AI IN THE GAME

FEASIBILITY OF ARTIFICIAL NEURAL NETWORKS IN REAL-TIME STRATEGY GAME DEVELOPMENT

BY MATTHEW PAUL

OVERVIEW

- Who Am I

- Real-time Strategy Games

- Artificial Neural Networks

- Games and Artificial Intelligence

- AI Collecting Resources

- Results and Further Research

- Questions and Comments

WHO AM I

- Computer Science in Computing

- Interested in Video Game Development

- Study AI that think like humans

REAL-TIME STRATEGY GAMES

- Gather Resources to Beat Opponent

- Playing Chess Without Turns

- StarCraft Franchise Made $679.5 Million

ARTIFICIAL NEURAL NETWORKS

- Digital Form of Biological Brain

- Neurons and Synapses
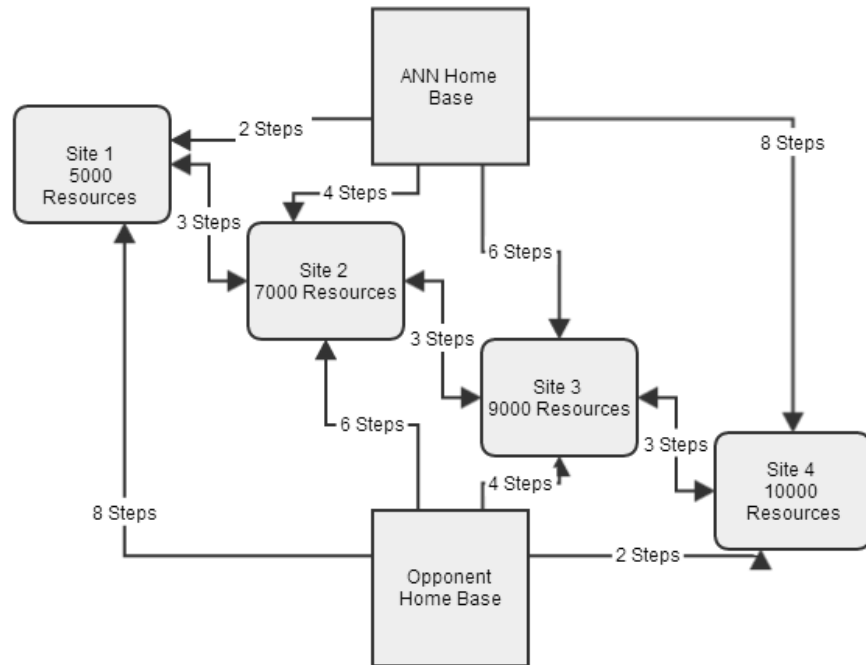
- Fires when Excited
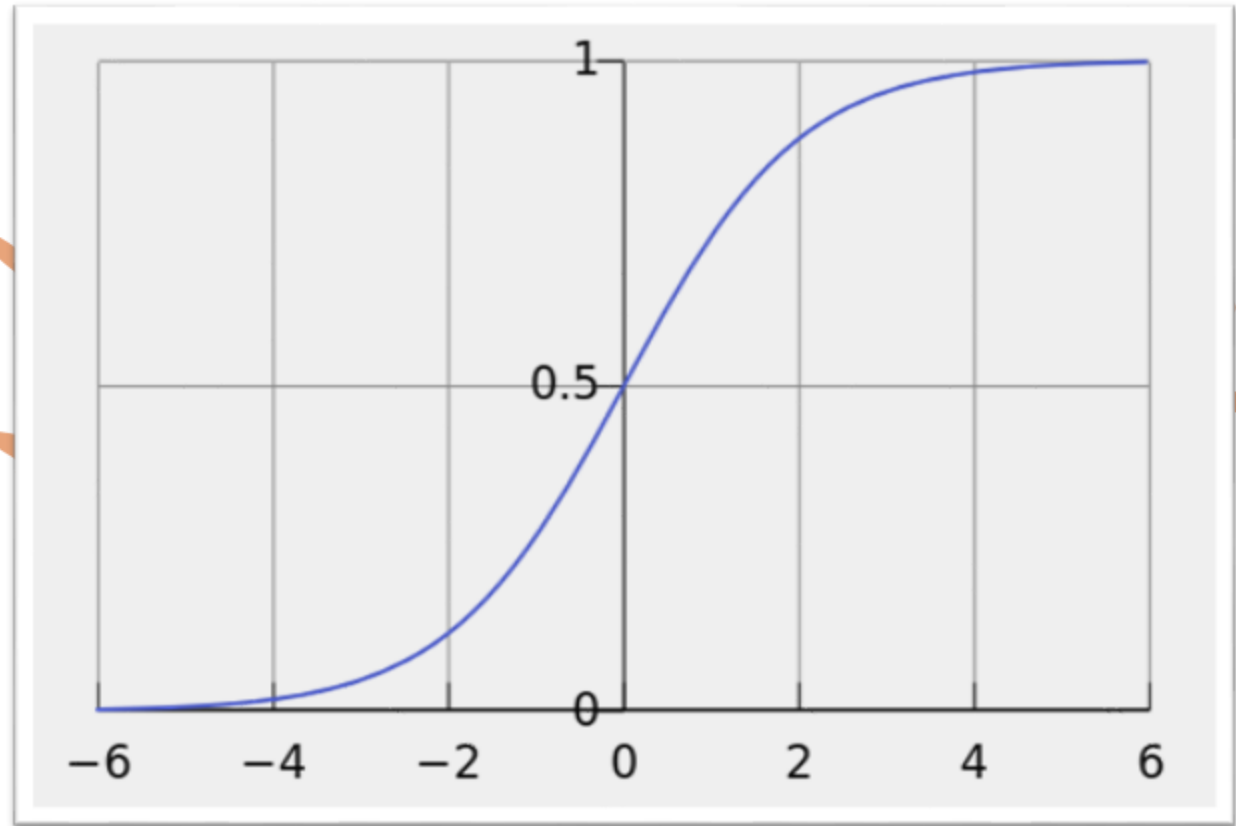
GAMES AND AI

