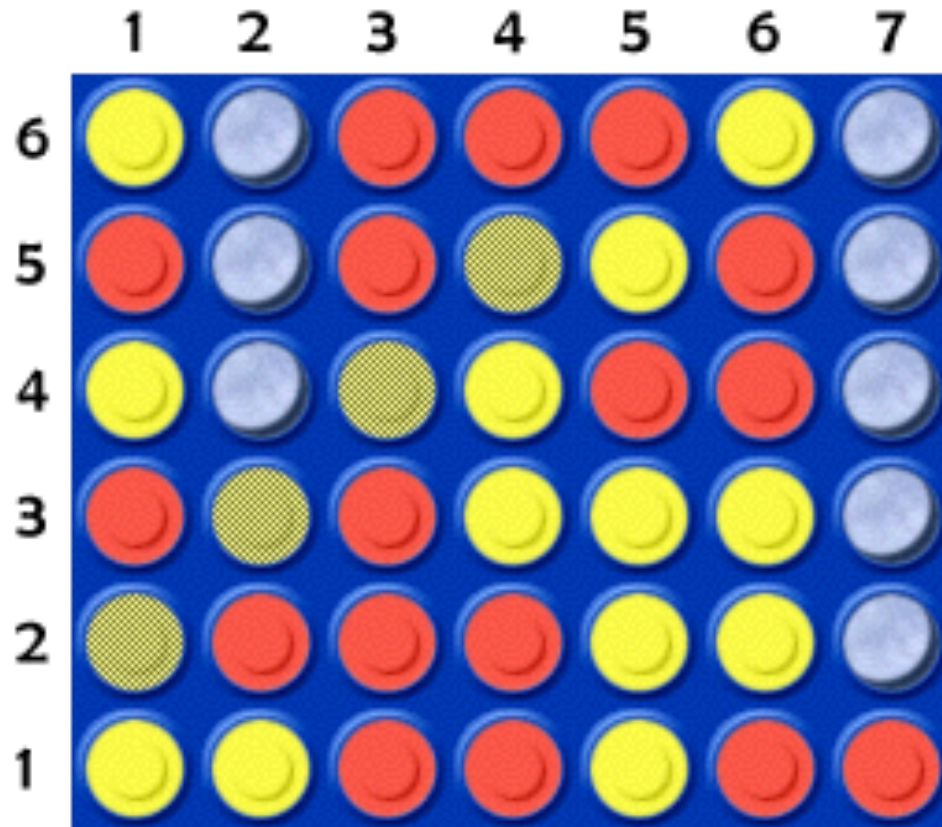# Connect Four

by Jacob Frericks

Rules

Snapshot

```
|0||0||0||0||0||0||0|
|0||0||0||0||0||0||0|
|0||0||0||0||0||0||0|
|0||0||0||0||0||0||0|
|0||0||0||0||0||0||0|
|0||0||0||0||0||0||0|
-------------------------
|1||2||3||4||5||6||7|
Player 1: What column number would you like to put your piece?
1

|0||0||0||0||0||0||0|
|0||0||0||0||0||0||0|
|0||0||0||0||0||0||0|
|0||0||0||0||0||0||0|
|0||0||0||0||0||0||0|
|r||0||0||0||0||0||0|
-------------------------
|1||2||3||4||5||6||7|
My turn!

|0||0||0||0||0||0||0|
|0||0||0||0||0||0||0|
|0||0||0||0||0||0||0|
|0||0||0||0||0||0||0|
|0||0||0||0||0||0||0|
|r||0||0||0||0||b||0|
-------------------------
|1||2||3||4||5||6||7|
Player 1: What column number would you like to put your piece?
3

|0||0||0||0||0||0||0|
|0||0||0||0||0||0||0|
|0||0||0||0||0||0||0|
|0||0||0||0||0||0||0|
|0||0||0||0||0||0||0|
|r||0||r||0||0||b||0|
-------------------------
|1||2||3||4||5||6||7|
My turn!

|0||0||0||0||0||0||0|
|0||0||0||0||0||0||0|
|0||0||0||0||0||0||0|
|0||0||0||0||0||0||0|
|0||0||0||0||0||0||0|
|r||0||r||0||b||b||0|
-------------------------
|1||2||3||4||5||6||7|
Player 1: What column number would you like to put your piece?
```
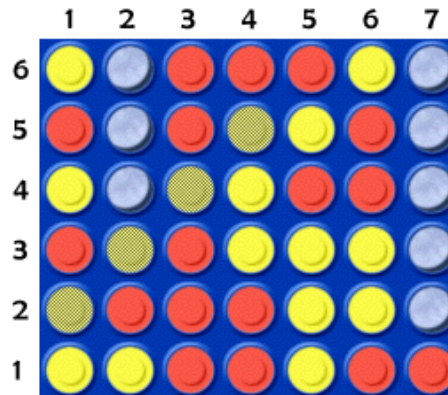
Algorithms: Random

- Randomly chooses a column to place the piece

Advantages

- Time complexity (O(1))

Disadvantages

- Loses nearly 100% of the time
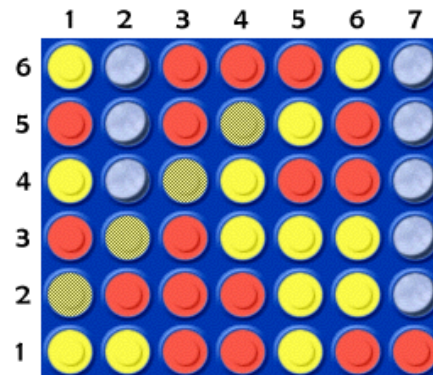
Algorithms: MiniMax

- Minimizes the possible loss for the worst case

Advantages

- Situation based (heuristic)

Disadvantages

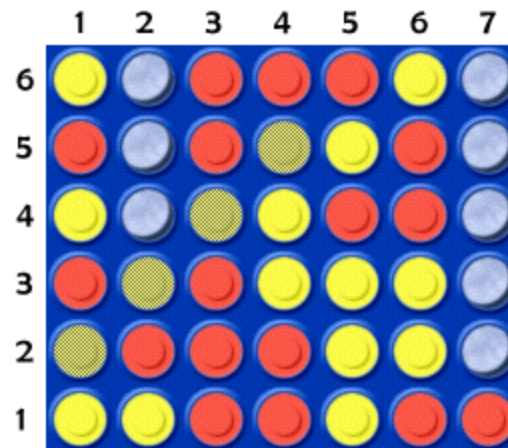- Time complexity (O(branchF^depth))

MiniMax

Reduce time complexity
- Cap the depth
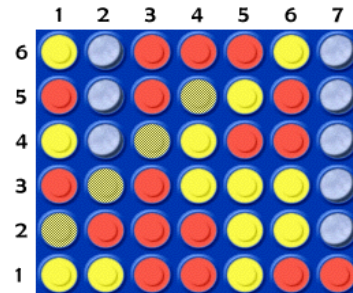 - different depth = different levels

Heavily dependent on its heuristic

Future Improvements

Heuristic
- Defensive
  - Only check opponents pieces
- Aggressive
  - Never check opponents pieces
- Combination (Blocker)
  - Block opponent's 4th piece, otherwise be aggressive

Future Improvements

GUI
- Make one

Alpha-Beta pruning
- Decrease time complexity

Questions?