llamafactory多机多卡

1:gpu

```
gpu使用情况
许伯阳: 5,6,7
康总: 3,4
叶哥: 0
多机多卡验证
master:1,
node1: 2,
```

2:构建镜像,配置

```
docker build -f ./docker/docker-cuda/Dockerfile \
    --build-arg INSTALL_BNB=true \
    --build-arg INSTALL_VLLM=true \
    --build-arg INSTALL_DEEPSPEED=true \
    --build-arg INSTALL_FLASHATTN=true \
    --build-arg PIP_INDEX=https://pypi.org/simple \
    -t llamafactory_mgpus:latest .
docker run -dit --gpus=all \
    -v ./hf_cache:/root/.cache/huggingface \
    -v ./ms_cache:/root/.cache/modelscope \
    -v ./data:/app/data \
    -v ./output:/app/output \
    -p 7860:7860 \
    -p 8000:8000 \
    --shm-size 16G \
    --name llamamaster \
    llamafactory_mgpus
```

配置master和node1

```
docker run -dit --gpus '"device=1"'  \
    -v /mnt/llamafactory/mgpus/master/huggingface:/root/.cache/huggingface \
    -v /mnt/llamafactory/mgpus/master/modelscope:/root/.cache/modelscope \
    -v /mnt/llamafactory/mgpus/master/data:/app/data \
    -v /mnt/llamafactory/mgpus/master/output:/app/output \
    -p 4007:7860 \
    -p 4008:8000 \
    -p 4009:9000 \
    --shm-size 32G \
    --name llamamaster \
    llamafactory_mgpus

docker exec -it llamamaster bash
# master
172.17.0.12    de237c11dd3f
# node1
172.17.0.13    5fb58c8c9bf0
```

```
ssh-rsa
AAAAB3NzaC1yc2EAAAADAQABAAABgQDnB4IZvbwz7HczEDP7kwUeYoIRUxbTTenSzex+G1c7VKZ7tuHpG
TSccYwEyy9UuZlmD68MM5zJ4jdUDxfztdwQbzVs2w4F4Bxbj125F2pgor4XfSXmQJp56QrKxPHxoLPYI/
2DbB2stA27CdR7OzKix8BtBhyQ5WAr9rMhiofU2xRnmZXP7GdJatO/WGxSgTfFaDltVQcMSPy2OhsgbtF
zqpXwIIK4ZQdD4hPNooLW+qr2smWDjosCa6NuAqzaTePpbYwIWKfjRrw941jOM3UlMyx9bBDIUrH4vowS
gSsLBOq2AkKc5CcEJdIWNFEil7IKIoBZJdQqiuv3nwkHj6On6Bvg8T97n5T689K5B5yjBlhJIGbhTEK1B
GQKjVh+OG1o2bd416MR/viEaiul4ezIbB/6NBqLeGdVJmwu2kAePb7qRgt5TdgoDv2DSJcKa+WUDxmWfZ
UPdt8oaVQ3h0y3bn95fFYAKEIS6GhDkSvZANeoV0Tfe372QZT8dhFOKsc= root@de237c11dd3f

docker run -dit --gpus '"device=2"'  \
    -v /mnt/llamafactory/mgpus/node1/huggingface:/root/.cache/huggingface \
    -v /mnt/llamafactory/mgpus/node1/modelscope:/root/.cache/modelscope \
    -v /mnt/llamafactory/mgpus/node1/data:/app/data \
    -v /mnt/llamafactory/mgpus/node1/output:/app/output \
    -p 4010:7860 \
    -p 4011:8000 \
    -p 4012:9000 \
    --shm-size 32G \
    --name llamanode1 \
    llamafactory_mgpus
docker exec -it llamanode1 bash

# etc/hosts
# master
172.17.0.12    de237c11dd3f
# node1
172.17.0.13    5fb58c8c9bf0

ssh-rsa
AAAAB3NzaC1yc2EAAAADAQABAAABgQDYsdT8FERQbLnbczeASvkzuLk28xtYCgwJ6iHrbHw0xu1G6OydX
vcfERsl+sjKCfan44vWRw8RES0OV/Kdfu/+MUV1enmYw4F26V06RzOo/1bPGJ7PnxaiI+3UNt3XO693ij
66XNQozZ3ZVMVGWuPMeif0lTnKZjfMbyDWQSbmNfMmxmY9KsaogBN37AQE8jX0YxDy0H5aVsYxnByL/xZ
7yVMHvbNHiNCtkgGEnC2H80R3d57F/Y5dOt8AcM9N1iE/85paX6z/O6LIUVzPSLE98f3LdljWL3+5YndA
ixMwXwO6S5RhmSbOMWj4wKmpslQqWNsxLwTPeKcf1prqtPtcrVNjC0Akm87qTrboLsDxl97U0uba0TsOs
6ad5dZZs/c2PeM69iAZbpvmDeHb4ZFwoTIq5hmMx5CyHbfnM9PcZULyHvfsfo6ccYN4PZ3THARedKh4xP
MWlfF/PSV1YFvFCCS24mzWWR09TwmN2xcUKFCg2snuEwVDg9aBbmaJe1k= root@5fb58c8c9bf0

# 容器内
chmod 777 /tmp
apt update
apt install -y iputils-ping openssh-server net-tools pdsh
/etc/init.d/ssh start

# hostfile, slots代表使用1个GPU
de237c11dd3f slots=1
5fb58c8c9bf0 slots=1
```

