Solving N-Puzzle Using Pattern Database

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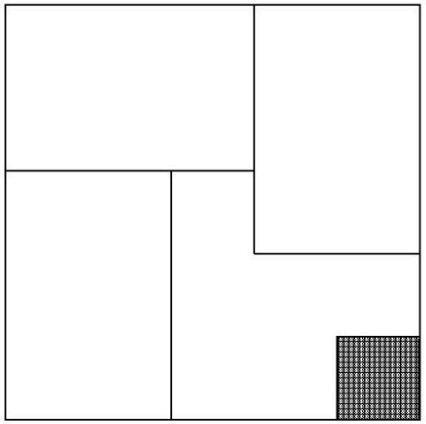
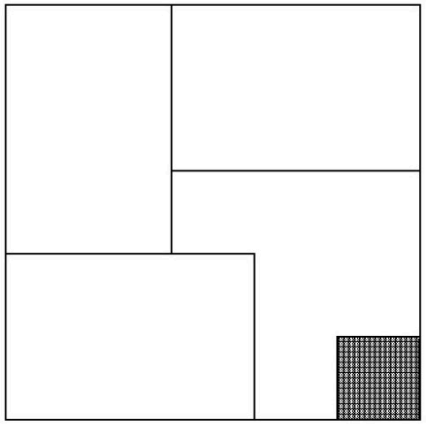
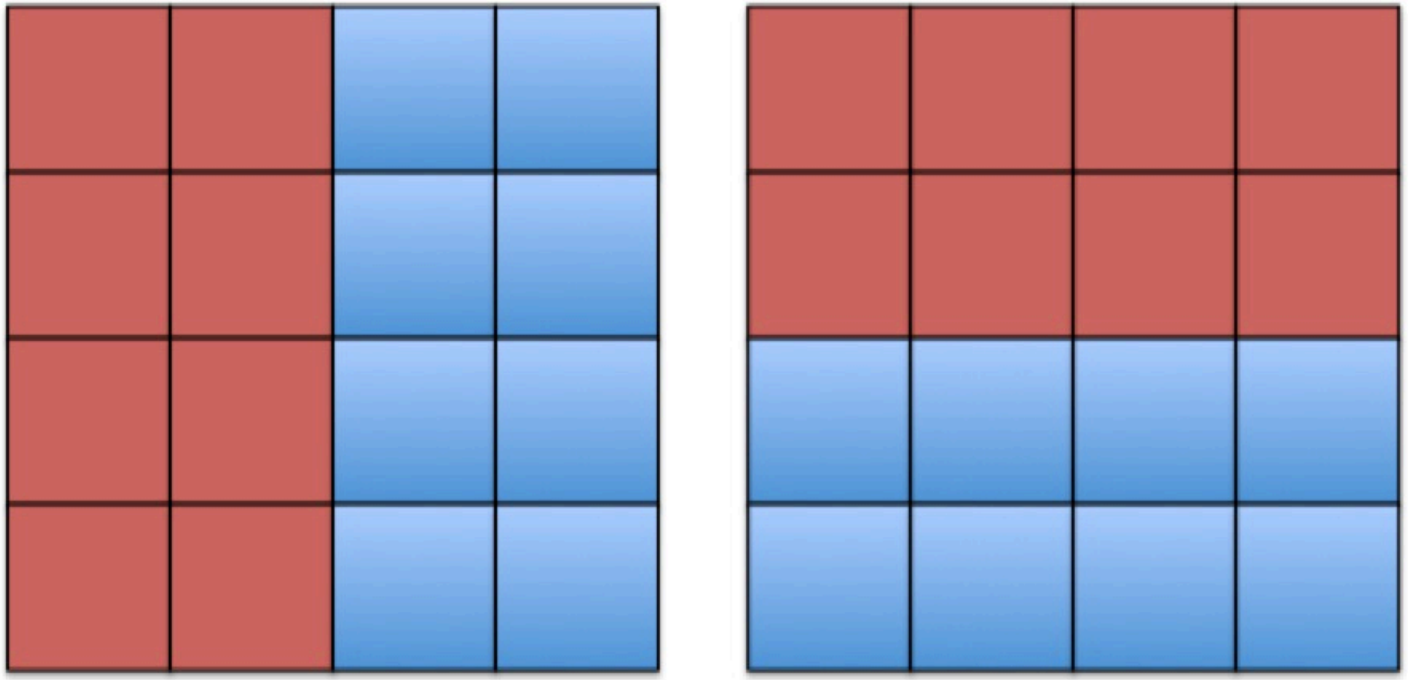
5x5





