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# KG-CoT: Chain-of-Thought Prompting of Large Language Models over Knowledge Graphs for Knowledge-Aware Question Answering

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Large language models (LLMs) encounter challenges such as hallucination and factual errors in knowledge-intensive tasks. On the one hand, LLMs sometimes struggle to generate reliable answers based on the black-box parametric knowledge, due to the lack of responsible knowledge. Moreover, fragmented knowledge facts extracted by knowledge retrievers fail to provide explicit and coherent reasoning paths for improving LLM reasoning. To address these challenges, we propose KG-CoT, a novel knowledge-augmented paradigm that leverages a small-scale step-by-step graph reasoning model to reason over knowledge graphs (KGs) and utilizes a reasoning path generation method to generate chains of reasoning with high confidence for large-scale LLMs. Extensive experiments demonstrate that our KG-CoT significantly improves the performance of LLMs on knowledge-intensive question answering tasks, such as multi-hop, single-hop, and open-domain question answering benchmarks, without fine-tuning LLMs. KG-CoT outperforms the CoT prompting as well as prior retrieval-augmented and knowledge base question answering baselines. Moreover, KG-CoT can

reduce the number of API calls and cost and generalize to various LLM backbones in a lightweight plug-and-play manner.

**Keywords:**

Natural Language Processing: NLP: Question answering

Natural Language Processing: NLP: Language generation

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