Development and Evaluation of a Minutes System Focusing on Importance in the Meeting

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ABSTRACT

At meetings, a variety of outputs such as presentation materials, text minutes, video/audio data are generated. Not only meeting participants but also absentees can easily understand meeting minutes easily if these data are mutually referred and extracted important points. Therefore, focusing on participants' importance, we have proposed and developed the system that automatically produces Web pages by collecting and editing meeting data with much labor saving so as to easily understand a sequence of meeting. The importances submitted by participants are automatically collected and showed their status to participants in this system. We developed, first, prototype version 1 and then enhanced to version 2 by taking into consideration of evaluation results obtained from the practical use. Finally, we state evaluation results of new version, and show the validity of our developed system.

1. INTRODUCTION

Generally, at meetings or seminars in laboratories, a variety of outputs such as presentation materials, text minutes, and video/audio data are generated. After the meetings, we often exchange the data among participants, and review them for reminding or reconsidering meeting outputs more details. It is considered that not only meeting participants but also absentees can easily understand meeting minutes easily if video, presentation pages and text data are mutually referred. However, it requires enormous efforts to collect data which are located in participants' PCs and to edit them to be mutually referred. Therefore, we have proposed and developed the system that automatically produces web pages by collecting and editing meeting data with much labor saving so as to easily understand a sequence of the meeting [1]. In addition, we proposed a more sophisticated system to enable to retrieve important points in the meeting. In this paper, we describe system development, and evaluation of the proposed system.

2. OBJECT OF STUDY

2.1 Scene of object

In our research, we focus on meetings and/or seminars where participants give presentation or record voice/video using PCs. Figure 1 shows an example of conference scenes. All meeting participants are using their own note PCs, and a presenter is making presentation by using his or her own PC. Participants A and D have camera devices attached their PCs, and record the meeting scenes.
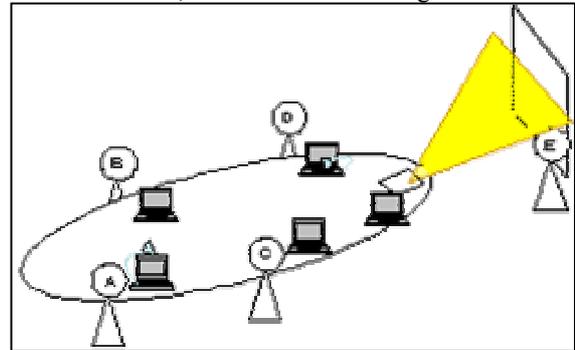

Figure 1. Environment of research target

2.2 Flow of contents

In this section, we consider the process from recording data to browsing contents by noting data generated by meetings. Considering video contents such as television broadcast or VoD, they have four processes as listed below.

(1) Data generation
(2) Recording data
(3) Editing contents
(4) Browsing contents

(1) Data generation is that potential contents are generated and stored. Potential contents such as persons, objects or events exist in specific places. (2) Recording data is recording video or audio data generated in (1). (3) Editing contents is a process to edit the contents for easy understanding. (4) Browsing contents is distributing contents to viewers. Figure 2 shows processes data where data and contents flow from (1) to (4).
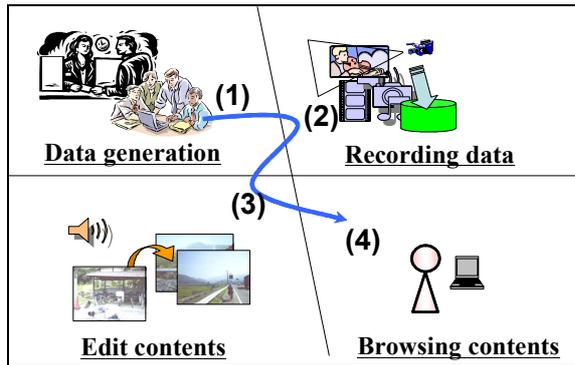
Figure 2. Flow of data and contents

2.3 Flow process of meeting data

In this section, we consider the flow of contents as distributed above in contract with data generated in meetings.

First, we consider the second process of (2) Recording data. Many of the meeting, data such as presentation files, text minutes, and video or audio files are saved to participants PCs independently. Therefore, in order to consolidate such data, there are many things to do, for example, we must ask participants to save the data to a shared folder, and consider the shared storage and a method of saving data.

