64, gradient_accumulation_steps=32

Metric	@1	@3	@5	@10	@20
NG	0.0066	0.0118	0.0127	0.0133	0.0139
HR	0.0066	0.0152	0.0174	0.0192	0.0216

训练数据为140000个, [wandb链接](#):

learning_rate=0.0003, weight_decay=0.0, warmup_steps=50, per_device_train_batch_size=64, gradient_accumulation_steps=4

Metric	@1	@3	@5	@10	@20
NG	0.0274	0.0318	0.0322	0.0330	0.0335
HR	0.0274	0.0346	0.0354	0.038	0.04

训练数据为140000个, [wandb链接](#):

learning_rate=0.0003, weight_decay=0.0, warmup_steps=50, per_device_train_batch_size=64, gradient_accumulation_steps=8

Metric	@1	@3	@5	@10	@20
NG	0.0254	0.0303	0.0312	0.0319	0.0326
HR	0.0254	0.0334	0.0356	0.0378	0.0408

训练数据为140000个, [wandb链接](#):

learning_rate=0.0001, weight_decay=0.0, warmup_steps=50, per_device_train_batch_size=4, gradient_accumulation_steps=32

第一个checkpoint的结果为

Metric	@1	@3	@5	@10	@20
NG	0.0234	0.0298	0.0302	0.0307	0.0312

Metric	@1	@3	@5	@10	@20
HR	0.0234	0.0338	0.035	0.0364	0.0384

第二个checkpoint的结果为

Metric	@1	@3	@5	@10	@20
NG	0.0216	0.0268	0.0272	0.0277	0.0282
HR	0.0216	0.03	0.031	0.0326	0.0346

第三个checkpoint的结果为

Metric	@1	@3	@5	@10	@20
NG	0.0204	0.0253	0.0257	0.0261	0.0266
HR	0.0204	0.0284	0.0294	0.0308	0.0328

提高per_device_train_batch_size一定程度上有助于提高model的效果,当然也跟lr、dataset size有关系

lr

训练数据为140000个, [wandb链接](#):

learning_rate=9.0e-05, weight_decay=1.0e-05, warmup_ratio=0.1,
per_device_train_batch_size=32, gradient_accumulation_steps=8

Metric	@1	@3	@5	@10	@20
NG	0.0204	0.0275	0.0282	0.0287	0.0293
HR	0.0204	0.032	0.0336	0.035	0.0376

训练数据为140000个, [wandb链接](#):

learning_rate=0.0006, weight_decay=0.0, warmup_steps=50, per_device_train_batch_size=64,
gradient_accumulation_steps=4

Metric	@1	@3	@5	@10	@20
NG	0.0262	0.0305	0.0306	0.0313	0.0321
HR	0.0262	0.033	0.0334	0.0356	0.0388

训练数据为140000个, [wandb链接](#):

learning_rate=0.001, weight_decay=1.0e-05, warmup_steps=200,
per_device_train_batch_size=64, gradient_accumulation_steps=4

Metric	@1	@3	@5	@10	@20
NG	0.0204	0.0249	0.0252	0.0258	0.0264

Metric	@1	@3	@5	@10	@20
HR	0.0204	0.0278	0.0284	0.0304	0.0328

训练数据为148480个, [wandb链接](#):

learning_rate=3.0e-05, weight_decay=0.0, warmup_steps=0, per_device_train_batch_size=64, gradient_accumulation_steps=4, 固定的lr

Metric	@1	@3	@5	@10	@20
NG	0.0116	0.0182	0.0190	0.0193	0.0198
HR	0.0116	0.0222	0.024	0.025	0.027

训练数据为148480个, [wandb链接](#):

learning_rate=0.0001, weight_decay=0.0, warmup_steps=0, per_device_train_batch_size=64, gradient_accumulation_steps=4, 固定的lr

