Prompt Engineering Basics

CoT Prompting (Chain-of-thought prompting)

paper: **Chain-of-Thought Prompting Elicits Reasoning in Large Language Models**

Chain-of-thought prompts contain a series of intermediate reasoning steps, and they are shown to significantly improve the ability of large language models to perform certain tasks that involve complex reasoning (e.g., arithmetic, commonsense reasoning, symbolic reasoning, etc.)

CoOp (Context Optimization)

paper: **Learning to Prompt for Vision-Language Models**

CoOp, or **Context Optimization**, is an automated prompt engineering method that avoids manual prompt tuning by modeling context words with continuous vectors that are end-to-end learned from data. The context could be shared among all classes or designed to be class-specific. During training, we simply minimize the prediction error using the cross-entropy loss with respect to the learnable context vectors, while keeping the pre-trained parameters fixed. The gradients can be back-propagated all the way through the text encoder, distilling the rich knowledge encoded in the parameters for learning task-relevant context.

KnowPrompt

paper: **KnowPrompt: Knowledge-aware Prompt-tuning with Synergistic Optimization for Relation Extraction**

KnowPrompt is a prompt-tuning approach for relational understanding. It injects entity and relation knowledge into prompt construction with learnable virtual template words as well as answer words and synergistically optimize their representation with knowledge constraints. To be specific, TYPED MARKER is utilized around entities initialized with aggregated entity-type embeddings as learnable virtual template words to

inject entity type knowledge. The average embeddings of each token are leveraged in relation labels as virtual answer words to inject relation knowledge. Since there exist implicit structural constraints among entities and relations, and virtual words should be consistent with the surrounding contexts, synergistic optimization is introduced to obtain optimized virtual templates and answer words. Concretely, a context-aware prompt calibration method is used with implicit structural constraints to inject structural knowledge implications among relational triples and associate prompt embeddings with each other.