OEB 192 – Avida project overview

Goal: Use Avida-ED (or full version) as a platform to perform evolutionary experiments that address one or more questions covered throughout the course.

Timeline:

10/12 – Discussion of evolution of digital organisms & introduction to assignment

10/17 – By class have run example adaptive trajectories (see next page)

10/31 – Turn in your project proposal

These are not graded, but we will provide feedback for resubmission.

11/5 – Turn in revised project proposal, if requested

11/11 – Turn in project report

Reports should contain no more than 4 pages of text, and contain an introduction (background to evolutionary question addressed and relating it to class topics/papers, and then a brief statement of your question/approach/hypotheses), methods (concise, but complete enough that I know exactly what settings you used, etc.), results (what did you observe?), discussion (how do your results shed light on your question/hypotheses?), and references. Figures (or tables) do not count in your 4 pages, and can simply be screen shots, or anything else. Be sure that they are sufficiently well-described to be interpretable. Quantification can be done by eye, and formal statistical analyses are not required (but welcomed if you desire).

11/21 – Presentations of Avida projects (& revised report, if desired)

Building upon your results and feedback from the project report, expand upon the initial work or perhaps follow-up on a surprising result? For example, often more replicates or a greater parameter range can be quite informative?

The presentations will, by necessity, need to be VERY short to leave time for questions and to get through everyone. One slide each for the big biological question to be addressed, exactly what it is that you did, a two slide overview of your key findings, and a final slide with your primary conclusions. You will have only 6 minutes – so you will need to be quite focused. This will then be followed by 2-4 minutes of questions before the next presentation…

If there were deficiencies in the original report, such that you'd like to turn in a revised written project (with the intent for a higher score) this can also be turned in on this day. Given that you will have done more experiments, it can be expanded to up to 6 pages of text.

AVIDA-ED exercises for 10/17

1. Follow instructions online and load AVIDA-ED onto your computer.
2. Try the following experiments (2 replicates for three conditions = 6 runs total) and PRINT the results asked for so that we may compare them.

First, drop the ancestor into the petri dish and use the following settings: μ=1.2%, N=400 (20x20), place offspring randomly, reward all tasks, experimental repeatability, pause run @ 2000 generations. Save the populated dish and pick one of your highest fitness isolates and save it, too. (Note that you should develop your own 'system' for keeping track of just what it is you did, either in the names of the populations or isolates, or separately.) Repeat the exact same experiment with the @ancestor to start it.

For the second pair of runs, use the exact same settings, except change u=3% (N=400). Save as before.

For the third pair of runs, use the same μ (1.2%) as the first run, except this time change to N = 81 (9x9).

*Flip to "Analysis" and drop each of the populations in. For the sake of comparison, do this in the order you evolved them. Print the chart of ave. fitness through time.

**In class on 10/17 we will compare our printouts

#Tip: Despite how the interface looks, to change either the mutation rate or population size you MUST use the slide bars rather than entering values directly.

#Tip: I've found that in order to start a new experiment where I can change the values of the parameters, I sometimes need to start a mock experiment and then discard it. This leaves me with a dish that allows me to change the parameter values. Simply asking for a 'new experiment' does not appear to be sufficient, at least with my operating system.

#Tip: You can use place offspring "near parent", but this will simply have the effect of slowing down adaptation, as the "battle" between genotypes can only take place at the edge of the population (the middle is just fighting to replace "itself").