~/.ssh/authorized_keys

```
ssh-rsa
AAAAB3NzaC1yc2EAAAADAQABAAABgQDnB4IZvbwz7HczEDP7kwUeYoIRUxbTTenSzex+G1c7VKZ7tuHpG
TSccYwEyy9UuZlmD68MM5zJ4jdUDxfztdwQbzVs2w4F4Bxbj125F2pgor4XfSXmQJp56QrKxPHxoLPYI/
2DbB2stA27CdR7OzKix8BtBhyQ5WAr9rMhiofU2xRnmZXP7GdJatO/WGxSgTfFaDltVQcMSPy2OhsgbtF
zqpXwIIK4ZQdD4hPNooLW+qr2smWDjosCa6NuAqzaTePpbYwIWKfjRrw941jOM3UlMyx9bBDIUrH4vowS
gSsLBOq2AkKc5CcEJdIWNFEil7IKIoBZJdQqiuv3nwkHj6On6Bvg8T97n5T689K5B5yjBlhJIGbhTEK1B
GQKjVh+OG1o2bd416MR/viEaiul4ezIbB/6NBqLeGdVJmwu2kAePb7qRgt5TdgoDv2DSJcKa+WUDxmWfZ
UPdt8oaVQ3h0y3bn95fFYAKEIS6GhDkSvZANeoV0Tfe372QZT8dhFOKsc= root@de237c11dd3f

ssh-rsa
AAAAB3NzaC1yc2EAAAADAQABAAABgQDYsdT8FERQbLnbczeASvkzuLk28xtYCgwJ6iHrbHw0xu1G6OydX
vcfERsl+sjKCfan44vWRw8RES0OV/Kdfu/+MUV1enmYw4F26V06RzOo/1bPGJ7PnxaiI+3UNt3XO693ij
66XNQozZ3ZVMVGWuPMeif0lTnKZjfMbyDWQSbmNfMmxmY9KsaogBN37AQE8jX0YxDy0H5aVsYxnByL/xZ
7yVMHvbNHiNCtkgGEnC2H80R3d57F/Y5dOt8AcM9N1iE/85paX6z/O6LIUVzPSLE98f3LdljWL3+5YndA
ixMwXwO6S5RhmSbOMWj4wKmpslQqWNsxLwTPeKcf1prqtPtcrVNjC0Akm87qTrboLsDxl97U0uba0TsOs
6ad5dZZs/c2PeM69iAZbpvmDeHb4ZFwoTIq5hmMx5CyHbfnM9PcZULyHvfsfo6ccYN4PZ3THARedKh4xP
MWlfF/PSV1YFvFCCS24mzWWR09TwmN2xcUKFCg2snuEwVDg9aBbmaJe1k= root@5fb58c8c9bf0
```

ds_confg.json

```json
{
  "train_batch_size": "auto",
  "train_micro_batch_size_per_gpu": "auto",
  "gradient_accumulation_steps": "auto",
  "gradient_clipping": "auto",
  "zero_allow_untested_optimizer": true,
  "fp16": {
    "enabled": "auto",
    "loss_scale": 0,
    "initial_scale_power": 16,
    "loss_scale_window": 1000,
    "hysteresis": 2,
    "min_loss_scale": 1
  },
  "zero_optimization": {
    "stage": 2,
    "allgather_partitions": true,
    "allgather_bucket_size": 5e8,
    "reduce_scatter": true,
    "reduce_bucket_size": 5e8,
    "overlap_comm": false,
    "contiguous_gradients": true
  }
}
```

```
多机sft
deepspeed --hostfile /app/config_file/hostfile \
    /app/src/train.py --deepspeed /app/config_file/ds_confg.json \
    --stage sft \
    --model_name_or_path /app/output/models/qwen1.5_0.5b_chat \
    --do_train True \
```

```
    --dataset_dir /app/data/ \
    --dataset xhs \
    --template qwen \
    --finetuning_type lora \
    --output_dir /app/output/lora/2 \
    --overwrite_cache \
    --overwrite_output_dir \
    --per_device_train_batch_size 4 \
    --gradient_accumulation_steps 4 \
    --lr_scheduler_type cosine \
    --logging_steps 10 \
    --save_steps 10000 \
    --learning_rate 1e-5 \
    --num_train_epochs 20 \
    --plot_loss \
    --fp16
```

