Proposal for Master Minds

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1   Introduction

Master Mind is a code breaking game that invented in 1970 by Mordecai Meirowitz. It ressembled from the earlier pencil game call Bull and Cows that may date back a century. The game play of Master Mind is straight forward:

1. The codemaker pick 4 pegs from all the pegs (pegs of 6 different color), and placed them in order as the code. (code can have same color pegs, e.g. red red blue blue)

2. The codebreaker need to guess both the color and the order of the code within 8 turns.

3. At each turn of guess, the codemaker provide feedback by placing 0 to 4 pegs, A black peg indicate that one of the peg in guess is correct in color and order. A white peg indicate that one of the peg in guess is correct in color but not order.

4. The game is terminated when codebreaker's guess is correct or all the guesses are incorrect within 8 turns

Since we will use parallelism to find the solution, our project so called Master Minds

2   Algorithm

The Master Mind game can be rephrase as The Mastermind Problem: Given a set of guesses and the number of colored and white pegs scored for each guess, is there at least one secret pattern that generates those exact scores? The Mastermind Problem has been proved as a NP-Complete problem

Our project will use Five-Guess Algorithm to break the code:

1. Generates set of possible codes, denote as S. E.g. $S = \{6^4 = 1296\ codes\}$

2. Start with a initial guess, (initial guess can be hardcoded or randomly selected from S)

3. Play the guess and get response from codemaker

4. If the program feedback is all black, we found the code.

5. Otherwise, removed all the codes that would not give the same response in last guess from S

6. Generate next guesses as following:

3   Testing Plan

Since the Mastermind game have many variations, our project intend to test on following variations:

1. Mastermind - 6 colors, guessing 4 pegs

2. New Mastermind - 8 colors, guessing 4 pegs

3. Word Mastermind - 26 letter, guessing 4 letters

4. Grand Mastermind - 5 colors with 5 shapes, guessing 4 pegs

5. Crazy Mastermind - 12 colors, guessing 4 pegs