- Rules-based AI => Standard
- More Power
- Some Exceptions
  - Black and White (Lionhead Studios)
  - F.E.A.R (Monolith Productions)
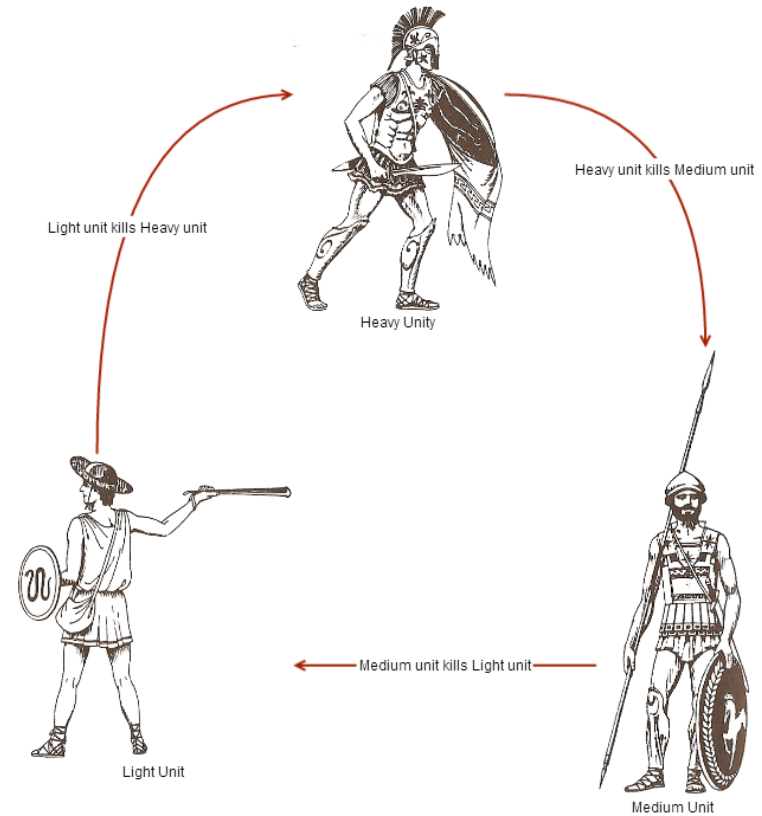
TEACHING THE ANN TO GATHER RESOURCES