正常加载:

```
de237c11dd3f: [INFO|trainer.py:2313] 2024-11-20 12:18:50,086 >> ***** Running training *****
de237c11dd3f: [INFO|trainer.py:2314] 2024-11-20 12:18:50,086 >>   Num examples = 1,508
de237c11dd3f: [INFO|trainer.py:2315] 2024-11-20 12:18:50,086 >>   Num Epochs = 20
de237c11dd3f: [INFO|trainer.py:2316] 2024-11-20 12:18:50,086 >>   Instantaneous batch size per device = 4
de237c11dd3f: [INFO|trainer.py:2319] 2024-11-20 12:18:50,087 >>   Total train batch size (w. parallel, distributed & accumulation) = 32
de237c11dd3f: [INFO|trainer.py:2320] 2024-11-20 12:18:50,087 >>   Gradient Accumulation steps = 4
de237c11dd3f: [INFO|trainer.py:2321] 2024-11-20 12:18:50,087 >>   Total optimization steps = 940
de237c11dd3f: [INFO|trainer.py:2322] 2024-11-20 12:18:50,091 >>   Number of trainable parameters = 3,784,704
  0%|          | 0/940 [00:00<?, ?it/s]/usr/local/lib/python3.10/dist-packages/torch/utils/checkpoint.py:295: FutureWarning: `torch.cpu.amp.autocast(args
 is deprecated. Please use `torch.amp.autocast('cpu', args...)` instead.
de237c11dd3f:   with torch.enable_grad(), device_autocast_ctx, torch.cpu.amp.autocast(**ctx.cpu_autocast_kwargs):  # type: ignore[attr-defined]
de237c11dd3f: {'loss': 3.9087, 'grad_norm': 0.7430564761161804, 'learning_rate': 9.997207818651273e-06, 'epoch': 0.21}
de237c11dd3f: {'loss': 3.8446, 'grad_norm': 0.6829023957252502, 'learning_rate': 9.988834393115768e-06, 'epoch': 0.42}
de237c11dd3f: {'loss': 3.7103, 'grad_norm': 0.6964868307113647, 'learning_rate': 9.97488907544252e-06, 'epoch': 0.63}
de237c11dd3f: {'loss': 3.7498, 'grad_norm': 0.4726545214653015, 'learning_rate': 9.955387440773902e-06, 'epoch': 0.85}
de237c11dd3f: {'loss': 4.0669, 'grad_norm': 0.48675575852394104, 'learning_rate': 9.930351269950144e-06, 'epoch': 1.06}
de237c11dd3f: {'loss': 3.7059, 'grad_norm': 0.5517176985740662, 'learning_rate': 9.899808525182935e-06, 'epoch': 1.27}
de237c11dd3f: {'loss': 3.6769, 'grad_norm': 0.38814425468444824, 'learning_rate': 9.863793318825186e-06, 'epoch': 1.48}
de237c11dd3f: {'loss': 3.6424, 'grad_norm': 0.3534882664680481, 'learning_rate': 9.822345875271884e-06, 'epoch': 1.69}
de237c11dd3f: {'loss': 3.7453, 'grad_norm': 0.3888565003871918, 'learning_rate': 9.775512486034564e-06, 'epoch': 1.9}
de237c11dd3f: {'loss': 3.9357, 'grad_norm': 0.4186440408229828, 'learning_rate': 9.723345458039595e-06, 'epoch': 2.12}
de237c11dd3f: {'loss': 3.6525, 'grad_norm': 0.3147875964641571, 'learning_rate': 9.665903055208013e-06, 'epoch': 2.33}
de237c11dd3f: {'loss': 3.7402, 'grad_norm': 0.3422832190990448, 'learning_rate': 9.603249433382145e-06, 'epoch': 2.54}
de237c11dd3f: {'loss': 3.5721, 'grad_norm': 0.33049951625823975, 'learning_rate': 9.535454568671705e-06, 'epoch': 2.75}
```

两个GPU占用

master: 1,

node1: 2,

```
localhost.localdomain        Wed Nov 20 20:21:50 2024  550.127.05
[0] NVIDIA GeForce RTX 4090 | 29°C,   0 % |   496 / 24564 MB | root(490M)
[1] NVIDIA GeForce RTX 4090 | 56°C,  52 % | 19568 / 24564 MB | root(19562M)
[2] NVIDIA GeForce RTX 4090 | 59°C,  79 % | 20842 / 24564 MB | root(20836M)
[3] NVIDIA GeForce RTX 4090 | 29°C,   0 % |     3 / 24564 MB |
[4] NVIDIA GeForce RTX 4090 | 28°C,   0 % |     3 / 24564 MB |
[5] NVIDIA GeForce RTX 4090 | 31°C,   0 % |     3 / 24564 MB |
[6] NVIDIA GeForce RTX 4090 | 29°C,   0 % |     3 / 24564 MB |
[7] NVIDIA GeForce RTX 4090 | 31°C,   0 % |     3 / 24564 MB |
```

