

Computer Monitored Problem Solving Dialogues

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This project looks over the shoulder at students collaboratively engaged in a math problem-solving activity. One task we looked at was mechanically classifying the students current activity or knowledge state, of which we have identified 15 different categories. We have produced an automatic classifier that examines student sentences and is 55% accurate in identifying utterances as containing certain bits of knowledge or evidence of certain activities. The classifier was built from a corpus of student-written reports. Treating each sentence as a bag of words, we built vector space models of the word co-occurrence matrix using both non-negative matrix factorization (NMF) and latent semantic analysis (LSA). Classification was achieved by comparing new, unknown, sentences with pre-built bundles of manually tagged sentences, one bundle for each classification. Our categories are specific to the problem being solved, particular bits of knowledge needed to understand a two-person game called Poison. We have also been characterizing the dialogues with problem-independent categories: a math collaborative dimension and a problem-solving dimension. This will enable us to classify utterances with regard to in what ways students are participating in the dialogue and the problem-solving process. The context of this work is a quantitative problem-solving course in which students work in small groups. Our goal is for the computer to notice some of the same aspects of the activity that a teacher walking around the classroom might observe, such as what realizations a group has achieved and how students are collaborating. This type of computer-mediated collaborative problem solving exposes student thinking, providing opportunities to gain insights about student learning.

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