Next, we consider the third process of (3) Editing contents. The generated meeting data is not only the continuous media such as video or audio but also presentation documents or text minutes. It is possible to understand the meeting details from the integrated data referred mutually. There are some tools such as the Microsoft Producer for PowerPoint 2002 [2]. However, in the case of using such tools, the more data is, the more the editing labor is. If there is no time information in the data, it is necessary to set time information to the data manually. Besides, it is necessary for uploading the contents. Focusing on these points, we proposed the system of automatically authoring the Web pages which make participants as well as absentees understand meeting details.

3. SYSTEM OUTLINE

In this chapter, we describe the outline of the proposed system.

3.1 Textmedia Recorder

The Textmedia Recorder is installed in each participant's PC. Figure 3 shows a window screen of the Textmedia Recorder prototype version 1 which we have developed.
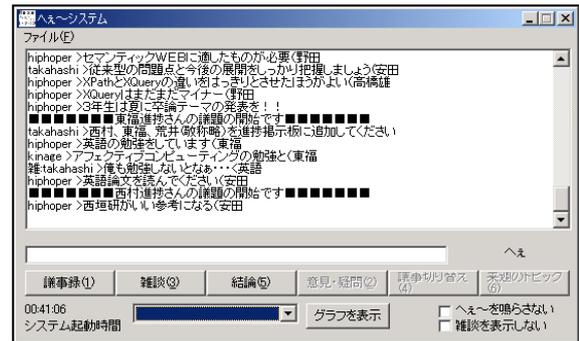

Figure 3. Textmedia Recorder prototype version 1

The Textmedia Recorder is meeting minutes tool executable by multiple persons with collaborative work. If a text message is typed in the textbox by some person, then the message can be shown in the textbox of all participants' Textmedia Recorder. When sending the message, a kind of message is specified by pushing the corresponding button such as minutes, comment/question, or chat.

A various of files, like audio/video, or presentation file are generated in each participants PC according to the meeting progression. These generated files are saved with time and place information by the Textmedia Recorder. Figure 4 shows a scene of automatic uploading of the meeting data with the Textmedia Recorder.
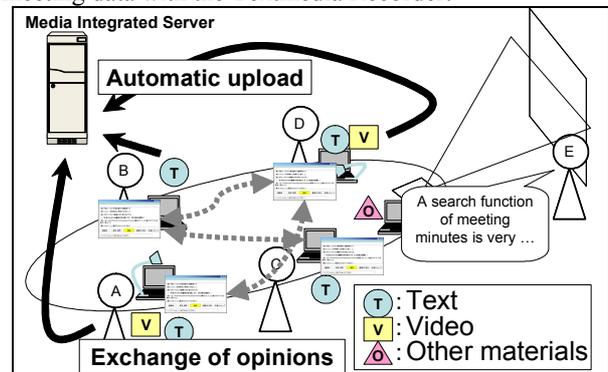

Figure 4. A scene of automatic uploading of meeting data

In order to hold the effective meetings, it is necessary for participants to have equal opportunities to make opinions/comment. Using this Textmedia Recorder, participants can exchange their opinions/comments even during presentation by a speaker.

The contents, recorded and saved with their information by the Textmedia Recorder, are instantly uploaded to a server if network connections are available. If the participant PC is offline, the contents are saved to local storage until on network connections are in use. Consequently the contents are uploaded as soon as network connections are available.

3.2 Submission and access to recorded contents

The uploaded contents are saved with time information in the Media Integrated Server. According to the Media Viewer requests, the adequate contents are distributed in coupled with a conference schedule function. Figure 5 shows a sequence of contents distribution.
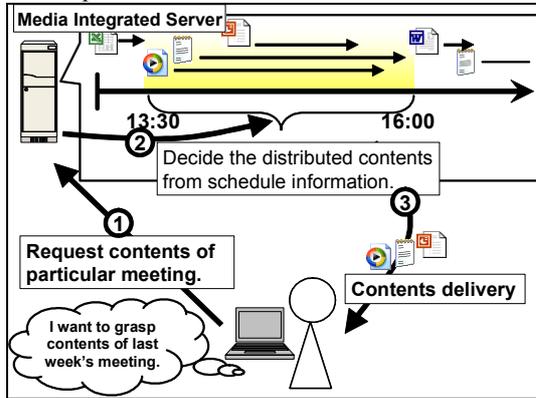

Figure 5. A sequence of contents distribution

With mutually referred with the timeline, the distributed contents is send to users browser. Figure 6 shows a screen example of contents view.

Figure 6. A screen example of contents view

If a user clicks a link of an opinion of a text minutes, the continuous media such as video are played when the text minutes recorded, and Web pages or presentation materials is shown at the same time. If there are multiple videos, it is possible to switch the videos.