结束,master 节点文件如下

```
de237c11dd3f: ***** train metrics *****
de237c11dd3f:   epoch                    =     19.8942
de237c11dd3f:   total_flos               = 33548999GF
de237c11dd3f:   train_loss               =      3.5809
de237c11dd3f:   train_runtime            = 0:14:49.74
de237c11dd3f:   train_samples_per_second =     33.897
de237c11dd3f:   train_steps_per_second   =      1.056
de237c11dd3f: Figure saved at: /app/output/lora/2/training_loss.png
de237c11dd3f: [WARNING|2024-11-20 12:33:40] llamafactory.extras.ploting:162 >> No metric eval_loss to plot.
de237c11dd3f: [WARNING|2024-11-20 12:33:40] llamafactory.extras.ploting:162 >> No metric eval_accuracy to plot.
de237c11dd3f: [INFO|modelcard.py:449] 2024-11-20 12:33:40,593 >> Dropping the following result as it does not have all the necessary fields:
de237c11dd3f: {'task': {'name': 'Causal Language Modeling', 'type': 'text-generation'}}
5fb58c8c9bf0: [rank1]:[W1120 12:33:40.568127662 ProcessGroupNCCL.cpp:1168] Warning: WARNING: process group has NOT been destroyed before we destruct ProcessGr
oupNCCL. On normal program exit, the application should call destroy_process_group to ensure that any pending NCCL operations have finished in this process. I
n rare cases this process can exit before this point and block the progress of another member of the process group. This constraint has always been present,
but this warning has only been added since PyTorch 2.4 (function operator())
de237c11dd3f: [rank0]:[W1120 12:33:41.802962566 ProcessGroupNCCL.cpp:1168] Warning: WARNING: process group has NOT been destroyed before we destruct ProcessGr
oupNCCL. On normal program exit, the application should call destroy_process_group to ensure that any pending NCCL operations have finished in this process. I
n rare cases this process can exit before this point and block the progress of another member of the process group. This constraint has always been present,
but this warning has only been added since PyTorch 2.4 (function operator())
de237c11dd3f: [2024-11-20 12:33:42,465] [INFO] [launch.py:351:main] Process 14741 exits successfully.
5fb58c8c9bf0: [2024-11-20 12:33:42,679] [INFO] [launch.py:351:main] Process 9844 exits successfully.
root@de237c11dd3f:/app# ls /app/output/lora/2/
README.md                added_tokens.json  merges.txt              tokenizer.json        trainer_log.jsonl   training_loss.png
adapter_config.json      all_results.json   runs                    tokenizer_config.json trainer_state.json  vocab.json
adapter_model.safetensors checkpoint-940    special_tokens_map.json train_results.json    training_args.bin
```

node1的输出如下

```
root@5fb58c8c9bf0:/app/output/lora/2# tree
.
└── checkpoint-940
    ├── global_step940
    │   └── zero_pp_rank_1_mp_rank_00_optim_states.pt
    └── rng_state_1.pth

2 directories, 2 files
```

(master 中执行)合并结果

```
llamafactory-cli export \
    --model_name_or_path /app/output/models/qwen1.5_0.5b_chat \
    --adapter_name_or_path /app/output/lora/2 \
    --template qwen \
    --finetuning_type lora \
    --export_dir /app/output/exportout/mgp_qwen1.5_chat0.5b \
    --export_size 2 \
    --export_legacy_format False
```

```
root@de237c11dd3f:/app# ls /app/output/exportout/mgpu_qwen1.5_chat0.5b/
added_tokens.json  generation_config.json  model.safetensors        tokenizer.json         vocab.json
config.json        merges.txt              special_tokens_map.json  tokenizer_config.json
root@de237c11dd3f:/app#
```

(master 中执行)推理

```
llamafactory-cli chat \
--model_name_or_path /app/output/exportout/mgpu_qwen1.5_chat0.5b \
--template qwen
```

```
[INFO|2024-11-20 12:47:39] llamafactory.model.model_utils.attention:157 >> Using torch SDPA for faster training and inference.
[INFO|2024-11-20 12:47:39] llamafactory.model.loader:157 >> all params: 463,987,712
Welcome to the CLI application, use `clear` to remove the history, use `exit` to exit the application.

User: 你好? 你能写一个关于提升英语的小红书文案吗?
Assistant: ✨【新学的英语新技能】
🌟【提升英语能力的12个秘诀】
1每天练习单词!
2多听多说!
3多读多写!
4多说多练!
5多听多记!
```