Building the Argument Structure of a Meeting from Drawing Events

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1 Background and Purpose

Recent studies have used methods, notations and tools for recording, representing and accessing *design rationale*(DR). It is argued that DR is neccessary for reusing past designs, coordinating people involved in a project, promoting critical reflection during design, facilitating maintenace and the use of the artifact. DR in the most general sense is an explanation of why an artifact is designed the way it is. So DR is often derived from the history of development processes, especially from the face-to-face meeting history. Because the meeting history consists of the utterances and actions of the meetings participants, they can become the segments of the DR. In fact, some of DR models based on the conversation model like speech acts, consist of the indexed utterances in conversation as their segments. But it is difficult for the current computer systems to recognaize the contents of each utterance automatically, hence one should classify each utterance manually for constructing the DR if he wants to use the conversational model, and it will require a great deal of labor to complete the classification.

In this paper, I only focus on the face-to-face meetings for developing the diagrams. For example in such meeting, the designs of user interfaces or software specifications by the diagrammatic languages are developed. And I present a systematic method to derive the segments of DR based on the drawing actions of participants, e.g. drawing the lines or boxes on the blackboard, eraseing some of them and pointing or tracking the flow of them. Some of such actions can be recognized by the current computer systems, e.g. *Xerox Liveboard*^{TM}, hence automatic classification of the DR segments can be expected by such computer systems.

2 The Method

As mentioned above, I only focus on the face-to-face meetings for developing the diagrams, because it is very difficult to establish a method which is able to apply any kinds of meetings. I call this type of meetings *Figure Centered Meeting*, abbreviated in *FCM*. In FCM, actions for drawing, erasing and pointing the diagrams on the shared workspace, became the main devices as well as the verbal actions, for the interaction among the meeting participants. I call such kind of drawing actions as *Drawing events*, and mainly focus on them. The drawing events should be easily observed from the outside of the interaction. In this paper, I mainly focus on the following six kinds of drawing events;

Display : starting to draw a new figure and focusing on it.

Change : changing the focus on one figure to another.

Add : drawing new part in current figure.

Delete : erasing some part of the current figure.

Point : pointing some part of the figure.

Trace : tracing some part of the figure.

And the segments of argument structure are decided by the following rules;

- By extracting "display" and "change" which occured in FCM, one extracts the discussion that change at the neighborhood time which the drawing events occured and the figures which were mainly discussed at the time.
- By extracting "add", "delete", "point" and "trace" which occured in FCM, one extracts the discussion that discussed at the neighborhood time which the drawing events occured frequently and the figures which were mainly discussed at the time.

These rules are derived from the results of the preliminary experiments, namely experiment#1 and experiment#2. In the experiments, two subejects cooperatively designed the softwre specification by using the OMT method. One subject used dataflow diagram for the design, and the other used state transition diagrams. In FCM in the experiment, the subjects should made the negotiation for their diagrams. Note that they could not use any computers but whiteboards and markers.

The activities of the subjects in the experments, were all recorded by the video cameras. And I analyzed the protocol of drawing events for constructing the method above. It was easy to recognize the drawing events from the recorded data, and this task could be automatically processed by the computer system.

3 Verification of the Method

The segments derived from the method should meet the contents of the meetings. So I designed and had the following experiments of FCM to verify it.

3.1 Purpose and Setting of Experiments

To extract mechanical divisions and semantical divisions in the FCM, I designed two experiments, namely Experiment#3. The setting of Experiment#3 equals to on of the preliminary experiments. I called the negotiation meeting Meeting#3. In experiment#3, a subject, namely Subject C_3, extracted "discussion"s and the other divisions intuitively. "Discussion" was defined a sequence of utterances and acts which the participants of the negotiation discussed about one topic. "Other" was defined a division which subject C_3 realized but was different from "discussion". Note that the subejct C_3 was not informed the way of my method.

3.2 Results and Discussion

I applied the method to the recorded data in Meeting#3, and several events were derived from the data. Two "display"s , eighteen "change"s and twenty "block"s included in the events. I defined a *Block* as a time zone where "add", "delete", "point" and "trace" occured frequently.

In Experiment#3, subject C_3 had derived thirty "discussion"s and two "other"s, from the recorded data of Meeting#3. And I had compared the Blocks derived by me with Discussions derived by subject C_3. From the results of the experiments, I had the following findings;

- The drawing event, "display" can be available to extract the semantical divisions from FCM.
- Unfortunately, the drawing event, "change" did not contribute for extract the semantical divisions from FCM.
- The drawing events, "block" contribute for extract the semantical divisions from FCM. In these experiments, 22 discussions out of 30 could be derived by the method.

4 Conclusion

In this paper, I proposed the method to derive the semantic segments from the records of the meetings. The method is based on the actions for drawing, erasing, pointing and tracing the diagrams on the shared workspace like whiteboard. And I validated the method for comparing the derived segments by the method with the segments provided by a subject. Because this method provides the segments of DR structure, most of all DR models can be used with this method. I now plan to investigate availability of computer support for the method. For example, if commercial CASE tools for software design or simple drawing tools are used cooperatively, our method can be applied to such task. And the progress of the techniques for recognizing the continuous utterance, e.g. keyword spotting, would contribute to the methods.