3.3 Searching method of the important scene

A search function of meeting minutes is very important in order to understand the meeting minutes. There exist some systems to record a meetings or lecture with video referring to the text minutes [3]. However, many of these systems only have search functions for video selected by text and voice.

It is considered that only these functions are not good enough to video retrieval. For example, when searching a word "ubiquitous" in meeting minutes, even if 20 results are shown by the system, it is not possible to understand
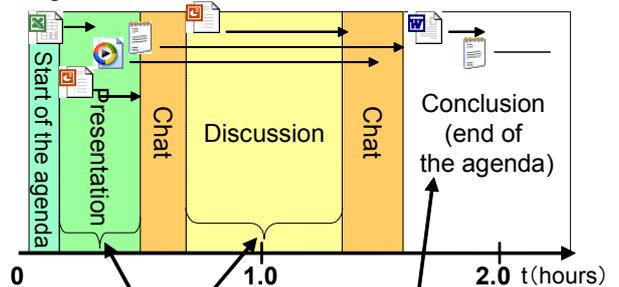
clearly which result is a content of the presentation or an idea from the discussion or an unworthy word during chat.

In this section, we describe the searching method for text minutes or continuous media focusing on meeting details and importance.

(1) Providing the meeting details

In order to understand the meeting details, we describe the method to provide what is going on by collaborative works. The participants select a meeting detail such as "start of the agenda", "presentation", "discussion", "chat" or "conclusion", and input to the Textmedia Recorder. These inputs by the participants can be made by not only one person but also multiple persons.

As recording a transition of meeting details with time information, it is possible to understand a whole of meeting and to search specific points of continuous media such as video or voice after meetings. For example, in the case of grasping decisions of the meeting, after viewing the points of "conclusion (end of the agenda)" in the contents, participants can get that details. And in the case of getting a background of the decisions, after viewing the points of "discussion" or "presentation" before the points of "conclusion", participants can easily get the background. Figure 7 shows an example of the providing meeting details.

Figure 7. Providing the meeting detail

(2) Providing the importance in meetings

The "importance" is an evaluated value point by participants in the meeting. If a participant feels important to someone's opinion such as new ideas, new discovery and significant opinions in decision making, then input the importance to the system. We consider various ways to input importance including pushing certain key on keyboard at real time, and selecting some numbers of review times. According to the kind of data or data search efficiency, input methods are adequately selected.

After a meeting, it is considered that importance inputted points in the meeting are where there exists important information. For example, if a video content of the 20 minutes "discussion" span is available, it is possible to search the important points which many participants particularly feel important. That is, it is

possible to get importance at the specific point in the span such as "presentation" or "discussion". Figure 8 shows an example of the showing conference importance.
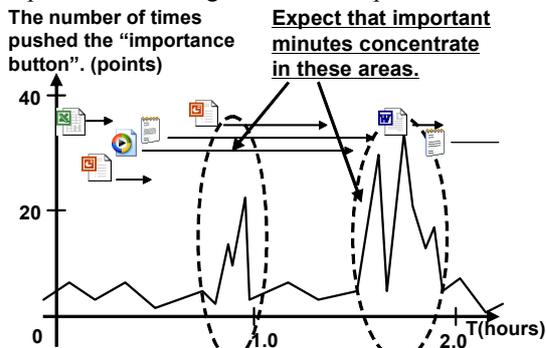

Figure 8. Showing meeting importance

Using this method, it is possible to search meeting details, for example, which span many participants are interested in, and to search the target information more efficiently in many data such as presentation documents, text minutes, video or audio files.

4. SYSTEM FRAMEWORK

The system framework is shown in Figure 9. The system consists of following three components.
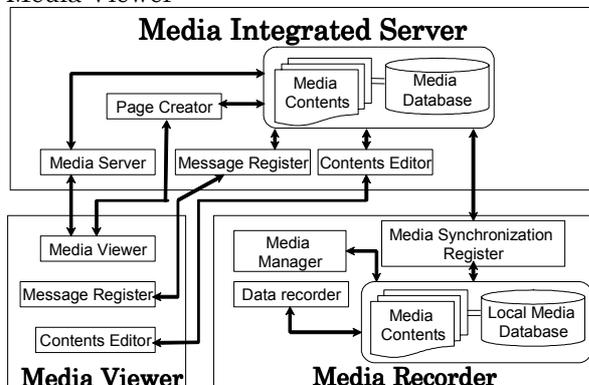- Media Integrated Server
- Media Recorder
- Media Viewer

Figure 9. System framework

4.1 Media Recorder

The media recorder has a function to record whole generated data such as presentation documents, text minutes, video or audio files. The saved data is uploaded through the Media Synchronization Register part related with a generated time, user information, meeting information and importance value.

