Paper Title: Towards a Socio-Historical Approach to Teach Natural Deduction in Logic

Review:

This paper presented a tutor that attempted to teach natural deduction in propositional logic, incorporating socio-historical theory in order to improve student retention in the course. This theory is also used to build a student model that imitates the reasoning processes used by students in solving logic proof problems.

The work presented is very promising for a few reasons. Most significantly among their contributions, it seems the authors were able to successfully create a system that can replicate a human strategy of solving logic proof problems and tutor students based on that model. To this end, it seems that socio-historical concepts can not only be adapted into a student model, but it actually makes the model more lifelike. It also seems to have fulfilled the authors' principal aim, namely to improve the experience of using a logic tutor for students (indicated by the improved approval rate and the reduced fail/dropout rate noted in their results section) by knowing when to give encouragement.

On the other hand, there are some significant problems in this paper. First of all, the section on socio-historical concepts (section 3) needs more information presented in a clearer way. An example or a discussion on the differences between socio-historical theory and other more common methods of teaching logic would be very helpful here. As this is a theory that the authors themselves acknowledge is not widely used among the rest of the community, more care needs to be taken to explain these concepts as clearly and thoroughly as possible. Another concerning point is that most of the sources cited by the authors are no more recent than 2010 (in fact only one source is more recent than that). The authors could benefit greatly by examining more recent tutoring systems in terms of how it relates to their work. At the very least the authors should look at the systems they do examine since many of those works have more recent iterations than the authors cite. As for results Finally, while it makes sense that the authors would focus on user perception metrics such as dropout rate and approval considering their aim, some comment must be made on the relatively low average grades. Either an explanation or clarification on the students knowledge as it relates to how low the grades are to begin with, noting the improvement achieved with their tutor, or a comment on how future work with the tutor could improve grades as well as user experience. Overall though, the paper needs to be edited seriously for clarification, preferably by someone who is knowledgeable in the overall field but not the research of this particular group. There are good ideas here but they aren't presented clearly.

Overall, this paper deserves a weak acceptance. The ideas presented here are very interesting, the student model in particular. However before it can be published it needs to be rewritten in a much clearer manner with more current sources.