## Testing

### Algorithm Effectiveness Testing

The aim of these tests is to evaluate the effectiveness of the implemented algorithms against neural networks that have no learning capabilities.

**Default Environment setup**:

|  |  |
| --- | --- |
| Variable | Value |
| Grid Size | 1,000 x 1,000 |
| Seed | 1 |
| Solid Density | 5% |
| Nutrient Density | 100% |
| Lava Density | 0% |
| Poison Density | 0% |
| Number of Updates | 50000 |
| Nutrient Values | |
| Ticks Between Spawns | 30 |
| Number of Attempted Spawns | 2,000 |
| Max Spawned Value | 5.0 |
| Min Spawned Value | 0.5 |
| Agent Values | |
| Number of Hidden Layers | 0 |
| Ticks Between Spawns | 40 |
| Number of Attempted Spawns | 5 |
| Maximum Number of Agents for New Spawns | 100 |
| Minimum Species Diversity | 50 |
| Mutation Chance | 5% |
| Energy Required to Reproduce | 200.0 |
| Starting Energy | 100.0 |
| Reward Values | |
| Nutrient Sensitivity | 0.1 |
| Health Sensitivity | 0.1 |
| Energy Sensitivity | 1.0 |
| Lava Sensitivity | 0.1 |
| Poison Sensitivity | 0.1 |
| Punishment Sensitivity | 10.0 |

For the upcoming tests, the following data will be recorded:

* Agents Above 1.0 Efficiency Graph
* Species Count Graph
* Average Efficiency Graph
* Number Of Updates for First Population Peak (if applicable)
* Number Of Updates for Average Efficiency to Pass 1.0 (if applicable)

Test 1

**No algorithm, no hazards (control)**

Adjusted values: Learning Disabled

Results:

A graph on a black background

Description automatically generated

A screen shot of a graph

Description automatically generated

A screen shot of a graph

Description automatically generated

Number Of Updates for First Population Peak: 33,035 Updates

Successful Population Peaked At: 756 Agents

Number Of Updates for Average Efficiency to Pass 1.0: 11,820 Updates

Notes:

Test 2

**Simple algorithm, no hazards, no variable RNG**

Adjusted values: Learning Enabled

Results:

A graph on a black background

Description automatically generated

A screen shot of a graph

Description automatically generated

A screen shot of a graph

Description automatically generated

Number Of Updates for First Population Peak: 20,871 Updates

Successful Population Peaked At: 2,498 Agents

Number Of Updates for Average Efficiency to Pass 1.0: 5,843 Updates

Test 3

**Simple algorithm, no hazards, variable RNG**

Variables adjusted: Learning enabled, learning value sensitivity randomized.

Results:

A graph on a black background

Description automatically generated

A graph with a line going up

Description automatically generated

A screen shot of a computer

Description automatically generated

Average sensitivity values:

A screen shot of a graph

Description automatically generated

A screen shot of a graph

Description automatically generated

A screen shot of a graph

Description automatically generated

A screen shot of a computer

Description automatically generated

Number Of Updates for First Population Peak: 25,674 Updates

Successful Population Peaked At: 3,134 Agents

Number Of Updates for Average Efficiency to Pass 1.0: 12,980 Updates

Test 4

**No Algorithm, Minor Hazards**

Variables changed: No learning, 1% lava, 5% poison

Results:

A graph on a screen

Description automatically generated

A graph on a screen

Description automatically generated

A screen shot of a graph

Description automatically generated

Number Of Updates for First Population Peak: 38,959 Updates

Successful Population Peaked At: 791 Agents

Number Of Updates for Average Efficiency to Pass 1.0: 12,489 Updates

Test 5

**Simple Algorithm, Minor Hazards**

**A graph on a black background

Description automatically generated**

A graph with blue lines

Description automatically generated

A screen shot of a graph

Description automatically generated

### Algorithm Efficiency Testing