In a meeting, there are various data generated by external devices, such as participant voice recorded by a voice recorder, videos recorded by a digital video camera, photos taken by a digital camera. It is considered that those data are needed to be stored as well. The External Data Converter, one of the tools of the ASSIST [4], is able to automatically get recorded data and time information, and to make relationship with other data. Using this tool, we are able to develop to collect such data as those generated by external devices.

4.2 Media Integrated Server

The Media Integrated Server is a server to store several contents. The data uploaded through the Media Synchronization Register is registered and stored to the database in the Media Integrated Server. Those registered contents are distributed to users according to requests by the Media Viewer. The video or audio streaming data is distributed through the Media Server part.

There is the Message Register part for storing added data, new comments, other discussion detail or documents after the meeting. It is possible to upload and store data to the Media Integrated Server through this part asynchronously. In addition, it is possible to edit contents which have already registered.

4.3 Media Viewer

The Media Viewer is a viewer to browse contents from the Media Integrated Server through the Page Creator part or the Media Server part. As described above, it is possible to register or edit contents through the Message Register part or the Contents Editor part.

5. PRACTICAL USE OF THE SYSTEM

We used the Textmedia Recorder prototype version 1 which we developed in our laboratory seminar. In this chapter, we describe the results, including the seminar participant comments. The circumstances of the system use are followings.
- Total of the seminar participants are 120
- Total of the system use participants are 51
- Number of the seminar times is 11
- Number of posted or stored minutes comments is 3257
- Number of stored importance is 1097

5.1 Participant's opinions/comments about the whole system

The opinions/comments of the participants are classified into three parts, (1) regarding an interface of minutes, (2) regarding enhancement of meeting management, (3) regarding the importance. The top of two opinions/comments in each category are follows.
(1) Regarding an interface of minutes
  - Who submit a comment should be shown more clearly.
  - Minutes should be separately indicated from others such as chats or comments.

(2) Regarding enhancement of meeting management
  – Some chats prevent a seminar progress.
  – It is lead to take minutes or comments when superiors like a professor or seniors are speaking.
(3) Regarding the importance
  – Importance minutes points should be emphasized to recognize them easily
  – The decisions or next week topics should be highly visible.

Regarding (1), it is possible to resolve improving the minutes' area interface of the Textmedia Recorder. Regarding (2), it is possible to cope by assigning multiple minutes taking persons, and taking minutes by turns. Regarding (3), it is possible to cope by changing color or size of letters according to the important level of minutes, or by showing specific messages when discussion items change.

5.2 Submission of importance

In this section, we examine the importance obtained in consideration of the relationship between minutes and importance.

Figure 10 shows the graph of a relationship between minutes and importance. The importance is shown by a thinner line in this graph. First peak of this line comes from testing of the system. The minute's importance is shown by bold one, and comparatively indicates low value in a whole. It seems to have some correlations between two lines in by areas surrounded by circles. However, in the other parts, it dose not seem to have correlations. We consider these parts where specific correlations are not found.
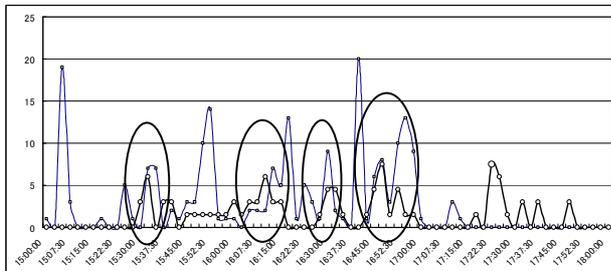

Figure 10. A graph of minutes and importance

By attending a seminar and observating participants' use of the Textmedia Recorder, we figure out that there are some kinds of importance in the importance indicated. There are various objects of importance, that is, voice of a participant, a minute text, a page of the presentation or a Web page on screen for one of referred materials. The Textmedia Recorder can simply record importance, however, it does not record what is important, or why this is important. Therefore, it is necessary to show clearly what is important, or why this is important.

6. IMPROVEMENT THE TEXTMEDIA RECORDER AND ITS EVALUATION

According to the results of the previous chapter, we developed the Textmedia Recorder prototype version 2. In this chapter, we described the detail of improvement and evaluation.