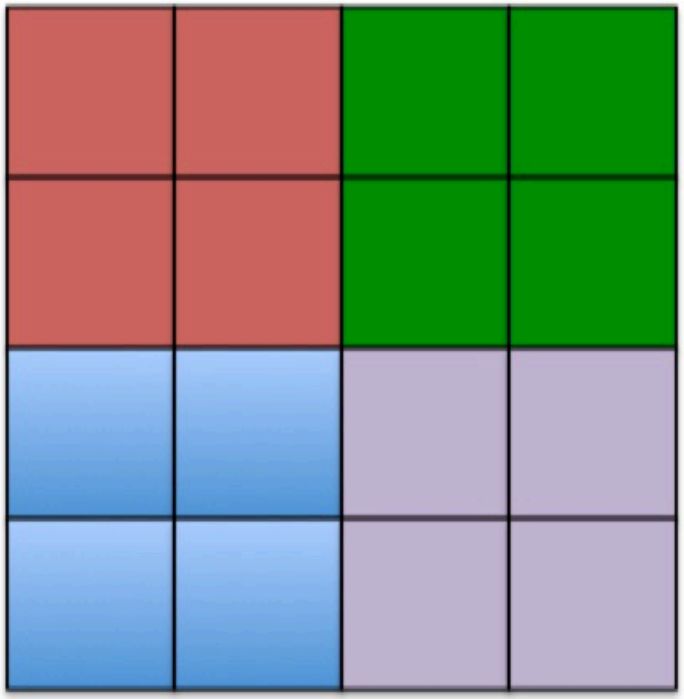
- C(25,6) * 6! = 127,512,000 for each of 8 patterns of size 6

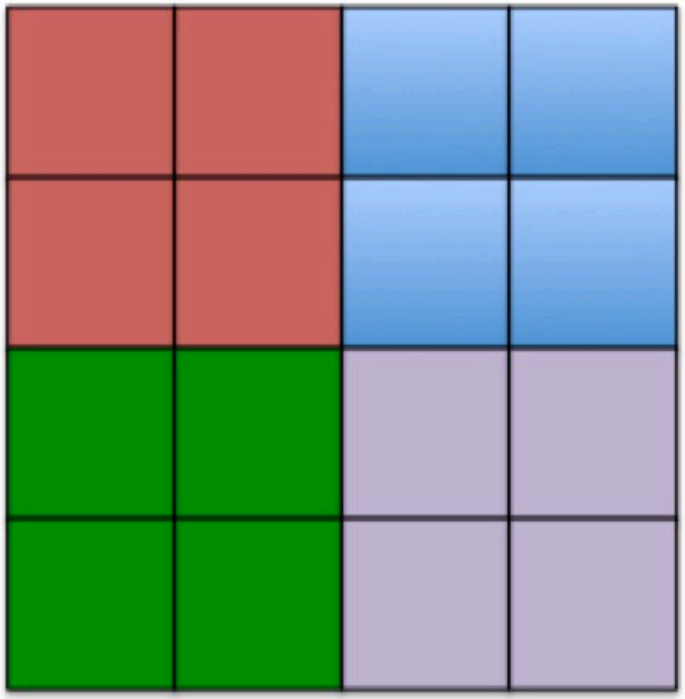
4x4 using 8/8 patterns



- C(16,8)*8! = 518918400 for each of the 4 patterns of size 8

4x4 using 4/4/4/4 patterns





- C(16,4)*4! = 43680 for each of the 8 patterns of size of 4.

Method of Pre-computing Database

- Generate all sequences C(n,k) * k! and perform A* with each of the starting position (pattern)
- A* uses Manhattan Distance as heuristic and outperforms BFS at least 10000 times .
- Only the moves of the tiles in the pattern are used, but the move of the empty tile should not be counted(in order not to overestimate the possible conflict).

Method of Problem Solving

- Preload Database into Memory (For performance issue).
- Perform Iterative Deepening A* (Iterative on the heuristic function)
- Update cost-limit to the smallest cut-off heuristic value
- For each node, the child are expanded through a fix sequence of direction