Meeting notes 3 31 2023

Everybody was there except Sophia

I. Amber and Dennis have 'keep the best' programmed for timed evidence, on single-, random-, and hybridized networks.

We discussed a problem with 'keep the best' for non-timed downstream evidence. Timed evidence can distinguish between network structures a → b → c , a → c → b, and b ← a → c. But mere 'downstream' evidence from an activation at a will treat all of these the same, since b an c are downstream from a in each case.

In that case, does 'keep the best' keep whatever structure was in place from a, even if it might be wrong?

We decided that we *would* program a 'downstream' keep the best to do that, precisely because it might have interesting results: that downstream 'keep the best' might get stuck or get the wrong answer. That would be a vindication of the Hume – Mill inclusion of temporal relations as important in establishing causality, in ways that are overlooked in attempting to construct Bayesian networks from purely correlational non-temporal data.

II. Dennis indicated that he had investigated more on 'back door' and 'front door' techniques in Pearl, but neither he nor Patrick were ready to outline them for us.

Dennis also raised the important question of what the interface was between Pearl on Bayesian nets and causality an what we are doing. Patrick said that was one of the main things he wanted to think about, but had been slacking.

III. Zhongming gave a presentation on a lead he is pursuing in the attempt to answer the question 'How much do we lose when we lose evidence regarding a node at a particular spot in a structure (root, middle, or leaf, for example)?' The measure of 'how much we lose' is how many networks are consistent with that information loss—the more consistent alternatives, the more the evidence loss.

The lead Zhongming is investigating involves trying to read other matrix results as applicable to some of our questions regarding networks, represented as matrices.

Some of those results involve discrete-time Markov chains, but with Zhongming's 'transition existence matrices' using just values of 1 and 0 instead of full probabilities. The hope is that periodicity or aperiodicity in updates of these matrices, and results like the Markov convergence theorem and the Chapman-Kolmogorov theorem, might be capable of application to our questions regarding multiple networks and limited information.

IV. Dennis took over control of Patrick's laptop and got the appropriate version of Python and our programs up and available there.

V. We'll meet again next Friday, April 21st, at **2:00**, though Dennis will be involved in percussion and not able to make it. For next week:

Amber will try to program the 'downstream' keep the best version mentioned above, after having perfected her UROPA presentation,

Zhomgming will continue to follow the matrix lead to see if it leads anywhere.

Patrick will try to pursue the 'back door' and 'front door' algorithms in Pearl, also trying to figure out where that work interfaces with ours.

We may at that point also know more about summer schedules and how we'll continue the work over the summer.