Tutorial on Large Language Models (LLM)

LLM basics

1. LLM Slides by Dr. Kevin Duh:
   https://www.cs.jhu.edu/~kevinduh/a/llm-tutorial/2406-JSALT-LLM.pdf
2. Additional materials:
   a. Stanford course CS224N: Natural Language Processing with Deep Learning (Neural Network Basics): https://web.stanford.edu/class/cs224n

Post training (finetuning, RL, test-time scaling)

1. Overview of finetuning methods:
   https://github.com/chrisvdweth/selene/blob/master/notebooks/llm_model_fine_tuning_overview.ipynb
2. Reinforcement Learning (RL) slides by Prof. Daniel Khashabi:
   https://self-supervised.cs.jhu.edu/sp2025/files/slides/14-15.alignment.pdf
3. Test-time scaling slides by Prof. Daniel Khashabi:
   a. https://self-supervised.cs.jhu.eAligning Self-Supervised Models with Human Intentsdu/sp2025/files/slides/15-16.inference-scaling.pdf
4. Additional materials:
   a. Stanford course CS336: Language Modeling from Scratch (especially Lectures 15-17 Alignment - SFT/RLHF/RL): https://stanford-cs336.github.io/spring2025/
   b. Stanford course CS 329X: Human-Centered LLMs:
      https://web.stanford.edu/class/cs329x/
   c. Hands-on examples:
      i. LLM fine-tuning examples using the transformers and peft packages:
         https://github.com/chrisvdweth/selene/blob/master/notebooks/llm_model_finetuning_lora_hf_kidsqa.ipynb
      ii. Nanochat (a simple pipeline for training LLMs with ~$100):
         https://github.com/karpathy/nanochat
      iii. Documentation for PEFT (Parameter-Efficient Fine-Tuning for LLMs):
         https://huggingface.co/docs/peft/en/index
      iv. Documentation for verl (an RL training framework for LLMs):
         https://verl.readthedocs.io/en/latest/
      v. A dataset preparation pipeline:
         https://wandb.ai/capecape/alpaca_ft/reports/How-to-Fine-Tune-an-LLM-Part-1-Preparing-a-Dataset-for-Instruction-Tuning--Vmlldzo1NTcxNzE2

Tinker guide

1. Quick start
   a. Tinker docs: https://tinker-docs.thinkingmachines.ai/
   b. Tinker Cookbook: https://github.com/thinking-machines-lab/tinker-cookbook
2. A minimal testing example (with a very small cost)
   a. SL: https://tinker-docs.thinkingmachines.ai/supervised-learning/sl-basic
   b. RL: https://tinker-docs.thinkingmachines.ai/rl/rl-basic
3. Simple cost guidance: https://www.datacamp.com/tutorial/tinker-tutorial