

Chapter 4

Inter-Animation between Utterances in Collaborative Chat Conversations

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ABSTRACT

With the wide adoption of instant messaging, online discussion forums, blogs and social networks, online communication has shifted from narration to highly collaborative discussions with multiple authors and discussion threads. However, the theories and methodologies for analyzing this new type of discourse which is different from narration, but also from dialogue, have remained mostly the same. The authors propose a new method for the analysis of this type of discourse, designed especially for multi-party chat conversations where parallel discussion floors and threads exist at the same time. The theoretical underpinning of the inter-animation framework is the detection of links between utterances in order to build a conversation graph that may be used to discover the discussion threads. The framework has been used for analyzing chat conversations of students in Computer Science in order to assess the involvement of each student, the inter-animation of the conversation and the degree of collaborative discourse.

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INTRODUCTION

The purpose of this chapter is to establish a new theoretical framework, called the *inter-animation framework* for the analysis of collaborative online discourse, that links Natural Language Processing (NLP) and text mining to learning theories where inter-animation is already used such as knowledge building (Rezende & Castells, 2010) and meaning making (Scott & Mortimer, 2005) that are widely adopted as starting points for Computer-Supported Collaborative Learning (CSCL). This framework is designed for the analysis of online discussions, such as chat conversations and discussion forums, where multiple participants are debating given topics, investigating new subjects or collaboratively solving problems in a learning context. Thus, there are two main characteristics of the texts that are suitable for analysis using the inter-animation framework.

- **Structure of the discourse:** They are dialogic by nature, meaning that the unit of analysis is the utterance. For chats and online forums, each utterance is directly bound to the unit of discourse: the discussion turn, which may be a chat reply or a post in a discussion forum.
- **Purpose or of the discourse:** They are encouraging all the participants to express their own opinions for solving a non-trivial task, that might have several correct answers or solving paths, therefore the overall structure of the discourse should be collaborative, with contributions from all (or most) of the participants throughout the whole discussion.

The first characteristic provides a structural constraint for the textual artefact analyzed with the proposed framework by linking each discussion unit directly to the analysis unit: *the utterance*. In this context, an utterance should ideally be seen

as a single and finalized act of speech that holds enough information to be interpreted on its own, such that all the other utterances in the adjacent discourse have the same property. It should be noted that this definition of the utterance is directly related to Bakhtin who considers an utterance to be the “unit of speech communication [...] determined by a change of speaking subjects, that is, a change of speakers” (Bakhtin, 1986, p. 71). Moreover, he also notes:

Any utterance -- from a short (single-word) rejoinder in everyday dialogue to the large novel or scientific treatise -- has, so to speak, an absolute beginning and an absolute end: its beginning is preceded by the utterances of others, and its end is followed by the responsive utterances of others. [...] The speaker ends his utterance in order to relinquish the floor to the other or to make room for the other's active responsive understanding. (Bakhtin, 1986, pp. 71-72)

This definition provided by Bakhtin for an utterance is a very good starting point for a linguistic analysis of discourse that goes beyond the traditionalist theories that are sentence or paragraph-based. However, it also has some loose parts when trying to use it in computational linguistics, as it is mostly philosophical and does not offer any details on how to achieve or derive any practical implementation. This is the most important reason why very few researchers in computational linguistics started from Bakhtin's theory to develop an analysis framework for discourse. However, there have been attempts to use semantic coherence to measure the response between utterances/turns in discussion groups (Dong, 2004), but also more evolved frameworks that aimed to identify a more complex set of links between utterances/turns in chat conversations (Trausan-Matu & Rebedea, 2010).

Although any discourse could be segmented into utterances, in order for the proposed frame-

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