Towards Extracting Human Relations at Workshop

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Abstract. To date studies of interactive systems in workshops have failed to estimate user behaviour. This paper presents an outline of activity capture method of workshop attendees. Toward capturing human relations at the site, we are focusing on voices and sounds of attendees to estimate attendees location and orientation, since orientation information can reflect a more detailed context. Without any special location sensors or direction sensors, a simple acoustic recorder and player enables the method to estimate the attendee's location and orientation history as well as recording the audio scenery.

1 Introduction

Recent years have seen growth of museum guidance systems that can provide information support to visitors. Those systems are not only to announce audio assist, but also to offer interactive functions such as location-awareness that can display additional information depending on the visitors locations. Web based systems can also be support the additional information at the site[1].

On the other hand, since the 1960s, participatory learning activities called workshops have been spread widely. The aim of workshops is not only problem-solving training like group working, but also discussion such as town development by community resident. Against this background, there has been a blossoming of citizen's creative workshop in recent years. For example, CAMP(Children's Art Museum & Park)[2], YCAM(Yamaguchi Center for Arts and Media)[3]and CANVAS[4]have been regularly organizing workshops that enhance children's creativity and expressiveness. In UK, Capture Wales[5]provides storytelling style workshop that uses visual contents. Some workshop has an idea that activates interactions between visitors[1]

In terms of enhancing creativity and expressiveness, reviewing autochtonous activities by cognitive approach is important. Such reviewing is called *reflection*. The reflection by verbalization is shown to be helpful in accelerating attendee's learing[2]. Focusing on expressive activity, the reflection of workshop has been categorized into the following:

[1] http://www.louvre.fr/
[2] http://www.camp-k.com/otona/camp/
[3] http://www.ycam.jp/greetings/
[4] http://www.canvas.ws/
[5] http://www.bbc.co.uk/wales/audiovideo/sites/galleries/pages/capturewales.shtml

– self reflection by attendee who performed the expressive activity on the workshop;
– reflection by facilitator who developed, organized and conducted the workshop.

The facilitator takes on an important role for the workshop In particular, upskilling of the facilitators helps the efficient operation of the workshop through the examining their and attendee's activities.

One of the conversational workshop analysises is that how the creation or the expression has been performed. In the analysis, interaction patterns of the attendee's speech are significant factors[3]. Therefore, videos and/or IC recorders are used in many workshops to record activities. The interesting scenes are extracted and the speech patterns are analyzed. At this time, it is considered that the efficiency of analysis are improved if the extraction of speech and situation are automated.

Therefore, we have been trying to tackle an extraction of workshop situation from several sensors such as IC sound recorder and IC cards. As the first step toward the extraction, we especially focus on attendee's location and orientation of the situation. This paper summarizes our essential approach for estimating location and orientation using networked sensing. It also describes an outline of acoustical analysis of the topological estimation.

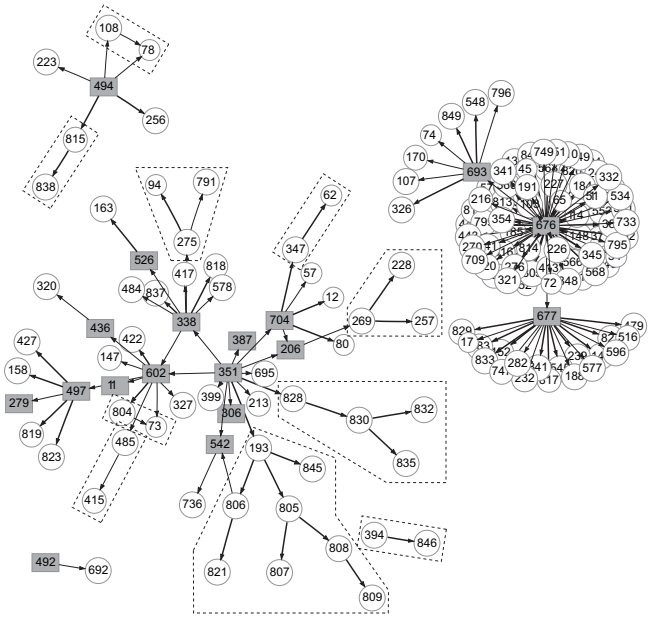

Fig. 1. Example of human relations on the site

2 Location and Orientation Estimation Method and User Devices

At the workshop, attendees have many kinds of human relations. For example, Fig. 1 shows a human relations at a conference site. This graph was extracted by simultaneous usage ecords of IC cards, while the system provided users an invitation function. Round nodes indicate general users, while box-shaped nodes indicates relevant people to the system.

