

Self-Consistency Prompting

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Definition

- **Self-consistency Prompting** is a method that helps language models solve complex problems by considering multiple ways to think about a problem and then choosing the most common solution.

How Does it Work?

- **Multi-path Reasoning:** Generates and evaluates various reasoning paths, choosing the most recurring outcome.
- **Confidence Through Consensus:** Achieves reliability when different reasoning approaches converge on a single answer, mimicking human confidence in decision-making.
- **Beyond 'Greedy Decoding':** Surpasses traditional 'greedy decoding' by avoiding pitfalls like repetition and local-optimality issues.

Self-consistency Prompting: Example

Chain-of-thought prompting

Prompt

Language Model

This means she uses $3 + 4 = 7$ eggs every day. She sells the remainder for \$2 per egg, so in total she sells $7 * \$2 = \14 per day.

The answer is \$14.

Self-consistency

Q: If there are 3 cars in the parking lot and 2 more cars arrive, how many cars are there in the parking lot?

A: There are 3 cars in the parking lot already. 2 more arrive. Now there are $3 + 2 = 5$ cars. The answer is 5.
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Q: Janet's ducks lay 16 eggs per day. She eats three for breakfast every morning and bakes muffins for her friends every day with four. She sells the remainder for \$2 per egg. How much does she make everyday?

A:



Language Model

Greedy decode

Sample a diverse set of reasoning paths

She has $16 - 3 - 4 = 9$ eggs left. So she makes $\$2 * 9 = \18 per day.

This means she sells the remainder for $\$2 * (16 - 4 - 3) = \26 per day.

She eats 3 for breakfast, so she has $16 - 3 = 13$ left. Then she bakes muffins, so she has $13 - 4 = 9$ eggs left. So she has $9 \text{ eggs} * \$2 = \18 .

The answer is \$18.

Marginalize out reasoning paths to get final answer

Pros: Self-consistency Prompting

Self-consistency Prompting finds the most common answer from different ways of solving a problem.

Makes the computer program's answers more reliable by checking them in many ways

Tells us how sure the program is about the answer, which is helpful

Simple method and doesn't need extra training, which saves time and effort

Cons: Self-consistency Prompting

Self-consistency Prompting finds the most common answer from different ways of solving a problem.

Evaluates multiple solutions,
requiring more processing power.

Potential for generating nonsensical or incorrect
answers necessitates cautious use.

Provides better results than some methods but doesn't guarantee
correctness.

Thank You
