Over-Generation and Compaction (OC): A Prompting Strategy for Procedural Text Adaptation with LLMs

Hyeongsik Kim, Yanheng Xu, Chaoqun Dong, Fei Du
Bosch Corporate Research and BSH Hausgeräte GmbH

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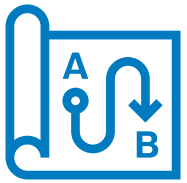
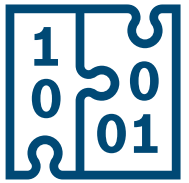
Motivation & Problem



Procedural Text Matters

- Many real-world tasks—like recipe revision or repair instruction updates — require precise procedural edits
- Both the sequence and details of each step must remain consistent and feasible
- Automating this kind of editing is essential for scalable content adaptation



Traditional Approaches

- Earlier methods relied on knowledge graphs or fine-tuned models for specific domains
- They work well in narrow settings but don't scale across diverse tasks
- Require expert curation and domain-specific data, which limits practicality

Challenge with LLMs

- LLMs seem capable of handling procedural edits via prompting, but in practice, naive prompts often fail
- Typical issues include surface-level edits, inconsistent or illogical steps, domain-inappropriate actions, etc.

Failure Example: Baseline Prompt

Input/Source and Target Recipe:

Steamed Turbot → Steamed Hairy Crab

Input/Source Recipe:

"Oh, Turbot imbued with dark powers, reveal your true strength before me! Now, by the name of your master, Xiao Ji, I command you - release the seal! Gather all the ingredients. Cut the scallions and ginger, and place them on an empty plate to separate the fish from the plate, preventing the fish skin from sticking during steaming. Clean and gut the fresh turbot, then make a few cuts on its body. Sprinkle salt and cooking wine, and marinate for 15 minutes. Place the sliced scallions and ginger on the fish, and pour in the seasoned soy sauce for seafood. In an Amway Queen wok, bring water to a boil, place the fish on the steaming rack, and steam for about 8 minutes. Meanwhile, in an Amway Queen 1.4L pan, heat a suitable amount of Amway Queen extra virgin olive oil, add chopped scallions and the seasoned soy sauce for seafood, and stir-fry until fragrant. Once the fish is done steaming, sprinkle some shredded scallions, goji berries, and cilantro. Finally, drizzle the hot fragrant oil over the top! Perfect!"

Failure Example: Baseline Prompt (Cont.)

Prompt:

You are a professional instruction writer. The [Base Instruction] creates the [Base Outcome], and your goal is to transform the [Base Instruction] into the [Target Instruction] to produce the [Target Outcome]. Output only the final transformed [Target Instruction] without any additional commentary or explanations ...

Resulted Recipe:

"Oh, Hairy Crab imbued with dark powers, reveal your true strength before me! Now, by the name of your master, Xiao Ji, I command you - release the seal! Gather all the ingredients. Clean and prepare the fresh hairy crab, ensuring it is thoroughly scrubbed. Place the crab belly-side up on a steaming rack to retain its juices. In an Amway Queen wok, bring water to a boil, adding slices of ginger and a splash of cooking wine to the water for aroma. Steam the crab for about 15-20 minutes, depending on its size. Meanwhile, in an Amway Queen 1.4L pan, heat a suitable amount of Amway Queen extra virgin olive oil, add chopped scallions, ginger, and a touch of seasoned soy sauce for seafood, and stir-fry until fragrant. Once the crab is done steaming, garnish with shredded scallions and cilantro. Finally, drizzle the hot fragrant oil over the top! Perfect~"

Failure Example: Errors in the Adapted Recipe

Issue Example: Olive oil? Soy sauce for seafood? No drizzling! It should be a dipping sauce!

- Gold references says: "... *Preparing the Dipping Sauce: In a bowl, combine black rice vinegar, brown sugar, and minced ginger. Stir until the sugar fully dissolves, adjusting sweetness as desired.Serving: After steaming, remove the crabs and serve them hot with the prepared dipping sauce...*"

Observation:

- Surface-level word substitution without procedural adaptation
- Inappropriate and incoherent adaptation

Proposed Approach – Over-Generation and Compaction (OC)

1. Over-generation:

- Prompt the LLM to generate an exhaustive, unrestricted draft of the target instruction
- Encourage diverse and unconstrained procedural exploration, producing rich intermediate details
- This stage maximizes exploration and forces the model to surface latent procedural knowledge that may otherwise remain implicit

2. Compaction:

- Then prompt the LLM to refine and condense the over-generated draft into a version aligned with the original format and length
- Focus on coherence, brevity, and adherence to structural constraints
- This stage maximizes relevance, yielding a concise and domain-appropriate final adaptation

Example Prompts for OC

Prompt (Over-Generation):

*You are a professional content creator. The [Base Instruction] produces the [Base Outcome], and your goal is to transform the [Base Instruction] into the [Intermediate Instruction] to produce the [Target Outcome]. Do not worry about the format, structure, or length of the [Intermediate Instruction]. However, your output must be a comprehensive, expanded version of the [Intermediate Instruction] that is at least **1000** times longer than the original [Base Instruction]. You must incorporate all relevant knowledge, information, best practices, important considerations, as well as warnings or pitfalls to avoid — essentially, everything you know about the subject, Instruction, and outcome. Output only the final [Intermediate Instruction], with no additional commentary or explanation. ...*

Prompt (Compaction) :

"You are a professional content creator working with the [Intermediate Instruction], which contains rich details intended to achieve the [Target Outcome]. Your top priority is to strictly match the length and format of the [Base Instruction], disregarding the original format of the [Intermediate Instruction]; within these constraints, condense the [Intermediate Instruction] as effectively as possible into the [Target Instruction]. Provide only the condensed [Target Instruction] without commentary, introduction, or explanation. ..."

Adapted Recipe with OC

Resulted Recipe:

“Oh, Hairy Crab imbued with autumn's essence, reveal your true flavor before me! Now, by the name of your master, I command you - release your roe! Gather all the ingredients. Clean the live hairy crabs thoroughly, scrubbing their shells and hairy claws under running water. Tie their legs and claws securely with kitchen twine to prevent movement during steaming. Fill a wok with water, add sliced ginger to the water, and bring it to a boil. Place the tied crabs belly-up on a steaming rack, ensuring they are spaced apart for even cooking. Cover the wok with a tight-fitting lid and steam over medium heat for 15-20 minutes, depending on the size of the crabs. Meanwhile, prepare the dipping sauce by combining light soy sauce, black vinegar, a pinch of sugar, sesame oil, and finely chopped ginger and scallions. Once the crabs are done steaming, their shells will turn bright orange, and their aroma will be fragrant. Transfer the crabs to a serving plate, garnish with scallions and cilantro, and serve with the dipping sauce on the side. Perfect~”

Conclusion and Takeaways

- OC prompting consistently enhances procedural text adaptation without any fine-tuning
- Demonstrates robustness across heterogeneous domains — from cooking to electronics and clothing
- Produces precise, domain-appropriate, and logically consistent adaptations
- Significantly improves consistency, feasibility, and detail fidelity across all evaluated models
- Notably, ChatGPT-4o-mini + OC achieves top performance, highlighting OC's scalability and efficiency

Source code and materials:
https://github.com/boschresearch/oc-prompt

For details beyond this presentation,
please refer to the paper and appendix

Questions are welcome
— feel free to contact us!