

Using genetic algorithms to develop an AI for a strategy game

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Abstract

Currently, the AI for strategy games involves combinations of heuristics and constants that need to be optimized for heuristic evaluation function to work efficiently. The problem is that there are a large number of constants and combinations of heuristics to optimize, a heuristic evaluation function may return suboptimal functions. For example, chess computers operate by evaluating heuristics based on things such as material, and position, which can be composed of many variables such as the moves available, and where pieces are. I plan to design a simple real-time strategy game and use a genetic algorithm to create the AI. Genetic algorithms can produce constants and combinations of heuristic algorithms that are optimized relatively quickly and accurately. They operate in a manner similar to evolution by eliminating suboptimal combinations of heuristics and constants, and swap the data of the surviving combinations.

Discussion

Number of Troops On Map	Time Taken in Seconds for graphics	Time(seconds) taken to run 15 times
10	0.05	0.75
1000	0.08	1.2
2000	0.15	2.25

Number of Troops On Map	Time Taken in Seconds for AI algorithm
9	0.14
1024	0.16
2000	0.2
5000	0.2
6822	0.3

In summary, my current code has significant speed issues. The new AI algorithm I am designing will take up a significant amount of computing power. Also, having more efficient code will make a genetic algorithm finish faster and reduce the need for complex networking because I will be able to run multiple instances of my game on the same processor core.

Results

Background and Introduction

The main advantage of a genetic algorithm is that it is capable of arriving at an optimal solution in a relatively short time without user input using the principles of natural selection. A genetic algorithm works by randomly determining a set of parameters and function combinations that are represented in chromosomes. An algorithm is run once for each chromosome based on the data in the chromosome and the suboptimal chromosomes are removed. Then the surviving chromosomes randomly mutate and exchange data.

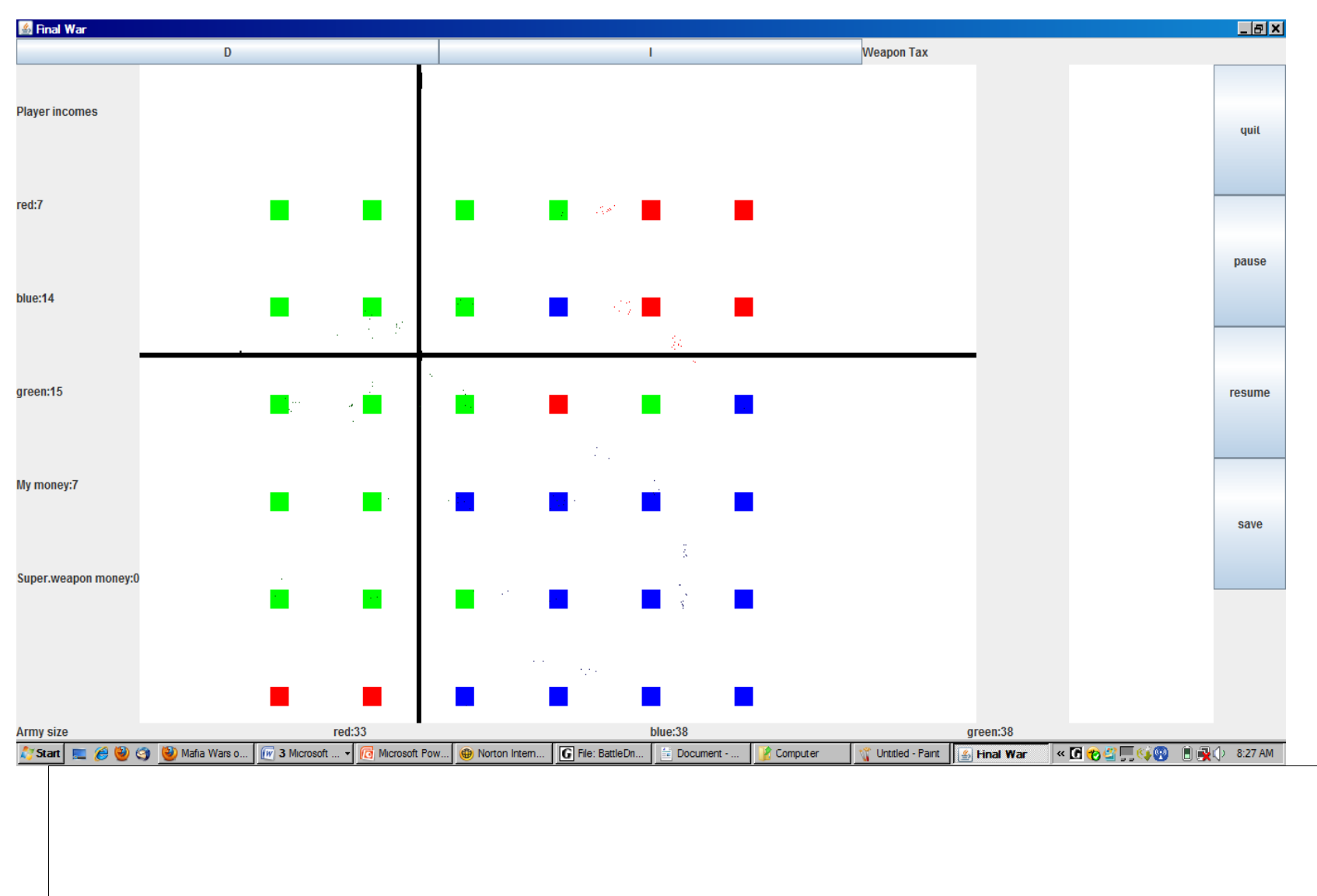


Figure 1: A screenshot of the game