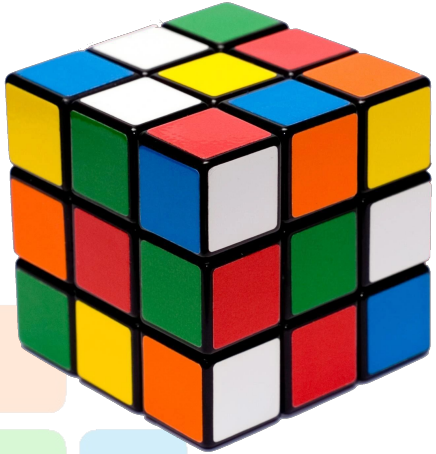
From Scramble to Solution:

Developing an Optimal Solver for the Kilominx, a Rubik's Cube Variant



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The Problem

- What is a Kilominx?

- What is an optimal solver?
  - Korf's Algorithm
  - Iterative Deepening A*
  - Pattern Databases

- What is God's Number?

- What makes this problem interesting?

My Objectives

Primary Objectives:

- Implement Korf's Algorithm for a **Rubik's Cube**
  - Gain a better understanding of the algorithm
  - Focus on efficiency

- Implement Korf's Algorithm for a **Kilominx**
  - Apply knowledge from before

Secondary Objectives:

- Tighten the bounds of the Kilominx's **God's Number**
  - Requires finding an optimal solution of at least 19 moves

- Create a **GUI** to improve interaction with the puzzles and their solvers

Results

Kilominx solver can find optimal solutions at **depth 13** in about **1 hour 42 minutes**, and up to **depth 14** in about **33 hours**.

Exponential growth in solve times as depth increases.

Primary Objectives both met (solvers implemented).

Secondary Obj. 1 (God's Number bounds) not possible due to exponential growth in solve times.

Secondary Obj. 2 (GUI) partially met - GUI implemented for Rubik's Cube only.

Scramble Length	Number of Tests	Average Solve Time (HH:MM:SS)	Standard Deviation (HH:MM:SS)
10	10	00:00:00	00:00:00
11	10	00:00:23	00:00:14
12	10	00:05:22	00:02:38
13	50	01:42:12	01:31:13
14	2	33:28:37	27:17:02