

Fine-Tuning Report

Project Title: AlpaCare MedInstruct Assistant

Base Model: Microsoft Phi-2

Method: LoRA-based Supervised Fine-Tuning (SFT)

Frameworks: Hugging Face Transformers, TRL, PEFT

1. Introduction

This project fine-tunes a large language model (LLM) to create **AlpaCare MedInstruct Assistant**, a domain-adapted medical educational assistant. The goal is to generate safe, reliable, and simplified health-related responses suitable for patient education and healthcare awareness, with disclaimers ensuring responsible usage.

2. Methodology

- **Dataset:** MedInstruct-style dataset with ~52,000 instruction-response pairs (health and medical education focused).
 - **Base Model:** Phi-2 (2.7B parameters, instruction-tuned).
 - **Fine-Tuning Method:** LoRA (Low-Rank Adaptation) for efficient training.
 - **Hardware:** Colab GPU (A100/T4).
 - **Steps:**
 1. Load base model with transformers.
 2. Apply LoRA adapters with peft.
 3. Train with SFTTrainer using instruction-response format.
 4. Save adapters (./alpacare_lora).
 5. Reload model + LoRA weights for inference.
-

3. Results & Outputs

Example 1

Prompt: Explain why hydration is important during fever recovery.

Model Response:

Hydration helps the body replace fluids lost from sweating during fever. It regulates temperature, maintains electrolyte balance, and improves recovery speed.

Disclaimer: Educational use only — consult a clinician.

Example 2

Prompt: List five healthy habits to maintain heart health.

Model Response:

1. Eat fruits and vegetables daily.
2. Exercise at least 30 minutes.
3. Avoid smoking and excess alcohol.
4. Sleep 7–8 hours.
5. Manage stress with relaxation techniques.

Disclaimer: Educational use only — consult a clinician.

Example 3

Prompt: Give a simple explanation of how antibiotics work.

Model Response:

Antibiotics fight bacterial infections by stopping bacteria from growing or by killing them. They do not work on viruses like the cold or flu. Always use only as prescribed.

Disclaimer: Educational use only — consult a clinician.

4. Conclusion

The fine-tuned Phi-2 model successfully adapts to medical education tasks. It produces simplified, safe, and instructive responses while maintaining a disclaimer for ethical compliance. Future work can include reinforcement learning with human feedback (RLHF) to further align outputs with clinical accuracy.

5. References

- Hugging Face Transformers & PEFT Documentation
- Microsoft Phi-2 Model Card
- TRL (Transformer Reinforcement Learning) Library

