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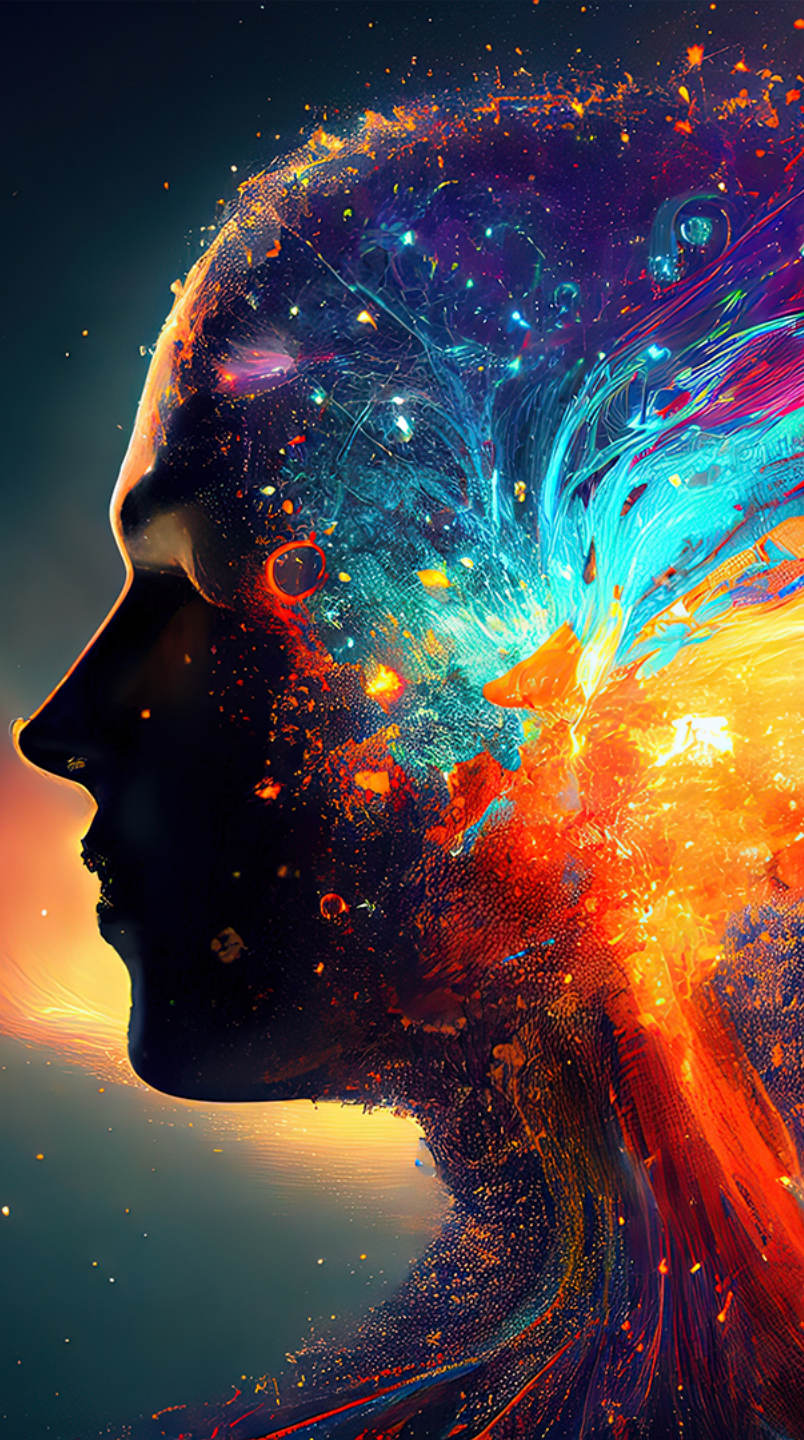
Chain-of-Thought Prompting



Instructor

Bhaskarjit Sarmah

Vice President, Blackrock

Definition

- Chain-of-thought is a method that improves the reasoning abilities of large language models by generating a series of intermediate reasoning steps

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How Does it Work?

- Chain-of-thought allows models to decompose multi-step problems into intermediate steps.

- But this also leads to additional computation for problems that requires more reasoning steps.

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Use-cases: Chain-of-Thought Prompting

Enhances language model's ability

Language models can generate chains of thought to solve complex tasks such as arithmetic, commonsense reasoning, and symbolic manipulation.

Interpretable window into model's behavior

Chain-of-thought allows for insights into how it arrived at a particular answer and opportunities for debugging.

Matches human capabilities

This methodology can be applied to various tasks that humans solve using language, potentially extending beyond arithmetic reasoning to tasks like machine translation.

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Chain-of-Thought Prompting: Example

Standard Prompting

Model Input

Q: Roger has 5 tennis balls. He buys 2 more cans of tennis balls. Each can have 3 tennis balls. How many tennis balls does he have now?

A: The answer is 11

Q: The cafeteria had 23 apples. If they used 20 to make lunch and bought 6 more, how many apples do they have?

Model Output

A: The answer is 27. ✗

Chain-of-Thought Prompting

Model Input

Q: Roger has 5 tennis balls. He buys 2 more cans of tennis balls. Each can have 3 tennis balls. How many tennis balls does he have now?

A: Roger started with 5 balls. 2 cans of 3 tennis balls each is 6 tennis balls. 5 + 6 = 11. The answer is 11.

Q: The cafeteria had 23 apples. If they used 20 to make lunch and bought 6 more, how many apples do they have?

Model Output

A: The cafeteria had 23 apples originally. They used 20 to make lunch. So they had 23 - 20 = 3. They bought 6 more apples, so they have 3+6 = 9. The answer is 9. ✓

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Pros: Chain-of-Thought Prompting

- Achieves state-of-the-art accuracy, surpassing finetuned models with a verifier
- Applicable to various tasks that require multi-step reasoning, making it a versatile approach in different domains
- Enhances the interpretability of language models by providing insights into the model's reasoning process through the generated chains of thought
- Chain-of-thought prompting is a ready-to-use, cost-effective strategy that doesn’t require model finetuning.

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Cons: Chain-of-Thought Prompting

Augmenting exemplars with thought chains for finetuning is resource-intensive

Generated thought chains don't necessarily yield correct reasoning, potentially leading to mixed accuracy.

Chain-of-thought reasoning is mainly effective in larger models and less practical for smaller ones.

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Thank You

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