6.1 Improvement of the Textmedia Recorder

According to the consideration of 5.1 (1) to (3) participants opinions/comments and 5.2 submission of importance, we enhanced our system to the Textmedia Recorder prototype version 2. Figure 10 shows a window screen of the Textmedia Recorder prototype version 2.
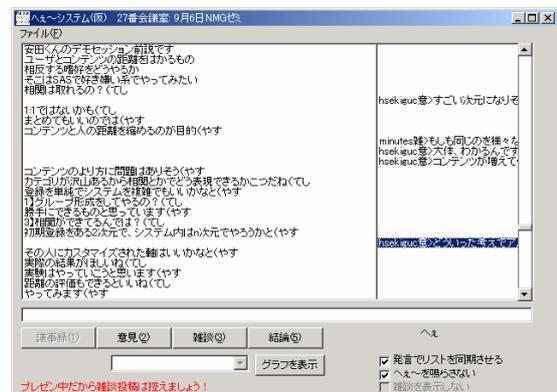

Figure 11. Textmedia Recorder prototype version 2

First, regarding the improvement item of 5.1 (1) "Regarding an interface of minutes", we developed the interface that the minutes texts are listed in the left text area, and the other comments are listed in the right text area. Besides, we synchronized between a right text area and a left text area. It is considered that it is easy to know referred text minutes where a comment of right area refers to. Second, regarding 5.2 "Submission of importance", we tried to develop to be able to vote a specific minute text. If a sentence of text minutes is double clicked, the importance point of the minute is incremented, and the importance point number is added to head of the sentence. This importance voting is able to be made among participants at the same time, and the Textmedia Recorder shows the voting status. Figure 12 shows voting of importance.
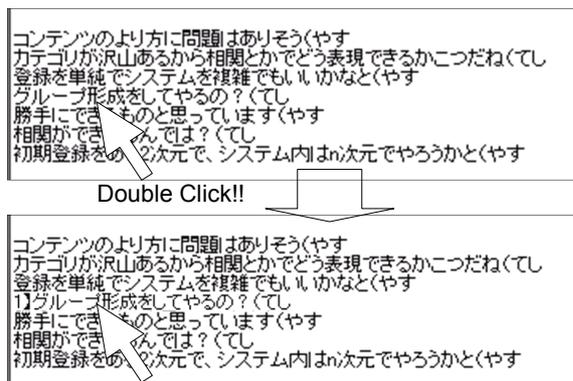
Figure 12. Voting of importance

Therefore, the issue regarding 5.2 "Submission of importance" is improved, and regarding the issue of 5.1 (3) "Regarding the importance", it is possible to show important minutes for participants.

6.2 Evaluation of Textmedia Recorder Prototype version 2

We evaluate the Textmedia Recorder prototype version 2 from questionnaires in a seminar. The number of participants is 10, and the system user is 4. For the improvement of the issue 5.1 "Regarding enhancement of meeting management", and one of the participants only takes minutes. The questionnaires are shown below.

Q1. Can you get important meeting items?
Q2. Can you get points that other participants remark?
Q3. Is your research subjects clarified?
Q4. Will this system be useful for summarizing a minutes?

We ask participants to select from 1(very good) to 5(very bad) and to write a reason for each question. From the replied questionnaires, we calculate the each average point. The results are as follows.

Q1.Average point is 2.75
Q2.Average point is 3.5
Q3.Average point is 3.0
Q4.Average point is 4.25

Though Q1 to Q3 ask whether or not participants can get an important point from minutes review, it seems that there is a room to be improved. The reasons are classified into following two.
(1) It is difficult to recognize details of the seminar from only this text minutes.
(2) The minutes and submission of importance is not enough to know seminar details.

(1) is the opinion caused by difficulty which participants get details from only text contents. This problem is able to be solved by referring mutually with the others materials such as presentation slides, audio and video.

There is an opinion "I can't submit any minutes or importance, because I don't get use to this system" regarding (2). Therefore, this problem is able to be solved by adapting participants to this system. However, the reliable way to get importance must be considered. For example, the issue is able to be improved by taking a few minutes for submitting the importance after or in the middle of a seminar.

Q4 shows highest point. The following reasons are described by participants, "I can get other ideas which participants with no oral discussion posted as comments are synchronized with minutes.", "It is good for me to know what the comments refer to. I can understand why the comments are submitted." The improved system is available for getting meeting details.

7. CONCLUSION

In this paper, we consider that a data process from automatically collecting to uploading. Next, we consider the relation between generated text minutes importance and submitted participants' importance. In addition, we explain improved system for clearly showing what is important. Moreover, we state evaluation results and show the validity of our proposed system.

Hereafter, we will continue to evaluate our proposed system and enhance it so as to be used more practically. We will also consider the educational availability by building into the "Slide Synchronization Tool" [5], which enable to share presentation pages with only web browsers, or "System MASA" [6], which enable to manage interactive Q&A on collaborative learning.

8. REFERENCE

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