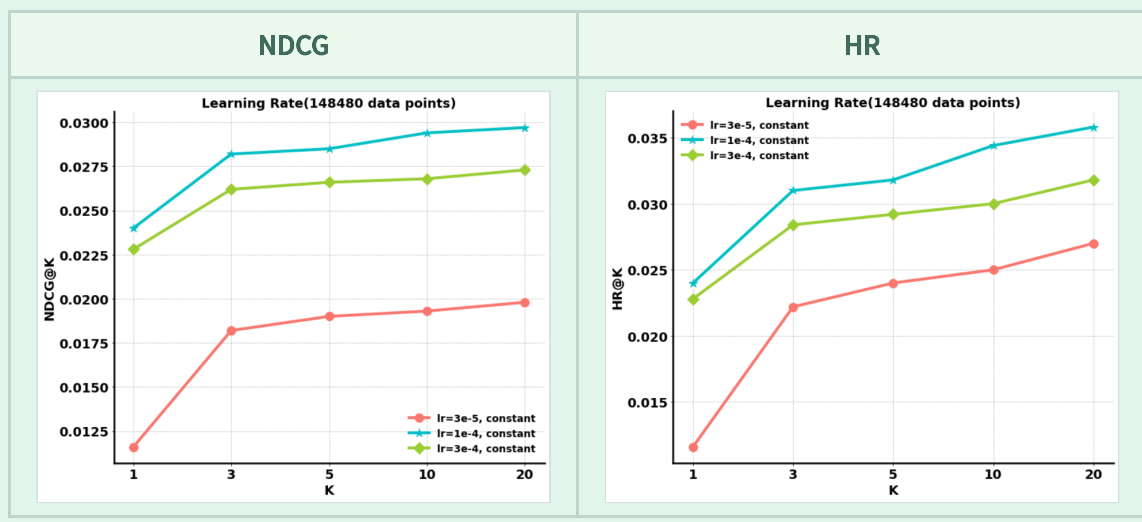
Metric	@1	@3	@5	@10	@20
NG	0.0240	0.0282	0.0285	0.0294	0.0297
HR	0.024	0.031	0.0318	0.0344	0.0358

训练数据为148480个, [wandb链接](#):

learning_rate=0.0003, weight_decay=0.0, warmup_steps=0, per_device_train_batch_size=64, gradient_accumulation_steps=4, 固定的lr

Metric	@1	@3	@5	@10	@20
NG	0.0228	0.0262	0.0266	0.0268	0.0273
HR	0.0228	0.0284	0.0292	0.03	0.0318

lr在取1e-4附近的值时表现就可以



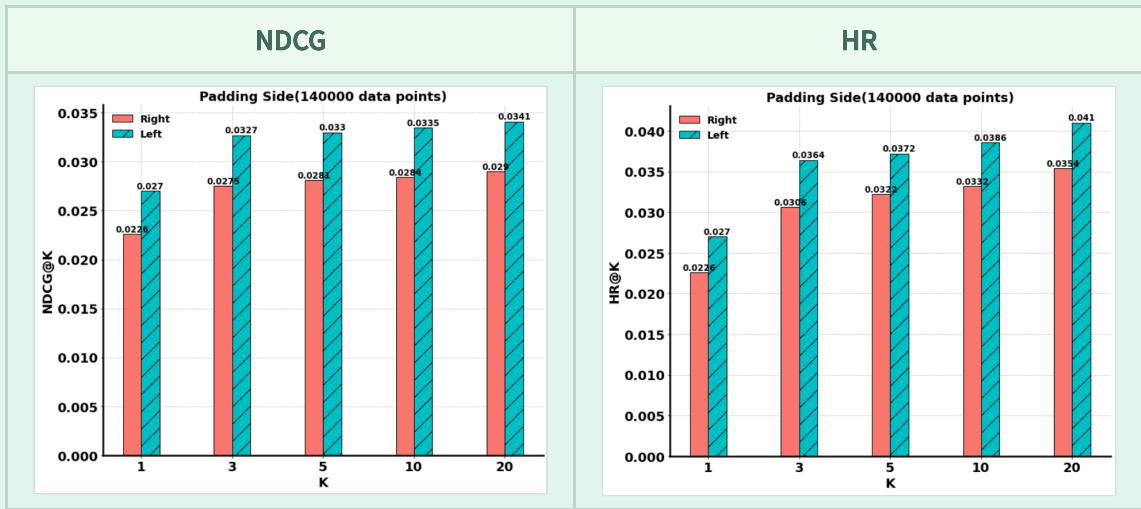
padding_side

训练数据为140000个, 改为right padding, [wandb链接](#):

learning_rate=0.0003, weight_decay=0.0, warmup_steps=50, per_device_train_batch_size=64, gradient_accumulation_steps=4

