Nidhi: Understanding DeepSeek's training pipeline from pretraining to fine tuning

Update: currently in the research phase, exploring DeepSeek's models documentation, GitHub repositories, and technical literature. While the full analysis is still in development.

Anticipated Outcome: Overview of DeepSeek's training pipeline from pretraining to fine tuning.

- Map out the complete DeepSeek training pipeline, including:
- Pretraining objectives and architecture
- Fine-tuning strategies
- Instruction tuning or alignment stages

A brief summary of all 7 models: their purpose, training method, datasets, and fine-tuning strategy

Models to be analysed:

1. DeepSeek-R1
2. DeepSeek-V2
3. DeepSeek-V3
4. DeepSeek-Math
5. DeepSeek-Prover-V2
6. DeepSeek-VL
7. DeepSeek-Coder

Research Question

How does DeepSeek design its training pipeline from large-scale pretraining to specialized fine-tuning, and what optimizations contribute to its performance and flexibility across tasks like code, vision, and reasoning?

Key Early Findings

Pretraining Phase

- Initiated with a "cold start" phase, utilizing supervised fine-tuning (SFT) on curated datasets to establish foundational reasoning capabilities.
- DeepSeek models introduce task-specific pretraining objectives:
  1. DeepSeek-Math uses math-intensive text and code during pretraining, blending natural language and symbolic reasoning.
  2. DeepSeek-Coder employs a fill-in-the-blank style pretraining objective, which is more effective for code infilling and completion than CLM alone.

(Ongoing Research)

- What role does RL play in replacing supervised fine-tuning in DeepSeek's pipeline?
- How does DeepSeek handle alignment, safety, and efficiency in the final stages of training?

Sources

https://www.techtarget.com/whatis/feature/DeepSeek-explained-Everything-you-need-to-know

https://github.com/deepseek-ai/DeepSeek-Math

https://www.boozallen.com/content/dam/home/docs/ai/a-technical-primer-on-deepseek.pdf

https://huggingface.co/deepseek-ai/DeepSeek-V2