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COMP 364

Final Project Written Report

**Introduction:**

The Rubik’s Cube has been the study of many students and academics over the years due to it being a combination puzzle that can exist in many states. Developed by Ernõ Rubik in 1980, this 3x3x3 cube puzzle is considered to be one of the best-selling toys of all time. It is set up with 6 colored faces with each face consisting of 9 cubies and each face being a different color. Each face is able to be rotated clockwise or clockwise-clockwise. The cube is mixed up with a random number of moves in order to get a cube that is not complete, i.e. not have all matching colors on the same face of the cube. The objective to solve the cube is to restore the cube to its original state, that is, having each face of the cube consist of the same color. For the purpose of our task, we referred to the various faces of the cube as up, left, front, right, down, back (See Figure 1).

In this report, we will examine an A\* search will an admissible heuristic and compare those results to a standard solving algorithm. We did not expect to come up with an optimal search, but our main focus was to come up with an artificial intelligence approach to this problem, based on the work we did in the first programming assignment which was to solve the Eights Puzzle. We utilized the framework from the Eights Puzzle and the code we wrote for the Rubik Solver to come up with this implementation. We consulted Richard E. Korf’s paper to come up with an admissible heuristic that utilizes the 3D Manhattan Distance, which in this case is the minimum number of moves to correctly position the cubie summed over all the cubies.

describe the goals your project and any context or background required.

Methods: describe the design of your code and your experiments.

Results: describes the results of your experiments, including tables and charts if appropriate.

Conclusions: summarize what you learned from the experiments; optionally, discuss alternative approaches and further work that could be done.

Bibliography: list the sources used.