The Instantiation of Brains

Design Document, Final project

Matthew A. Letter

&

Lin sun

University of New Mexico

Neural Networks 547

[Mletter1@unm.edu](mailto:Mletter1@unm.edu)

[sun@unm.edu](mailto:sun@unm.edu)

**Abstract:**

Table of Contents

1. Introduction : 2

2. Description of Anticipated Designs: 2

2.1 Architecture 0: staying in place 3

2.2 Architecture 1: movement 3

2.3 Architecture 2: Movement and eat-all-on-contact 3

2.4 Architecture 3: Movement, eat all on contact, classification with Delta Rule Neuron for one eyelet 3

3. Learning Approach : 3

4. Evaluation Approach: 3

5. Analysis/Presentation Approach : 3

6. Preliminary Results: 3

7. Known Issues: 4

# 1. Introduction :

This paper rigorously establishes that neural network design models can be used to manipulate learning on simulated biological system. All the research was done Using professor Thomas Caudell’s animal robot environmental model.1 The starting point of the research involved 3 architectures, used to establish the parameters of life with respect to the simulated organism and its environment. These provide a basis for analyzing the implemented neural network algorithms. The goal of which is to create a “neuron” based brain for the organism to live as long as possible in its environment.

# 2. Description of Anticipated Designs:

### 2.1 Architecture 0: staying in place

In this design, the robot animal was set to stay in one place until it dies

### 2.2 Architecture 1: movement

In this design, the robot animal was set to move in a direction until it dies. The direction was incremented by 5o, after every epoch.

### 2.3 Architecture 2: Movement and eat-all-on-contact

In this design, the robot animal was set to stay in one place until it dies

### 2.4 Architecture 3: Movement, eat all on contact, classification with Delta Rule Neuron for one eyelet

In this design, the robot animal was set to stay in one place until it dies

Discussion of your first few neural architectures, - How will the robot decide to eat and move? - How do you expect this to meet project goals? - What evolutionary development path can you take with this architecture?

# 3. Learning Approach :

How is the robot going to learn to distinguish object type? - How is it going to learn which directions and speeds to take?

# 4. Evaluation Approach:

How are you going to test your robot/brain in the environment? - What data are you going to collect? - How many experimental trails will you need to run to get reliable statistics? - What criteria are you using for the success of the project?

# 5. Analysis/Presentation Approach :

How are you going to analyze your experimental data during development?  - What plots are you going to produce showing the performance of the robots? - How are you going to present your results to yourselves and in the final report? - What results are you going to give in the report?

# 6. Preliminary Results:

Descriptions of the first four architectures. - Preliminary performance results for each of these.

# 7. Known Issues:

Give a schedule for completing the project, including milestones. - Any major problems or questions? - Team issues? - Code issues? - Resource issues?

The first four architectures mentioned below are:

Architecture 0: No movement, measure lifetime. Architecture 1: Movement, measure lifetime as a function of speed. Architecture 2: Movement and eat-all-on-contact, measure lifetimes as a function of speed. Architecture 3: Movement, eat all on contact, classification with Delta Rule Neuron for one eyelet, plot RMS training error verses eat event.

Measurements should be collected over a number (>100) of trials, where the agent starts at random locations and headings. Report histograms, averages, and standard deviations for each experimental condition for each architecture.

Document: A title page listing the title of your team’s project, plus all team members with their email addresses, plus up to 10 single sided, 1.5 line spaced pages, 1” margins, 12 point Times font, including figures and references. Number all pages at bottom. Put captions on all figures. Label all axis of graphs. Be very concise!