Gomoku

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1. Preliminaries

1.1. Software

For this project, I write it by Python. The package I have used is use $numpy$ and $copy$

1.2. Algorithm

For this Project, I use the method of heurlstlc search. The primary part of this Algorithm is the design of the evaluation function.

And to optimize the Algorithm, I use the Min-Max Analysis to design a game tree, and use Alpha-Beta purning to simplify the process of search. But limited by the time. The depth of the tree should less then 8.

2. Methodology

2.1. Representation

In my code, according to the example given by the teacher, I design six method:

- $count()$
- $calcute\_value()$
- $get\_pos\_value()$
- $get\_pos\_list()$
- $tree()$
- $go()$

For these methods:

- The $go()$ is the method that test program will call.
- The $count()$, $calcute\_value()$ and $get\_pos\_value()$ can calucute the value of each coordinate in the chessboard which is null now.
- The $get\_pos\_list()$ and $tree()$ will build a game tree.

2.2. Architecture

- $go()$
  - $count()$
  - $calucute\_value()$
  - $get\_pos\_value()$
  - $calcute\_pos\_list()$
  - $tree()$

    * $count()$
    * $calucute\_pos\_value()$
    * $get\_pos\_value()$
    * $calcute\_pos\_list()$

2.3. Detail of Algorithm

Firstly, I need to design a evoluation function to get the value of all the coordinate with null color. I calculate the value of one location by combinate the conditions of 8 directions of this coordinate:

- Count how many chess with he same color as yours in one direction
- Count how many chess with the same color as yours if there is one null chess in one direction
- In the end of this direction is null chess or the versus color chess.

=0

After get the conditions of all the 8 directions of the null chess coordinates. I can combinate two direction in one line and get the result in this line.

According to the conditions I get on the 4 lines, I can give weight value to this coordinate.

3. Empirical Verification

3.1. Design

3.2. Data and data structure

3.3. Performance

3.4. Result

3.5. Analysis

Acknowledgments

References

[1] XXXXXXX