Review report for the first revision of the paper 'Annotated Natural Deduction for Adaptive Reasoning'

October 19, 2017

1 General appreciation

acceptable after minor revisions

2 General remarks

- Most of my comments have been taken care of.

- A lot of small mistakes remain. The authors should carefully reread the full paper, as I cannot guarantee that I did not miss any imperfections.

3 Detailed remarks

1. p. 9 fig. 6, rule RU: should be $max(s', s'')$, no?

2. p. 9 fig. 6, rule RU+RU2: one needs sets of abnormalities in the conditions, not just single abnormalities such as ϕ^- and ϕ'^-.

3. p. 9, enumeration at end of page, item 3: why 'family' of sets? This extra terminology seems unnecessary and could be replaced by 'set of sets'

4. p. 10, Fig. 8: I fail to understand these proofs: why do they prove that RU and RU2 are redundant? The premises of the proof are none of them conditional, while the local premises of rules RU and RU2 are conditional.

5. p.10, par.1: 'the disjunction Δ' - Δ is a set, not a disjunction.

6. p.10, def.5: why 'the union of *some*'? shouldn't that be 'the union of *the*' or 'the union of *all*'

7. p.10, par. following def.5: '$\bigcup \Delta(\Gamma)$' is not an operator but an expression. More importantly: 'is not intended as disjunctive'. This is incoherent. Either no set of formulas on the right side of $\vdash$ is disjunctive or they all are. You cannot change the meaning of the sequents, just because they are the result of another rule. If you wish to do this anyway, you need to introduce a syntactic way to distinguish non-disjunctive right hand side

sequents from the others. For example by adding a superscript UnRel to the $\vdash$, or writing $UNREL(\bigcup \Delta(\Gamma))$ instead of $\bigcup \Delta(\Gamma)$ indicating that it's a line to merely indicate which abnormalities are unreliable. This point is less problematic for the result of the CHOICE rule, because $\Phi(\Gamma)$ is anyway a set of sets of formulas, and so there is no confusion with a disjunctive set of formulas.

8. p. 11, rule CHOICE: the result of this rule should somehow be relativized to the stage of the proof. The set $\Delta(\Gamma)$ can change when smaller disjunctions of abnormalities are derived. So a result $\Gamma; \cdot \vdash_s \Phi(\Gamma)$ is no longer valid if somewhere in the proof we already obtained more minimal disjunctions of abnormalities. Only the very last derivation of $\Phi(\Gamma)$ counts.

   I would propose something like this: add an index $_s$ to $\Phi(\Gamma)$ and stipulate that the notation '$\Delta \in \Phi(\Gamma)$' stands for '$\Phi_s(\Gamma)$ is derived in the proof for some s and there is no $s' > s$ s.t. $\Phi_{s'}(\Gamma)$ is also derived in the proof.

   A similar problem holds for $\bigcup \Delta(\Gamma)$. Somehow one should require that only the last derivation of that should be taken into account when applying the marking rule.

9. : p. 11, Prop. 1 and 2: remove 'still'

10. p. 15, line 4: 'choice set' should be 'minimal choice set'

11. p. 15, rules $\boxtimes$M, $\boxtimes$M2: choice_i should be choice_i^{min}. Same for the applications of these rules in Fig. 12 and for the occurrences of $\mathsf{choice}_i(\{\Delta_1, \ldots, \Delta_n\})$ further in the paper (p. 23 and 24 for example).

12. p. 15, rules $\boxtimes$M, $\boxtimes$M2: I fail to see why $\Phi(\Gamma)$ should be mentioned in the premises of the first, but not in the premises of the second.

13. p. 17, section 4.5. The more complex example is still too simple for the revised version of the paper. The reader finds nowhere an illustration of the Minimal Abnormality strategy and how it differs from Reliability. As this is the most complex part of the paper, it is important that it be illustrated.

14. p. 23, Theorem 3: (1) ϕ^- should be Φ^- (it can be a set of abnormalities). The proof should be modified accordingly. (2) The left hand side of 'if and only if' should be existentially quantified for Φ, i.e. 'there is some Φ s.t. ...' should be added. (3) The last of ϕ should be replaced by ψ.