

Initiative Patterns in Dialogue Genres

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1 Overview

One of the ways of distinguishing different dialogue genres is the differences in patterns of interactions between the participants. Morbini et al (2013) informally define dialogue genres on the basis of features like user vs system initiative, amongst other criteria. In this paper, we apply the multi-label initiative annotation scheme and related features from (Nouri and Traum, 2014) to a set of dialogue corpora from different domains. In our initial study, we examine two question-answering domains, a “slot-filling” service application domain, and several human-human negotiation domains.

2 Dialogue Domains

The Twins are two life-size virtual characters who serve as guides at the Museum of Science in Boston (Swartout et al., 2010). The characters promote interest in Science, Technology, Engineering and Mathematics (STEM) in children between the ages of 7 and 14. They are question-answering characters, but unlike SGTs Blackwell and Star, the response is a whole dialogue sequence, potentially involving interchange from both characters, rather than a single character turn.

Amani (Artstein et al., 2009) is an advanced question-answering character used as a prototype for systems meant to train soldiers to perform tactical questioning.

Radiobots (Roque et al., 2006) is a training prototype that responds to military calls for artillery fire in a virtual reality urban combat environment. This is a domain in the slot-filling genre, where there is a preferred protocol for the order in which information is provided and confirmed. Users are generally trainees, learning how to do calls for fire, they are motivated users with some training.

Farmer’s Market Negotiation (Carnevale, 2013) are bilateral role-play negotiations between undergraduate business students. The owners of the two restaurants had asked the participants to go to the market and get some apples, bananas, lemons, peppers and strawberries. Each participant has a different payoff matrix for the value of items, and the goal of the negotiation is to partition the items. Initiative annotations for this dataset were used in (Nouri and Traum, 2014)

Cartoon Negotiation (Ziebart et al., 2012) are role-play negotiation dialogues in which two participants negotiate on several issues, each of which has several possible values, and the payoff matrix for the issues differs between the participants.

3 Initiative Annotation Scheme

We use the initiative annotation scheme from (Nouri and Traum, 2014). This scheme breaks both *initiative* and *response* into two distinct concepts, for 4 label, total. For initiative, first there is providing unsolicited, or optional, or extra material, that is not a required response to a previous initiative (N for new). Second, there is the sense of putting a new discourse obligation (Traum and Allen, 1994) on a dialogue partner to respond (I for Invoke obligation). These two concepts often come together, such as for new questions or proposals that require some sort of response: they are both unsolicited and impose an obligation, however, it is also possible to have each one without the other. Statements can include new unsolicited material, without imposing an obligation to respond (other than the weak obligation to ground understanding of any contribution). Likewise, clarification questions impose new obligations on the other, but often do not contribute new material or are not optional, in that the responder can not reply appropriately without the clarification. For response, one

concept concerns fulfilling obligations imposed by prior initiatives (labelled F, for fulfillin obligation). To not do so could be considered rude and a violation of conversational norms in some cases. This is only relevant, if there is an existing initiative-related obligation as part of the conversational state. Another concept generalizes the notion of response to anything that contributes to the same topic and makes an effort to relate to prior utterances by the other party, whether or not it fulfills an obligation or whether there even is a pending obligation (labelled R for related).

4 Initial Results

We have so far annotated at least five dialogues in each of the domains in 2. We are analyzing several automatically extracted features based on the label, including

- the count of each label (I,F,R,N) per negotiation and per person
- the ratio, difference and absolute difference of the number of labels for each person against the number of labels for their negotiation counterpart
- the above measures normalized by the number of turns in dialog
- **Within-turn patterns** the number of all possible combinations of labels for each utterance. There are 16 possible combinations for the 4 types of labels that can be shown as tuples (R,F,I,N).
- **Across-turn Patterns** the number of all possible sequences of labels across two adjacent turns. There are also 16 possible combinations capturing how often each label is followed by labels.

Preliminary findings show differences on a number of dimensions. As expected, the Twins domain in the simple question-answering genre had the highest percentage of F annotations overall, and a disparity between user (many I's) and twins (many F's). The Amani domain was broadly similar, though included a higher percentage of total I's, given that the character often responded to questions with offers or grounding moves. Negotiation domains tended to be more symmetric amongst the distribution of moves to participants.

We intend to continue this annotation and analysis and present more complete results at the workshop.

Acknowledgments

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