

Design of a Real Time Strategy Game with a Genetic AI

Bharat Ponnaluri

Computer Systems Lab 2009-2010

Abstract

Currently the AI in many strategy games makes decisions by plugging in game data into a heuristic. Obtaining an optimal set of evaluation functions and constants is difficult. My goal is to design a real-time strategy with an intelligent AI. I will use a genetic algorithm to create effective combinations of evaluation functions for my heuristic. To do that, I will have a genetic algorithm create combinations of heuristic evaluation functions and constants that allow the AI to make intelligent decisions. The AI will also take advantage of patterns in other player's behavior. For example, if an AI recognizes that one player has a tendency to retreat troops, the AI will attack that player.

Background and Introduction

Genetic algorithms are good at evolving optimal heuristics without user input by applying the principles of natural selection. Genetic algorithm work by randomly creating a combination of evaluation functions for a heuristic. The suboptimal chromosomes are removed and the better ones swap data and randomly mutate.

War of Attrition

	Don't Fight	Fight
Don't Fight	(0,0,0)	(-t+1,-t,2t)
Fight	(t,-t+1,2t)	(-t,-t,2*t)

Here, there are two players fighting over a city, and neither player wants to give up. However, the longer they fight, the more they lose, and the more the third player gains. This is a payoff matrix based on the time(t) that two players fight.

Discussion

Number of Troops On Map	Update time(s)	Rendering Time(s)
10	0.61	0.75
1500	0.70	1.2
2500	0.64	2.25

In summary, my current code has significant speed issues because when you add the update and rendering times, they end up taking more than one second. This is despite the fact that I changed my troops to look like squares and eliminated some redundant code. Speed is critical to my project so that my genetic algorithm can run faster and I will be able to run it with graphics.

Results

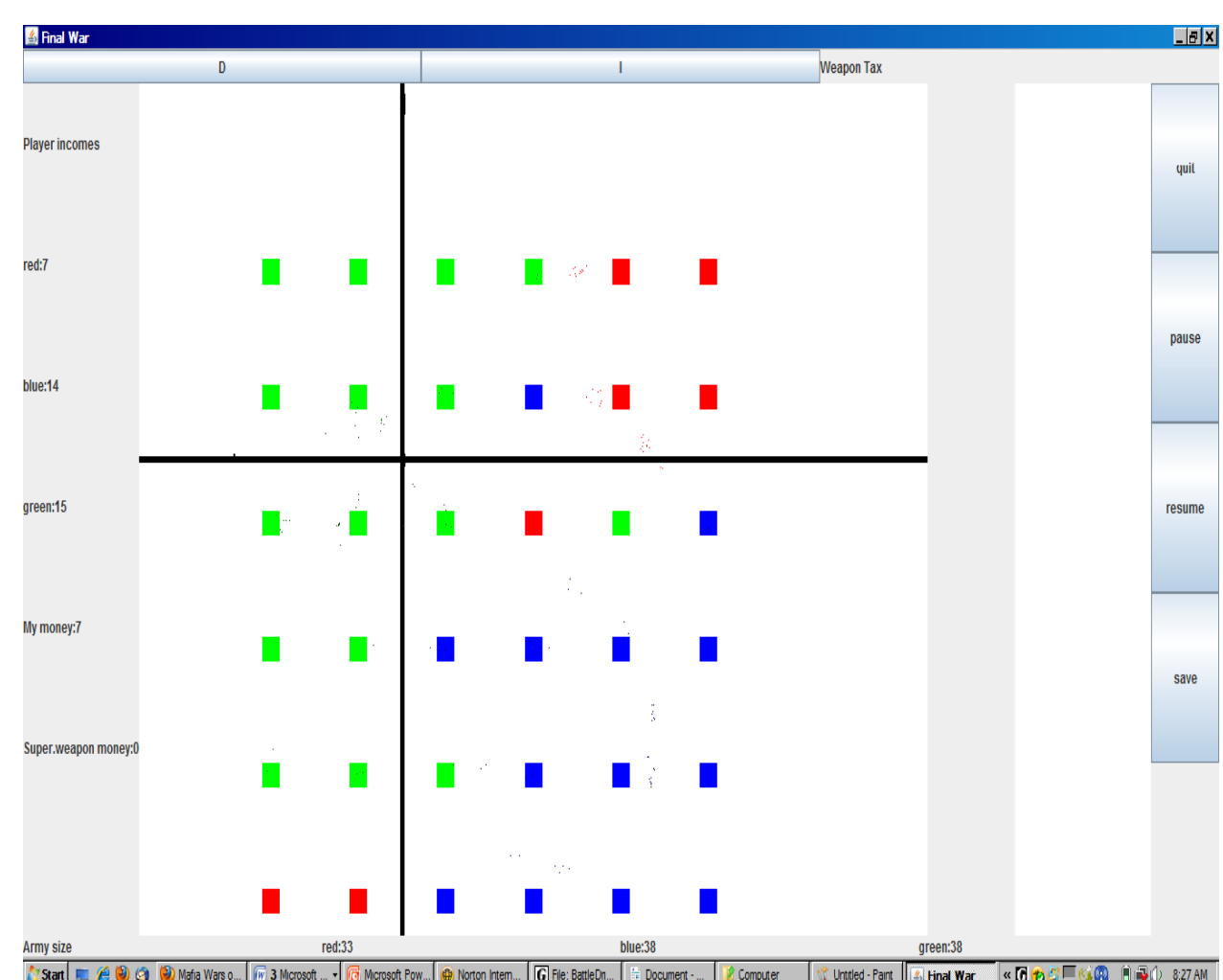


Figure 1: A screenshot of the game

I was able to successfully convert my City class to a Zone class, which helped me code my improved heuristics. My improved heuristics generated logical values, but deleted all the AI troops and made their cities white. Trying to track down and fix the bugs in my Zone class and my heuristics took unexpectedly long