<http://unityblob.s3-website-eu-west-1.amazonaws.com/>

**Project Description**

The software is an evolutionary simulator, dealing with observations of mimicked natural evolutions. The scope of the project is to produce a system that can be used to study evolution in a limited environment where the user can intervene and change the parameters. Particular interest is placed on creature and group behaviour, and population dynamics.

The project involves building a tool which allows visualisation of an environment and enables users to interact with various parameters in the environment. It is intended as an educational tool to allow users to better understand evolutionary dynamics. Creatures called “blobs” evolve in this simulated environment by having techniques used in Genetic Algorithms applied to their DNA. This DNA described their characteristics and behaviour.

**Installation**

Built using the Unity development platform, the project is meant to run on as many platforms as possible.

On Windows, it is available in browser via the Unity Web Player (unsupported on Google Chrome). It is also available as a standalone executable.

On Linux/Unix based systems it can be run in the browser using Pipelight (<http://pipelight.net/cms/installation.html>)

On Mac, it runs in the browser via the Unity Web Player, or as a standalone.

**Controls**

Camera Movement: *Arrow Keys*

Zoom: *+ / - / Scroll wheel*

Selection: *Left Mouse Click*

Add Blobs: *Shift* + *Left Mouse Button*

Add Food: *Shift* + *Right Mouse Button*

**Interface**

The simulation can be started by pressing the “Start” button, paused by pressing “Pause” which replaces “Start”, or reset to a blank state by pressing “Reset”.

The creatures involved in the simulation are represented by the blue “blobs”. Their patience (the time it takes until a certain “blob” moves to a new area in search for food) is encoded in the brightness of each particular “blob”. Food is represented as the green dots. Food spawns in clusters, which have a limited lifetime. The various sliders on the right control the properties of the environment.

The graph is used to show the population in red, the average patience in blue, and the average energy needed for reproduction in green.

**Experiments to perform**

1. Without modifying the parameters, what can be said about the population size over a long period of time?

|  |
| --- |
| In the beginning, the population size increases at a high rate (exponentially). After a while (approx. 2 minutes), the size of the population seems to grow linearly, being inversely proportional with the pop rate (observed from the plots). |

1. Tweak the food spawning rate. Make observations about the population size.

|  |
| --- |
| In order to observe the relation between food spawning rate and the population size, I have performed 3 experiments:   1. If the food spawning rate is low, then the population size does not grow rapidly 2. If the food spawning rate is medium, then the population size grows at a slow pace in the beginning, but after a while (approx. 30 seconds) it starts growing quicker. 3. If the food spawning rate is high, then the size of the population increases rapidly from the beginning. |

1. Does the size of the food clusters seem to impact the average patience of the population?

|  |
| --- |
| When I tweaked the size of the food clusters at small, medium and, big, I observed that the average patience of the population decreases when the size of the food cluster is increased. Therefore, over a period of time (e.g. 1 minute) one can infer that the patience of the population is inversely proportional with the size of the food clusters. |

1. What are the effects of a sudden influx in population size? (*Shift* + *Left Mouse Button* to add more blobs)

|  |
| --- |
| If initial parameters are not modified and a sudden influx in population size is generated, then the pop rate starts increasing very fast. |

1. What are the effects of creating a very dense food cluster? (*Shift* + *Right Mouse Button* to add food)

|  |
| --- |
| If initial parameters are not modified and a very dense food cluster is created, one can observe that the blobs tend to “migrate” towards the aforementioned food cluster. |

**Questionnaire**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree |
| 1. The interface is intuitive |  |  |  | x |  |
| 1. I am able to draw conclusions form the simulation |  |  |  | x |  |
| 1. The controls are easy to use |  |  |  |  | x |
| 1. I am given enough information |  |  | x |  |  |
| 1. The software is responsive |  |  |  |  | x |
| 1. The interface is aesthetically pleasing |  |  |  |  | x |
| 1. Information is conveyed effectively |  |  |  | x |  |

**General Feedback**

|  |
| --- |
| In my opinion, the evolutionary simulator is easy to use by a person with a technical background. It has a high potential in being used as an educational tool, mainly for teaching Biology and other adjacent sciences. The user interface is aesthetically pleasing and clean. However, since the attention of the user is centred towards the middle part of the screen, one would be able to draw conclusions easier and faster if the controls component is swapped with the plot component. The sound feature engages the user in paying more attention to the blobs’ evolution and it also represents an enjoyable feedback when one interacts with the simulator. If camera tracking is activated and the size of the population of blobs is large, the blob tracking feature becomes troublesome from the user’s visual perspective. A potential solution for making the experience more pleasing would be to change the colour of the blob which is being tracked. |

**Features you would like added**

|  |
| --- |
| 1. Changing the colour of the blob, which is being tracked when camera tracking is activated. 2. Swaping the plot component with the controls for adjusting the parameters. |