Consensus Development Support System for Opinion Convergence by Visualizing Input History

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ABSTRACT

When collecting opinions to decide roles, majority votes after discussions are often used. Therefore, an environment that smoothly leads to reasonable and satisfactory conclusions is necessary. In this paper, the authors propose a consensus development support system that visualizes opinion input histories. Users input their opinions by moving images on the interface with a mouse, and input histories are replayed as animation. Users can input not only local but global opinions by seeing other user inputs. Such input histories might change other users’ minds by visualizing minority opinions. In this study, the targets of the system are role-sharing problems ordinary discussed in small groups of four to eight acquaintances. Based on the experimental results, the system effectively realized opinion convergence and acceptable conclusions.

Keywords: Communication Support, Consensus Development Support, Discussion Convergence, Information Systems, Visualization of Input History

1. INTRODUCTION

When we collect opinions and decide roles, we frequently use majority votes after discussions. Therefore, we need an environment that smoothly leads to a reasonable and satisfactory conclusion. Although brain storming (Osborn, 1979) and Mindmap (Buzan, 2006) visualize the distribution of opinions and support to collect various opinions as a divergent thinking support (Nemeth, 1987), they lack functions that support opinion convergence that discussion members can accept.

In this study, we propose a consensus development support system that visualizes opinion input histories. It deals with such familiar role-sharing problems as the division of tasks and determining the sequence of turns for...
particular responsibilities in a group of four to eight members who know each other.

Based on the previous definitions of divergence and convergence (Basadur, 1996; Clark, 1965; Kerr, 2004), opinion divergence in this study is defined as the enumeration of various choices for each role, and opinion convergence is defined as a choice for each role supported by a majority of the discussion members.

Discussion members input their opinions by moving objects displayed on the interface with their mouses. The opinion, “person A is suitable for role B,” is expressed by the input where “an image of person A is moved to the area of role B”. Discussion members can also refer to an animation of input histories to consider others’ and their own past opinions.

People tend to be affected by the majority in environments where they can see the opinions of others (Asch, 1951). Therefore, the proposed system has a function that enables users to change their opinions after considering minority opinions. Such consideration is meaningful because members can think about problems deeply to arrive at better solutions (Bray, 1982).

Members in a group accumulate opinions in the divergence phase, and final decisions are made by a majority vote after considering each opinion about role sharing. The proposed system has the following three features that smoothly converge opinions:

1. Asynchronicity: Opinions aren’t input simultaneously.
2. Anonymity: Each opinion is not identified.
3. Visualization: Members can see the distribution of opinions and confirm input histories.

The first enables users to input at their convenience without meetings. The second enables users to input opinions frankly without fear of reprisals from superiors or acquaintances. The third requires that members confirm the situations of other opinions before they input new ones. The proposed consensus development support system with the above features encourages the development of acceptable conclusions.

In this paper, the details of the proposed system are described in Section 2. Preliminary and evaluation experiments are described in Sections 3 through 5, related works are mentioned in Section 6, and this paper provides a conclusion in Section 7.

## 2. CONSENSUS DEVELOPMENT SUPPORT SYSTEM

In this section, the details of the proposed consensus development support system are described.

### Problem Settings

Our proposed system deals with such familiar role-sharing problems as division of tasks and determining the sequence of turns for duties in a group of four to eight members who know each other from the same class, the same laboratory, or the same divisions. Role-sharing problems include such relatively simple examples as clean-up duties, cookout preparation, softball positions, and roles in a play.

### System Overview

Figure 1 shows the framework of our consensus development support system. The images of each role and each candidate are set as the initial settings. Users as members who develop a consensus can input their opinions after logging onto the system by moving objects displayed on the interface with their mouses. The opinion “person A is suitable for role B” is expressed by the input where “an image of person A is moved to the area of role B.” Users can also refer to animation of input histories to consider others’ and their own past opinions.

The system executes image processing when an opinion is input and also saves and replays opinion input history.

### Opinion Input and System Processing

This subsection describes the system processing that corresponds to opinion input. Figure 2
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