SIMULATION

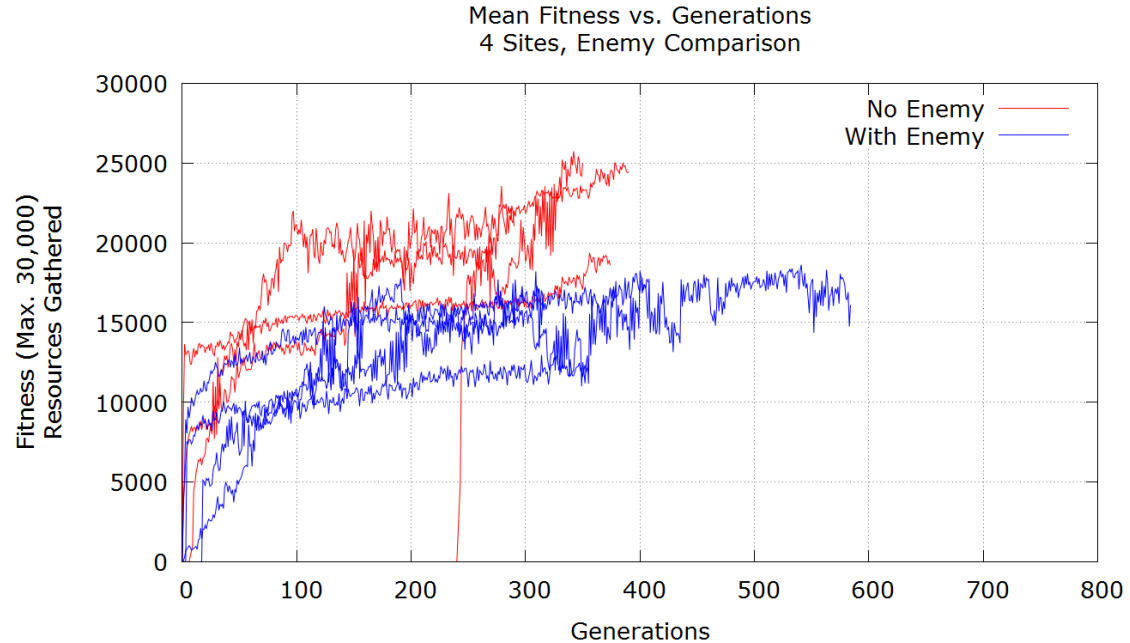- Worker + Building = Resources Gathered

SIMULATION, FIGHTS

- Strengths and Weaknesses
- No Turns
- Adds Complexity

Light unit kills Heavy unit

Heavy unit kills Medium unit

Heavy Unity

Light Unit

Medium unit kills Light unit

Medium Unit

RESULTS

Mean Fitness vs. Generations
4 Sites, Enemy Comparison

- Demonstrated different strategies
  - AI with no enemy => Workers
  - AI with enemy => Hit and Run
- Problems
  - Hidden Bugs
  - Hard to Understand
  - Weird Behavior
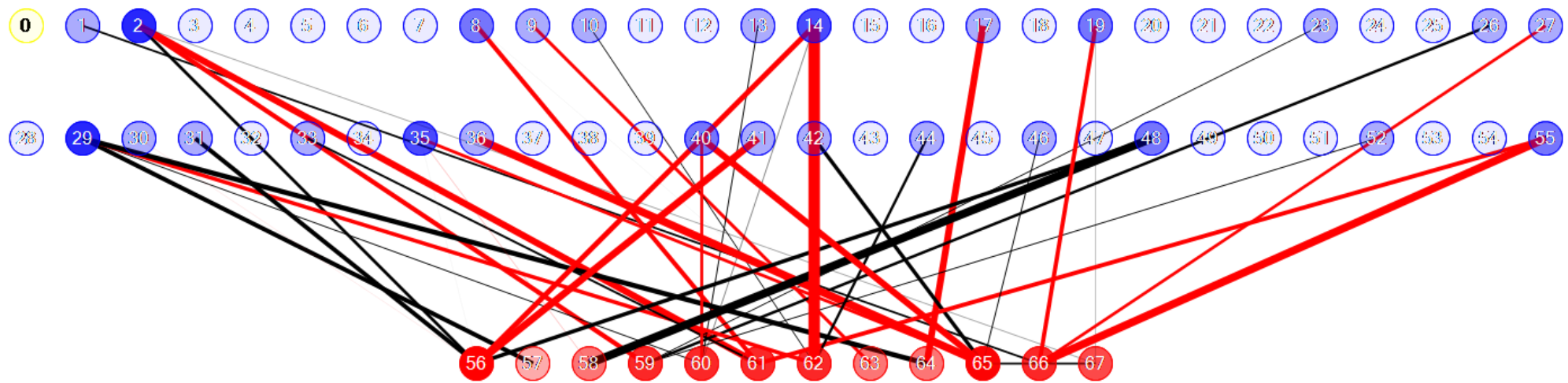
EXAMPLE NEURAL NETWORK

4 Sites, No Enemy. Demonstrated Good Collection

PUSH THE ENVELOPE A LITTLE AT A TIME

Why We Need Advanced AI in Games

- Increase Profitability

- Increase Enjoyment

- Larger Potential Gains

- Employ AI Engineers

- Potential Research Bed

Obstacles to Advanced AI

- Hard Learning Technology in Project

- Indirect Benefit

- Recent Field

- Larger Risk

  - *Production values have risen to a level that games are starting to cost $3 million to $10 million to produce… At this level, companies can't afford to take chances on defining new categories. -- Sierra founder Ken Williams*

FURTHER WORK

- Research Arms Race in Simulation

- Commercial Real-time Strategy Environment

- Explore Niche in Gaming for Advanced AI

THANK YOU

- Questions? Comments?