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Intelligent User Interface Design for Teachable Agent Systems

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ABSTRACT

Betty's Brain [1] is a learning-by-teaching environment where students "teach" Betty by constructing a concept map that models relations between domain concepts. The relations can be causal, hierarchical, and property links between the entities that represent the domain. The goal is for students to understand and then teach Betty about interdependence and balance among entities in a river ecosystem. As a part of the teaching process, students can query and quiz Betty to assess her understanding based on what she has been taught.

Students can query Betty by asking her two types of questions: (i) "*What happens to <concept A> when <concept B> increase/decrease?*" and (ii) "*Tell me about <concept A>*". Betty answers questions by employing a qualitative reasoning mechanism, and explains her answers verbally and by using animation. Betty's explanations, and some feedback on the correctness of the answers should prompt the students to think more deeply about the domain processes, and motivate them to learn better before they teach her again.

Students can request external feedback by asking Betty to take quizzes that are administered by a teacher agent. The teacher agent uses an overlay model to provide hints about concepts and links missing from the concept map. The hint levels start from general (e.g., suggesting that the student read a particular resource) to specific (e.g. indicating that a link is missing between two specific concepts. By seeing the quiz questions, students become aware of which concepts are important to model domain phenomena. The feedback from the teacher agent, points the students to understanding interrelationships among concepts.

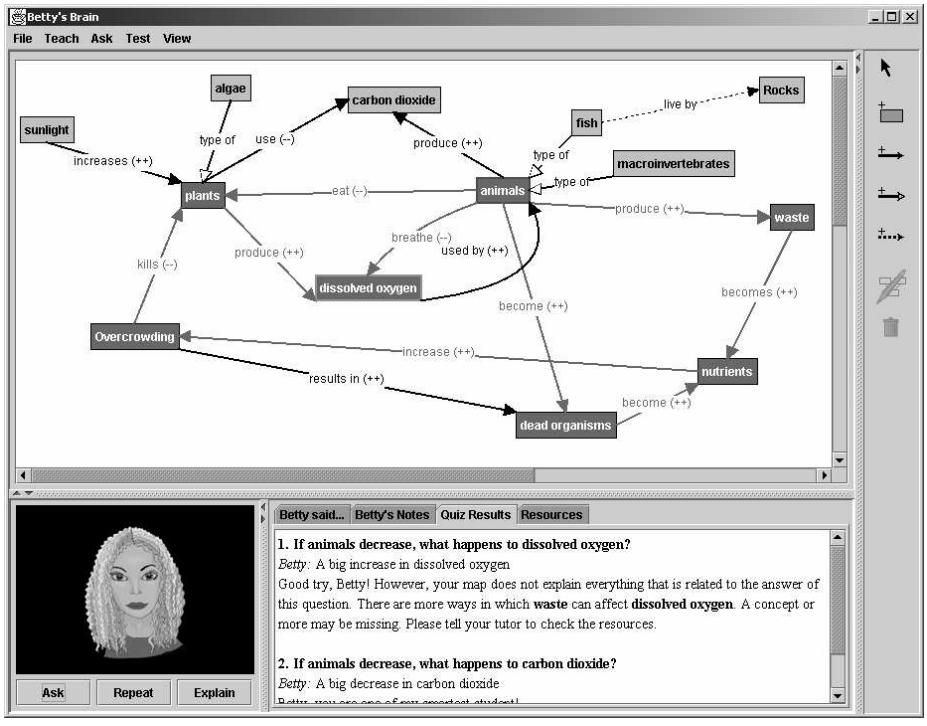
Results from our most recent study indicate that the query feature appeared to be effective in helping students develop an understanding of the interrelationships of living and non-living things in an ecosystem. The quiz feature is effective in helping students decide the important domain concepts and types of relationships to teach Betty. However, our observations of students during the study suggest that students using the quiz feature may have been overly focused on "getting the quiz questions correct" rather than "making sure that Betty (and themselves) understood the information."

To help students focus more on learning, the next versions of Betty and teacher agent will be more interactive and metacognitive. In addition, the teacher will provide feedback that is related more to the global issues of balance and interdependence instead of individual links.

At the demonstration, we will have a working version of our teachable agent system, Betty's Brain. We will demonstrate it's user interfaces for the student to create and modify their concept maps, the query interface, and Betty's response to queries, and the teacher agent interface that responds when the student's ask for help. In addition, the system also contains online resources that students can refer to when they are creating and updating their concept maps.

REFERENCES

[1] Davis, J., Leelawong, K., Belynne, K., Biswas, G., Vye, N., R. Bodenheimer, and Bransford, J. Intelligent User Interface Design for Teachable Agent Systems. in Proceedings of IUI '03 (Miami FL, May 2003), in press.



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