

Self-Consistency

Perhaps one of the more advanced techniques out there for prompt engineering is self-consistency. Proposed by [Wang et al. \(2022\)](#), self-consistency aims "to replace the naive greedy decoding used in chain-of-thought prompting". The idea is to sample multiple, diverse reasoning paths through few-shot CoT, and use the generations to select the most consistent answer. This helps to boost the performance of CoT prompting on tasks involving arithmetic and commonsense reasoning.

Let's try the following example for arithmetic reasoning:

Prompt:

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When I was 6 my sister was half my age. Now  
I'm 70 how old is my sister?
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Output:

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35
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The output is wrong! How may we improve this with self-consistency? Let's try it out. We will use the few-shot exemplars from Wang et al. 2022 (Table 17):

Prompt:

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Q: There are 15 trees in the grove. Grove workers will plant trees in the grove today. After  
they are done,  
there will be 21 trees. How many trees did the grove workers plant today?  
A: We start with 15 trees. Later we have 21 trees. The difference must be the number of trees  
they planted.  
So, they must have planted  $21 - 15 = 6$  trees. The answer is 6.  
Q: If there are 3 cars in the parking lot and 2 more cars arrive, how many cars are 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.  
Q: Leah had 32 chocolates and her sister had 42. If they ate 35, how many pieces do they have  
left in total?  
A: Leah had 32 chocolates and Leah's sister had 42. That means there were originally  $32 + 42$   
 $= 74$   
chocolates. 35 have been eaten. So in total they still have  $74 - 35 = 39$  chocolates. The  
answer is 39.
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Q: Jason had 20 lollipops. He gave Denny some lollipops. Now Jason has 12 lollipops. How many lollipops did Jason give to Denny?

A: Jason had 20 lollipops. Since he only has 12 now, he must have given the rest to Denny. The number of lollipops he has given to Denny must have been $20 - 12 = 8$ lollipops. The answer is 8.

Q: Shawn has five toys. For Christmas, he got two toys each from his mom and dad. How many toys does he have now?

A: He has 5 toys. He got 2 from mom, so after that he has $5 + 2 = 7$ toys. Then he got 2 more from dad, so in total he has $7 + 2 = 9$ toys. The answer is 9.

Q: There were nine computers in the server room. Five more computers were installed each day, from monday to thursday. How many computers are now in the server room?

A: There are 4 days from monday to thursday. 5 computers were added each day. That means in total $4 * 5 = 20$ computers were added. There were 9 computers in the beginning, so now there are $9 + 20 = 29$ computers. The answer is 29.

Q: Michael had 58 golf balls. On tuesday, he lost 23 golf balls. On wednesday, he lost 2 more. How many golf balls did he have at the end of wednesday?

A: Michael initially had 58 balls. He lost 23 on Tuesday, so after that he has $58 - 23 = 35$ balls. On Wednesday he lost 2 more so now he has $35 - 2 = 33$ balls. The answer is 33.

Q: Olivia has \$23. She bought five bagels for \$3 each. How much money does she have left?

A: She bought 5 bagels for \$3 each. This means she spent \$15. She has \$8 left.

Q: When I was 6 my sister was half my age. Now I'm 70 how old is my sister?

A:

Output 1:

When I was 6 my sister was half my age, so she was 3. Now I am 70, so she is $70 - 3 = 67$. The answer is 67.

Output 2:

When the narrator was 6, his sister was half his age, which is 3. Now that the narrator is 70, his sister would be $70 - 3 = 67$ years old. The answer is 67.

Output 3:

When I was 6 my sister was half my age, so she was 3. Now I am 70, so she is $70/2 = 35$. The answer is 35.

Computing for the final answer involves a few steps (check out the paper for the details) but for the sake of simplicity, we can see that there is already a majority answer emerging so that would essentially become the final answer.

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