Metric	@1	@3	@5	@10	@20
NG	0.0226	0.0275	0.0281	0.0284	0.0290
HR	0.0226	0.0306	0.0322	0.0332	0.0354

right padding不是影响model效果的关键因素



tokenizer fast

是不是用fast tokenizer对结果影响不大

prompt format

训练数据为140000个, 改为Qwen的格式, [wandb链接](#):

Train:
 """Below is an instruction that describes a task, paired with an input that provides further context. Write a response that appropriately completes the request.

Instruction:
 <lim_start>
 data_point["instruction"]
 <lim_end>

Input:
 <lim_start>
 data_point["input"]
 <lim_end>

Response:
 <lim_start>
 data_point["output"]
 <lim_end>
 """

Inference:
 """Below is an instruction that describes a task, paired with an input that provides further context. Write a response that appropriately completes the request.

Instruction:
 <lim_start>
 instruction
 <lim_end>

Input:
 <lim_start>
 input
 <lim_end>

Response:
 """

learning_rate=0.0003, weight_decay=0.0, warmup_steps=50, per_device_train_batch_size=32, gradient_accumulation_steps=8

Metric	@1	@3	@5	@10	@20
NG	0.0258	0.0313	0.0316	0.0320	0.0323
HR	0.0258	0.0348	0.0356	0.037	0.038

prompt format对model的效果影响不是很大

train_on_inputs

训练数据为148000个, [wandb链接](#):

learning_rate=0.0003, weight_decay=0.0, warmup_steps=200, per_device_train_batch_size=64, gradient_accumulation_steps=16

第一个checkpoint的结果为

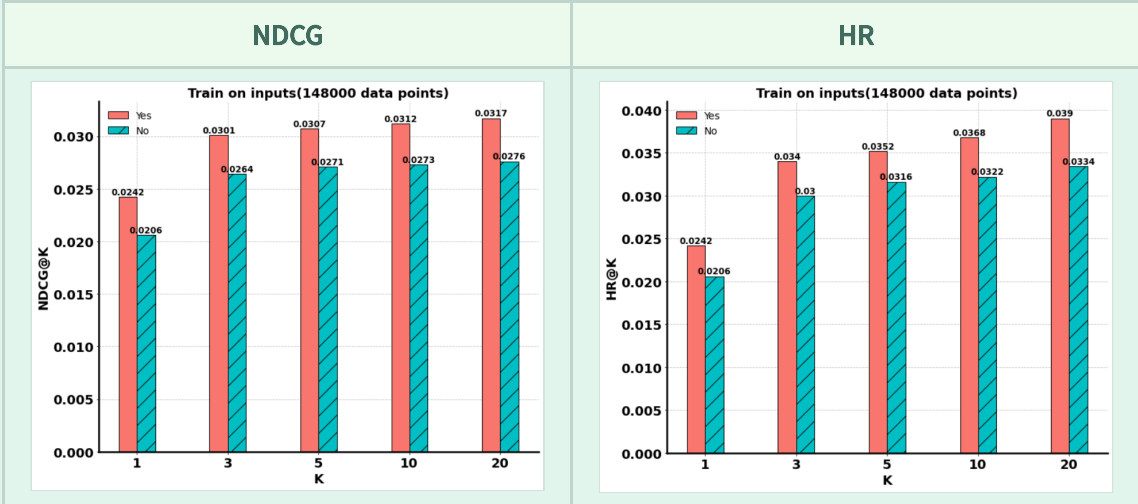
Metric	@1	@3	@5	@10	@20
NG	0.0126	0.0186	0.0191	0.0192	0.0198
HR	0.0126	0.0222	0.0234	0.024	0.0264

