Base, Chat and Reasoning Models: Understanding LLM Types

Key Concepts Covered

- No lab exercise today, focus on model comparison instead
- Recap of previous days: explored frontier models (OpenAI, Gemini, Olama, Llama variants)
- Built web page summarizer using OpenAI API and Llama
- Goal for today: compare different frontier models, understand chat vs. reasoning models
- Learn strengths and weaknesses of each model type

Types of Large Language Models (LLMs)

- Three main types: base models, chat/instruct models, reasoning models
- Base model: predicts next word in a sequence, like predictive text on phones
- Early GPT-3 was a base model, used for sequence completion
- Chat/instruct models: trained with message-response format, use system/user/assistant prompts
- Chat models created using reinforcement learning from human feedback (RLHF)
- Reasoning models: trained to think step-by-step before answering, output their thought process
- Hybrid models: can switch between chat and reasoning modes, decide how much to "think" based on input
- Examples of hybrid models: Gemini Pro 25, GPT-5, latest Quen version

Model Training and Prompting Techniques

- Chain-of-thought prompting: adding "please think step by step" improves reasoning
- Reasoning budget/effort: how much thinking a model does before answering
- Budget forcing: technique to make models reason more deeply, e.g., inserting the word "wait" in the output sequence
- "Wait" prompt causes model to reflect and reconsider, leads to better outcomes (per S1 paper, Jan 2025)
- Reasoning models with higher reasoning budgets perform better on benchmarks

When to Use Each Model Type

- Reasoning models: best for problem-solving, puzzles, intelligence tests; slower but more accurate
- Chat models: faster, better for interactive use and creative content generation; may be less analytical
- Base models: best starting point for training new skills or constructs, not for direct chat or reasoning tasks

Additional Notes

- Hybrid models balance speed and reasoning, adapt based on task complexity
- No clear metrics for creativity—try both chat and reasoning models for content generation
- Benchmarks and leaderboards will be discussed in week four
- Resources and further reading (e.g., S1 paper) will be provided later