

Generating Streamlining Constraints with Large Language Models (Abstract Reprint)

Florentina Voboril¹, Vaidyanathan Peruvemba Ramaswamy¹, Stefan Szeider¹

¹Algorithms and Complexity Group, TU Wien, Vienna, Austria

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Abstract

Streamlining constraints (or streamliners, for short) narrow the search space, enhancing the speed and feasibility of solving complex constraint satisfaction problems. Traditionally, streamliners were crafted manually or generated through systematically combined atomic constraints with high-effort offline testing. Our approach utilizes the generative capabilities of Large Language Models (LLMs) to propose effective streamliners for problems specified in the MiniZinc constraint programming language and integrates feedback to the LLM with quick empirical tests for validation. Evaluated across seven diverse constraint satisfaction problems, our method achieves substantial runtime reductions. We compare the results to obfuscated and disguised variants of the problem to see whether the results depend on LLM memorization. We also analyze whether longer offline runs improve the quality of streamliners and whether the LLM can propose good combinations of streamliners.

References

Voboril, F.; Ramaswamy, V. P.; and Szeider, S. 2025. Generating Streamlining Constraints with Large Language Models. *Journal of Artificial Intelligence Research*, 84: 16:1–16:19.