第二个checkpoint的结果为

Metric	@1	@3	@5	@10	@20
--------	----	----	----	-----	-----

Metric	@1	@3	@5	@10	@20
NG	0.0206	0.0264	0.0271	0.0273	0.0276
HR	0.0206	0.03	0.0316	0.0322	0.0334

train on inputs为true的时候效果比false时好



数据类型(fp32、bf16)

数据类型对结果影响不大

推理参数

对目前的sota探究推理参数

num_beams

num_beams=1

Metric	@1	@3	@5	@10	@20
NG	0.0256	0.0310	0.0316	0.0321	0.0327
HR	0.0256	0.0346	0.036	0.0376	0.04

num_beams=2

Metric	@1	@3	@5	@10	@20
NG	0.0254	0.0310	0.0316	0.0319	0.0326
HR	0.0254	0.0348	0.036	0.0372	0.0398

num_beams=4

Metric	@1	@3	@5	@10	@20
NG	0.0270	0.0327	0.0330	0.0335	0.0341

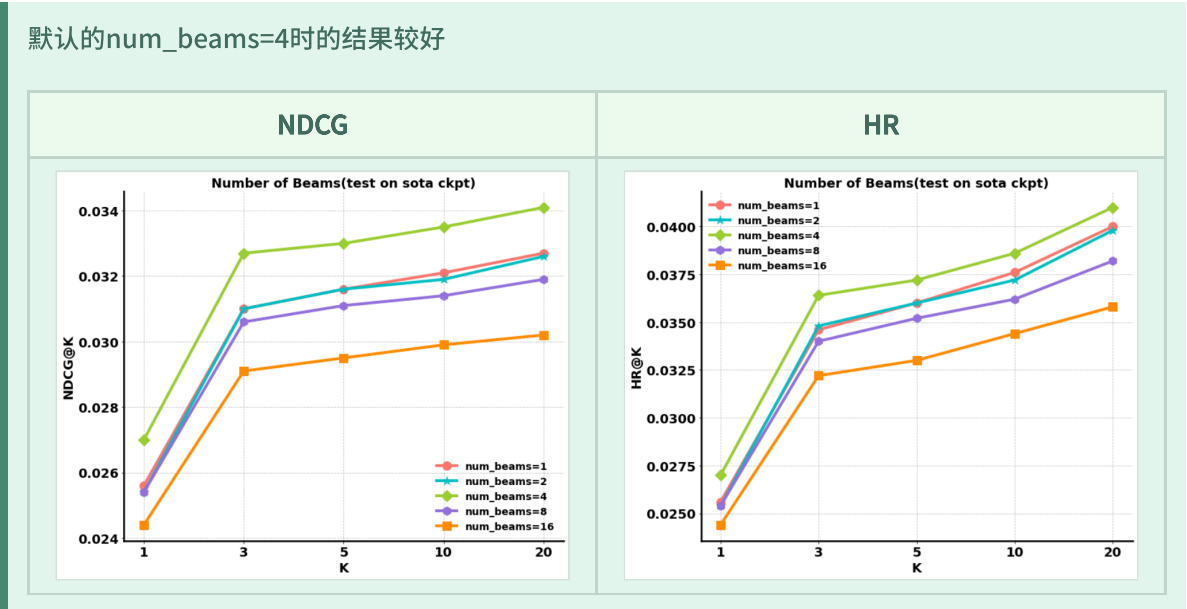
Metric	@1	@3	@5	@10	@20
HR	0.027	0.0364	0.0372	0.0386	0.041

num_beams=8

Metric	@1	@3	@5	@10	@20
NG	0.0254	0.0306	0.0311	0.0314	0.0319
HR	0.0254	0.034	0.0352	0.0362	0.0382

num_beams=16

Metric	@1	@3	@5	@10	@20
NG	0.0244	0.0291	0.0295	0.0299	0.0302
HR	0.0244	0.0322	0.033	0.0344	0.0358



max_new_tokens

影响不大