ADL HW3 Report

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1 LLM Tuning

Describe

I randomly choose 8,000 samples from the training data set, and the other 2,000 samples are used for validation. In this assignment, I use QLoRA, a PEFT method, to tune `zake7749/gemma-2-2b-it-chinese-kyara-dpo`. The figure shows how QLoRA works:

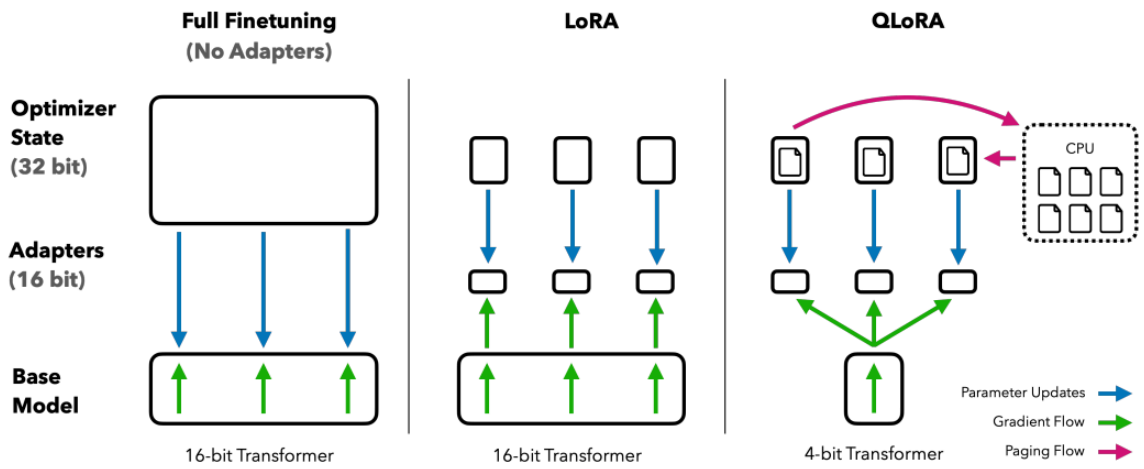

Figure 1: QLoRA

The following table shows the hyperparameters I used in this task:

max_length	512
num_train_epochs	7
gradient_accumulation_step	1
per_device_train_batch_size	2
learning_rate	1e-5
lr_scheduler	cosine
num_warmup_steps	300
weight_decay	1e-4
lora_rank	64
lora_alpha	16
lora_dropout	0.1
seed	1337

Table 1: Hyperparameters for `zake7749/gemma-2-2b-it-chinese-kyara-dpo`

Show your performance

My final performance on public testing set is 16.95746875.

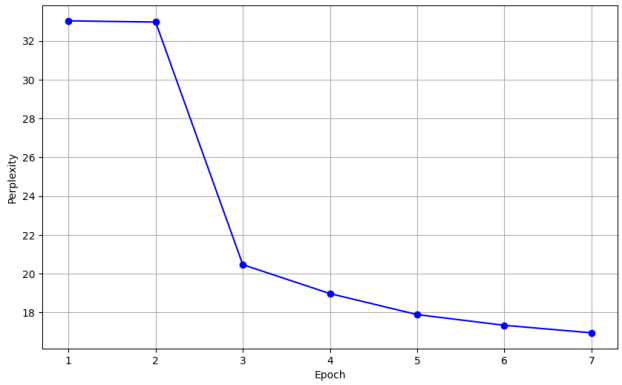

Figure 2: Mean Perplexity on Public Testing Set

2 LLM Inference Strategies

Zero-Shot

The hyperparameter settings are listed in Table 1. Here is the prompt I used in this session:

" 你是一名精通中文的教授，以下是用户和人工智能助理之間的對話。你要對用户的問題提供有用、安全、詳細和禮貌的回答。請將文言文翻譯成白話文或白話文翻譯成文言文。
USER: instruction ASSISTANT:"

Few-Shot (In-context Learning)

The hyperparameter settings are listed in Table 1. Here is the prompt I used in this session:

" 你是一名精通中文的教授，以下是用户和人工智能助理之間的對話。你要對用户的問題提供有用、安全、詳細和禮貌的回答。請將文言文翻譯成白話文或白話文翻譯成文言文。這邊提供你兩個範例。 USER: 翻譯成文言文：雅裏惱怒地說：從前在福山田獵時，你誣陷獵官，現在又說這種話。答案： ASSISTANT: 雅裏怒曰：昔畋於福山，卿誣獵官，今復有此言。 USER: 沒過十天，鮑泉果然被拘捕。幫我把這句話翻譯成文言文 ASSISTANT: 後未旬，果見囚執。 USER: instruction ASSISTANT:"

I choose the first two examples from the training dataset.

Comparison

The following table describes the performance of the three strategies.

Strategy	Mean Perplexity
Zero-shot	9558.876875
Few-shot	532.833125
QLoRA	16.95746875

We observe that QLoRA achieves the best performance, followed by few-shot learning (with two examples), while zero-shot learning performs the worst.

3 Bonus: Try Llama3-Taiwan (8B)

I tried `yentinglin/Llama-3-Taiwan-8B-Instruct` in this task, and the hyperparameters I used are listed in Table 1. I finally get mean perplexity of 6.54590625. Here is a comparison between different methods:

Strategy	Mean Perplexity
Zero-shot	9558.876875
Few-shot	532.833125
QLoRA	16.95746875
Llama3-Taiwan	6.54590625

We can see that Llama3-Taiwan performs the best.