DISCUSS: Enabling Detailed Characterization of Tutorial Interactions Through Dialogue Annotation

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1 Introduction

We describe new work in using dialogue annotation for tutorial tactic discovery. When analyzing a tutorial dialogue session, surface features such as ratio of student to tutor speech, average delay between turns, and speech disfluency rates can serve as approximate measures for student participation, certainty, and affective state – factors critical to the success of an ITS. While these data are relatively easy to extract directly from a transcript and do provide insight into the nature of instruction, they are too coarse to give directed feedback to tutors and tutorial dialogue authors. Instead, an intermediate representation that summarizes the exchanges within a dialogue may be useful such as provided by a new annotation scheme for tutorial tactic representation called the Dialogue Schema for Unifying Speech and Semantics (DISCUSS), which we briefly describe here and detail in [1].

2 Background and Related Work

A variety of previous research has employed tutorial dialogue annotation for both general-purpose educational analyses as well as for more directed goals of optimizing ITS behavior. Graesser and Person [4] used tutorial dialogue annotation to determine the aspects of a dialogue that correlate statistically with learning gains. Boyer et al. [2] applied Hidden Markov Models to a corpus tagged with dialogue acts to discover patterns in tutorial dialogue strategies. Chi et al. [3] utilized smaller, more specific annotation to learn when a tutor should *elicit* rather than *tell* an answer to students. Collectively, these cases illustrate how dialogue level analysis requires richer representations than can be derived from transcripts alone. We are currently collecting a corpus of one-on-one ITS/WOZ led tutorial dialogues for inquiry-based instruction of FOSS science materials [5]. When complete, we will have nearly 1000 transcripts spanning 4 domains and 16 sub-domains of elementary school science. Preliminary observations from the WOZ transcripts suggest that the semantic entailments between student utterances and the goals for a lesson are the driving force behind tutor behavior.

3 The DISCUSS Annotation Scheme

Based on our analysis, we developed DISCUSS to reflect the relationships between learning goals and the dialogue. It does this in multiple layers, which capture the pragmatics, semantics, and structure of a conversation. Together, these layers yield a

comprehensive, yet domain-independent, description of the tutorial dialogue. Figure 1 illustrates how DISCUSS can be used to represent these relations.

Goal1: Batteries provide electricity Semantic Parse: [Agent].batteries, [Predicate].provide, [Theme].electricity.
S1: *It looks like the battery is giving electricity to the light bulb* Semantic Parse: [Agent].battery [Predicate].giving [Theme].electricity [Beneficiary].light bulb Answer/Describe/Process [Goal1]
T2: *Giving electricity. Interesting. Tell me more about that.* Mark/Null/Null [S1.Predicate, S1.Theme], Feedback/Positive/Null, Ask/Elaborate/Process [S1]

Figure 1: Sample snippet of DISCUSS annotation

4 Discussion

This annotation will allow extraction of more detailed features that can give better indication of conversation cohesiveness, student understanding, and tutor pedagogical style. The shallow semantics that DISCUSS captures will allow us to investigate how tutorial tactics vary and agree across domains and concept types as well as between tutors, and it will allow us to identify relations between student populations and instructional styles. Most importantly, this more detailed representation will allow us to map specific aspects of the dialogue onto the general patterns of tutorial dialogue strategy.

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6 References

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