

Introducing RMT: A dialog-based tutor for research methods

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AutoTutor is an intelligent tutoring system that interacts with students in the way that human tutors do: with natural language dialog (Graesser, Wiemer-Hastings, Wiemer-Hastings, Kreuz, & the TRG, 1999). It presents questions and responses with a talking head which uses speech production and gesture to give graded feedback. It understands student replies using surface clues and latent semantic analysis (LSA) (Landauer & Dumais, 1997). It directs a student through a tutoring session using responses from its curriculum script which represents its knowledge of the domain (Wiemer-Hastings, Graesser, Harter, & the Tutoring Research Group, 1998).

AutoTutor has been shown to be effective in aiding student learning. Compared to control subjects who simply reread a chapter, students who used AutoTutor had improved learning and memory of the lessons by .5 to .6 standard deviations (Graesser, Person, Harter, & the TRG, 2001).

The AutoTutor system has limitations however. Despite the fact that the questions in AutoTutor's curriculum script are meant to be "deep reasoning" questions, its approach to the dialog is very shallow. There are two main reasons. First, AutoTutor's language analysis mechanism is limited. LSA tells AutoTutor how similar a particular student answer is to some desired good answer. But if the student answer is not so close, the system does not know where it is lacking. More detailed analysis of the student answer could change the types of responses AutoTutor makes. Instead of just moving on to the next point when the current one was matched sufficiently, an improved understanding mechanism would support more intelligent generation of follow-up questions.

The second limitation to the depth of AutoTutor's conversations is its subject matter. Computer Literacy attempts only to familiarize students with the basic concepts of computers, and does not get into any deep issues. Thus, many of AutoTutor's questions have a short-answer feel; the ideal answers can be summed up in one or two words. A more complicated domain would allow much more interesting discussions.

For these reasons, we are developing RMT, the Research Methods Tutor. RMT is aimed at undergraduate psychology or cognitive science students who are studying research meth-

ods. RMT takes a case-based approach. It presents a research question to the student, and asks the student how to go about evaluating it. This domain supports in-depth discussions of the student's approach to addressing the research question. It also allows the system to develop the student's analogical reasoning. RMT brings in related research paradigms to help the student infer both similarities and differences with their approach.

RMT also makes use of the Structured LSA (SLSA) language analysis system (Wiemer-Hastings, 2000). This system uses part-of-speech tagging, anaphora resolution, and shallow parsing to break apart input sentences into their subject, verb, and object segments and to replace pronouns with their antecedents. This technique provides a better match to human similarity judgments than standard LSA does (Wiemer-Hastings & Zipitria, 2001). Additionally, this allows the tutoring system to know what part of the student's answer matched an expected good answer, and what part did not match. This will allow RMT have a more effective dialog with the student by finding the "nugget of truth" in the answer, and leading the student to the complete correct answer.

References

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