Meeting 3 10 2023

Catching up:

I. What we have: Dennis' time-stamped evidence stream from the world. With that, 3 modify-existing networks heuristics:

Single point mutation
Random single- and double- point mutation
Hybrid genetic algorithm.

We update our networks with these on the basis of our evidence stream, scoring the result in terms of comparing adjacency matrices.

We talked about how to implement hybridization, and settled on Amber's plan:
Start with a random network, and score it. Hybridize it with a random network (or several random networks), giving us two offspring, and score those. If any are better, make those the working network. If not, stick with the parent and repeat.

We also discussed the routine for hybridization. A version that avoids bias is to pick a random set of spots on the code for network A, and generate offspring #1 by replacing those with the values on the corresponding spots on network B, generating offspring #2 by replacing all *other* spots with the values of the corresponding spots on network B.

(Genetic algorithm hybridization is usually done with a large pool of strategies, cross-breeding the top two and reinserting both them and offspring into the pool, but Amber's plan seemed to look more like changing an existing network and thus formed a better parallel for comparison with one-point and random one-two point mutation.)

II. There are two directions to go from here.

One is to add 'hill-climbing' or 'keep the best' heuristics. We decided that 'keep the best' really is a hill-climbing strategy.

Three variations can work like this:

We know which initiations have the right (timed) scores. Only change those that do not. Those changes could be by:

- Single-point mutation
- Random single- and double-point mutation
- Hybridization of just the inaccurate spots.

In fact, we know which cells have the right (timed) scores: an initiation a [b1 c2] in our representation, where evidence from the world is a [b1 c1], is right in the b1 element, so even that might be kept.

III. The other direction:

Our world has been very nice in the evidence it has offered: complete for all initiations, and conveniently timed.

What if the world isn't so nice? Patrick suggested last time that perhaps untimed 'downstream' evidence alone would be enough to peg the world, at least with parsimony. But that won't be true if the world is redundant, with links both a-b-c and directly from a to c.

It *would* be enough if the world was guaranteed to have only one path between any two nodes. But that's just the world being convenient in another way: itself being parsimonious, instead of giving us convenient times.

An open question: What if we don't have activation evidence from all nodes? We can measure how much information we lose by how many networks are consistent with the evidence, though only one will actually match the world. Is that number of theory alternatives different if the evidence we lack is from a root node? A middle node? A root node?

IV. For next time:

Amber and Dennis are going to work on perfecting the hybridization heuristic (don't change to a hybrid if the parent was better), and on implementing versions of the 'keep the best.'

It was also mentioned that we'd like a way to get around the 'timing out' problem in the program so as to allow for runs with more nodes.

Patrick is going to try to formulate some more typically analytical math questions in here for Zhongming to work out. A start is that open question at the end of III above.

At Dennis's urging, Patrick also promised to think more about not merely activation evidence but 'keep b from firing' evidence. That seems important.

Sophia is going to
(a) look up John Stuart Mill's 'methods of difference' toward the end of Methods of Logic (I think) to see whether there is a classical parallel to what we are doing, and
(b) look over 'draft 1' for ideas, corrections, related literatures.

I think we're going to try to go for 3:00 again next week, though it depends on whether Sophia has a conflict then.

Dennis also has to work with Patrick on making the program accessible on his computer. But that was left until next week.