Bayesian nets
Meeting notes 2/10/2023

Everybody was there except Sophia

I. Patrick began by distributing 'Draft 1,' a very rough exploration of an intro to eventual presentations and submissions. That was also emailed independently.

He should have said, but didn't: As a standing principle, everything we do can be used by anyone in the group, for whatever further purposes, as long as it carries a note of credit to the group.

We'll be leaning on Sophia for other help with writing, and 'sideways' contacts with other relevant philosophy. In doing 'draft 1' Patrick wondered whether van Fraassen on empirical adequacy of theories should come in, for example.

II. Dennis has programmed an updated version of the evidence stream from the world, which indicates what nodes are activated at successive stages with an initial activation of individual notes.

As Dennis noted, this is the world being *very* generous with its evidence. Given that one can basically read off the world's network from the evidence. Not even a parameter of parsimony is required.

A. One take at that stage: Yes, that's true, but our structurally adaptive heuristics aren't reading it off—they're using search methods of mutation and genetic algorithm. We can still compare those heuristics in terms of how well and how fast they find that structure.

B. Another take: This opens up questions regarding more limited forms of evidence.

1. For example: What if we constrain our evidence to telling us what nodes are activated 'downstream' from an initial node activation, without telling us at what stage they are activated?

That with a measure of 'accuracy' alone won't be enough to eliminate the additional links that Amber found in an earlier instantiation.

The open question: Would that together with a parsimony measure be enough to identify the world's net uniquely?

2. We might also ask what limitations of evidence result in what 'variance' of accuracy in formation of our representation. How many 'equally good' networks do we get (over all networks possible) when our evidence does not include activation of bottom-of-the-network leaf nodes, for example? Root nodes? Middle nodes?

It could be that a heuristic's relative ability to find the world depends on (a) the structure of the world and (b) the specific parts of that structure from which we receive evidence.

III. For next time, in two weeks—February 24th—

Amber can run our handful of clean heuristics – single-point mutation, random single- an double-, and hybrid genetic algorithms—on the 'complete evidence' formulation from Dennis.

Dennis is going to give us a 'downstream only' version of evidence, as in B.1. above, together with an accuracy and parsimony scoring technique. With that we should be able to explore whether that evidence, with those constraints, is sufficient to identify the world's network uniquely.

> …If it is, that's a strong point for parsimony: that it can compensate for other evidence limitations, beyond merely making things efficient and tidy. That would mean that parsimony may be a really strong theoretical desideratum.

Dennis and Patrick are also going to think about how we can implement two other exploratory heuristics we've talked about:

'Keep the best,' from Dennis

'Hill-climbing,' from Patrick

It is hoped that Sophia will give draft 1 a look-over for suggestions

Patrick also promised to give Zhongming's piece a closer reading. Parts of that might look good as an appendix in a developed paper.