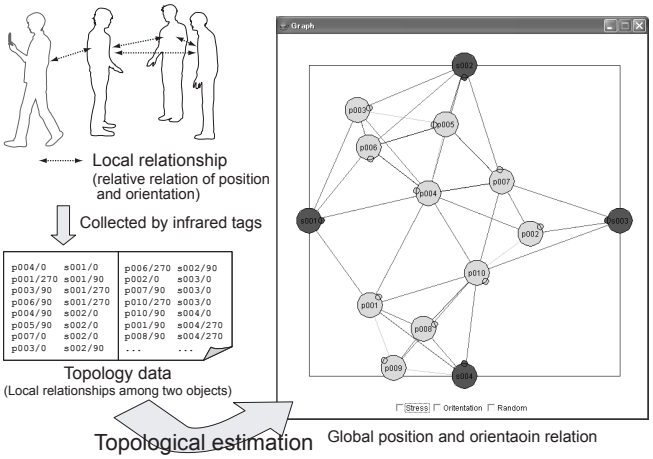

Fig. 2. Overview of the topological estimation

We are trying to extract such figure 1 graph from audio records that logged by user's IC recorders. As the first step toward the extraction, we especially focus on attendee's location and orientation. While there proposed various types of location estimation method[4], many of the previous methods focus on absolute position estimation. The key of workshop, however, is attendees or visitors. At the reflection time, the important events can be observed around attendees. Therefore, we focus on the relationship between attendees, that is local relationship, rather than absolute position.

Our principal estimation method for location and orientation uses topology that is defined as collection of *local relationships*. The local relationship is the positional and angular relationship between two objects: humans or things. The *global relationship* is a set of objects' relationships represented by the entire local relationship.

The topological estimation engine extracts a global relationship from the local positioning relationships. Fig. 2 shows an overview of input (left part) and global relationship output (right part). Then the engine produces context information of the objects, such as a classified group or an interesting object for a user, based on the global relationship. In this paper, however, we emphasize an examination

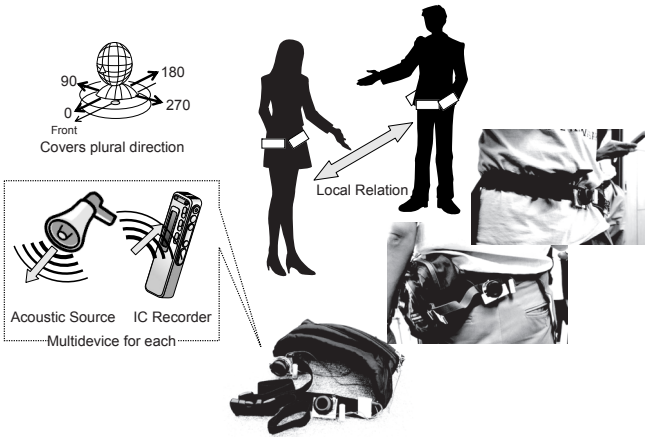

Fig. 3. System structure and users' device using acoustic sound

of users' devices described in the next section. The detailed algorithms - how the global relationship can be estimated - can be found in [5].

Fig. 3 shows an acoustic sound based topological estimation structure. In this figure, we use an IC recorder to collect sound signal that indicates users' ID and direction as well as ambient sound such as users' conversation at the workshop. The recorded information is analyzed after the workshop. If the specific sound of user A is found from user B's audio file and the sound user B is found from user A's audio file at a similar time, Then the precise temporal difference of the two audio file and traveling time from user A to user B are calculated. Thereby, the distance and vague orientation among the two users are estimated. By collecting all proximal information of each object, that is local relationships, location and orientation of all the objects are estimated.

3 Summary

One of the purposes of interactive system is capturing human relations to provide information properly. We are now focusing on the workshop and trying to collect activities and to extract situations. This paper has presented a location and orientation estimation method towards extracting human relations at the site. In the method, each audio signal captured by a recorder is analyzed and identified as vicinity of simple relation between two attendees. The locations and orientations of all the attendees are estimated by collecting all the simple relation information.

Acknowledgment

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