Game of Life Presentation

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Introduction

- Conway's Game of Life
  - Simplest possible universe capable of computation
  - Rule
    - Dies if # of alive neighbor cells =< 2 (loneliness)
    - Dies if # of alive neighbor cells >= 5 (overcrowding)
    - Lives if # of alive neighbor cells = 3 (procreation)
    - Remains if # of alive neighbor cells = 4
- Possible rules to program the Game of Life
  - 3^9 = 19683

Interestingness of Life Model

My choice to interesting life model

Convergence limit

# of cells of first stage * 0.2 < # of cells of each stage < # of cells of first stage * 5

Variety of cell position

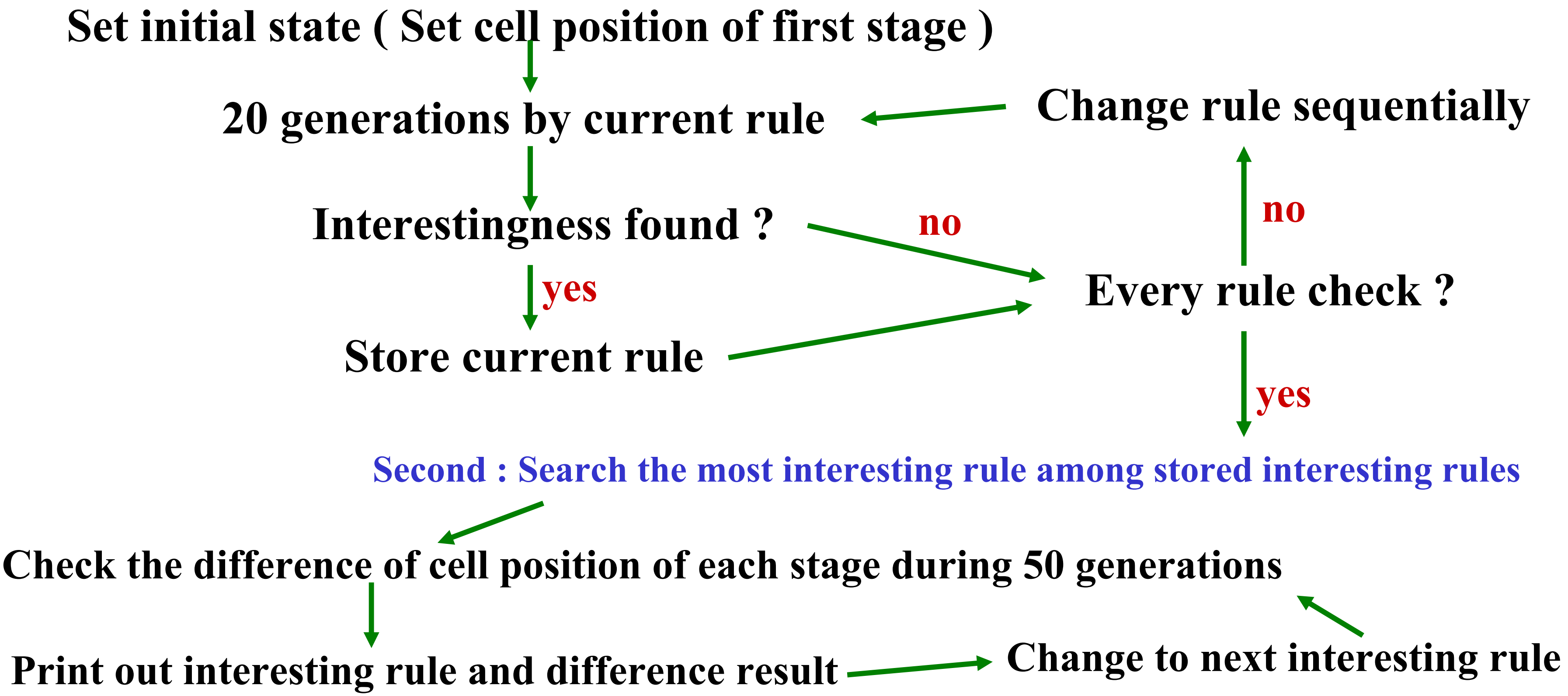
cell position of current stage != cell position of past stage

The most interestingness

maximum difference of cell position of each stage

Approach to find interesting life model

First : Find interesting rules among every rules



Set initial state (Set cell position of first stage)

20 generations by current rule

Change rule sequentially

Interestingness found ?

no

no

Every rule check ?

yes

Store current rule

yes

Second : Search the most interesting rule among stored interesting rules

Check the difference of cell position of each stage during 50 generations

Print out interesting rule and difference result

Change to next interesting rule

The most interestingness => maximum difference (variety of cell position of each generation)

Finding the most interesting rule

First search : Find interesting rules among every rules,
Run 20 generations every rule

↓

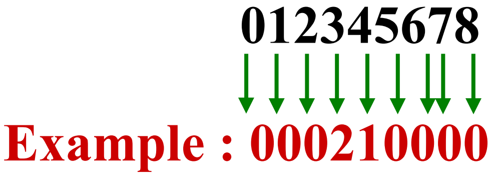
Second search : Search the most interesting rule among stored interesting rules,
Run 50 generations every rule that is found in the first search

If interesting rule found in first search gets out of my function to interesting life model in second search, the program prints out "Not Found" in the textbox.

The form of rule

Consists of 9 ternary variables

The number of alive neighbor



012345678

Example : 000210000

Lives if # of alive neighbor cells = 3

Remains if # of alive neighbor cells = 4

'0' means that cell dies
'1' means that cell remains
'2' means that cell lives(borns)

The extent of difference of cell position

Same cell position on several generations : Not interesting

Simple difference of cell position on several generations : Not interesting

Complex difference of cell position on several generations : Interesting

Modification for DEMO version

It takes long time to check all case of rules !!!

So, DEMO version only checks following rules.

# of cases of "cell remains" is one & # of cases of "cell lives" is one

Conclusion

I choose the sequential search to find interesting rule because in case of finite rules, sequential search requires less execution time than genetic algorithm.

The number of interesting life model depends on initial state.

Interesting events found by my function & certain initial state

=> Bomb, fireworks display