Computational Evolution Progress Report

Bullet points correspond to those in the same position on the project plan. This list summarises what has been completed for each bullet point up to the present time:

Week 1 (Oct 10)

* Sifted through artificial life papers and the college central library. Found some good reading and examples but have been unable to find Artificial Life 1 anywhere.
* Git repository was set up and tested. Bug and food classes were created and the initial coding structure determined.

Week 2 (Oct 17)

* World, bugs, food, and reproduction all coded. Food grows.
* Decided against overlap to simulate the collision of organisms like in real life to introduce overpopulation principles and hence added collision checks. Reproduction works in a mother-child model where the mother retains most of the food; energy wasn’t conserved at this point.
* Rather than rush to output data the code was again restructured, adding a parent class for organisms. The S.O.L.I.D principles for object oriented programming were researched but have been challenging to strictly follow.

Week 3 (Oct 24)

* First world runs and graphical plotting of the world completed. Seeding not prioritised at this point but was added in week 4.
* Output were used to check for and fix small issues such as the spawn area not being the same size as the world. Coding skeleton already well implemented from the previous week.

Week 4 (Oct 31)

* Initial data for a simple environment contain bugs and food were generated and output. Had our first world run and found that with food growing the environment tends towards an equilibrium. Some simple evolution was added. All data output in CSV format (comma-separated values) to allow for simple analysis and plotting.
  + Had not yet reached testing different food distributions.
  + Started looking into plotting gene space to map bug evolution.

After discussing the initial project plan and our current progress with our project supervisor in week 3 it was noticed that a major step was missing from weeks 4 to 5.

Revised Week 5 (Nov 7)

* After the initial world runs were working and data was being output, some further evolution of bugs (such as reproducing faster) needed to be added.
* The evolution of these bugs would then be mapped in gene space using contour plotting. This may be quite difficult.

This step is currently being worked on, and when combined with the plotting and analysis planned in the second half of week 4 is projected to take up to the end of week 5.

Also currently considering removing collision for bugs to investigate number of offspring as an evolutionary trait Debating pros and cons between this and using an alternative evolutionary trait to plot contours in gene space. Currently at a critical stage with some very important design decisions to make, need to do some research and discuss further.

After a meeting in week 4 it was also noted that conservation of energy was not being followed during bug reproduction. It was noted that this was breaking the laws of nature (allowing bugs to evolve to reproduce infinitely) and would need to be corrected. This has been fixed by conserving the energy of the bug-child system before and after reproduction.

These factors push back what was previously planned for later weeks. Now with a better understanding of problems that might be faced during this project the later weeks can hopefully be planned to a more accurate degree:

* Week 6/7/8 – Some serious design decisions will have hopefully been made in week 5. Some examples:
  + The previously decided upon predators.
  + Giving bugs a maturity age so they can only reproduce upon reaching age.
  + Introducing a new species at different points in time.
  + Evolution of bugs/food to only be able to be eaten by a certain evolution of predators/bugs.
  + Vary environment (add water, rocks.etc).
  + Vision will be difficult and time consuming to implement.

The chosen design decisions will be implemented and investigated, with more added depending on if ample time is left over.

* Week 9 – As before.
* Week 10 – As before.