

An Algorithm for Synthesizing Reversible Logic Circuit from Arbitrary Permutations

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We present an algorithm that aims to find a sequence of reversible logic gates for synthesizing a given n -bit substitution map using a gate library consisting of multiple-controlled Toffoli gates.

Reversible logic synthesis is very much like solving Rubik's cube. The main idea is to find an intermediate permutation that can be viewed as a smaller problem. See, Figure 1 for visualization.

In this poster presentation, we focus on showing rather detailed processes. What we call 'block' in the paper⁽¹⁾ corresponds to the aligned 2-by-2 sub-cubes in Figure 1. For given permutation, a procedure to form a block will be explained. Complexity of the algorithm naturally follows by inspecting the procedure.

References

- [1] Hochang Lee, Kyung Chul Jeong, Daewan Han, Panjin Kim, arXiv:2107.04298 (2021)
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Figures

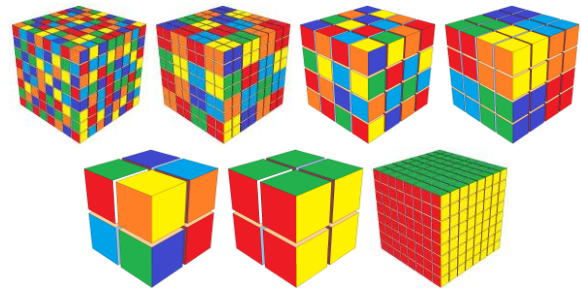


Figure 1: Image example using Rubik's cube for recursive block decomposition.
