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Improvement of the QOL of elderly people utilizing ICT

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We are researching ways to improve the QOL of elderly people living in care facility, or at home by utilizing information and communication technology (ICT). As part of that, we digitize old photos of the elderly, and upload these photos to the cloud service. Then, we have built an environment that can be utilized these data in a various media types for care services. Specifically, memories of the elderly are converted to interactive digital photo album like a video slide show, and care staffs, family members and volunteers use these media for providing topics while active listening with the elderly. We also constructed environment that allows remote active listening by using a video call while sharing the above-mentioned media in order to introduce to increase the chances of communication of the elderly.

1. Introduction

Japan faced a super-aging society and increasing nuclear families, elderly people living alone is common. These elderly living alone have little opportunity to communicate with others in the day-to-day activity. In addition, even in the elderly living in care house don't have chanses of communicating with others in the same way.

It is known that communication plays a major role in improving QOL of elderly people and the reminiscence method using photographs has been assessed in the field of care [Nawate11]. In the previous study, the effect of " The reminiscence videos " which strengthened the reminiscence method has been confirmed for the patient's emotional stability [Kuwahara05]. The video phone system having the function of sharing the reminiscence photos has been proposed to increase the opportunity of communication for elderly people [Kuwahara05]. Instead of the IP phone which is desicated device, the remote active listening system which uses not only reminiscence photos but also common photos for example cooking and events based on Skype®and Web browser was proposed[Tsuji10]. Further, the degree of burden on the active listening volunteers have also been studied [Iwamoto13]. However, our previous studies required special devices and software platform, and it is difficult to deploy the system widely to elderly people communities. Also, there is the mentenance problem.

In order to overcome above mentioned difficulties, we combined the cloud services that are freely available in the Internet for implementing almost the same functions that we developed in our previous studies. By using the cloud services, we can provide our proposed services everywhere the Internet is available without the cost. In this paper, we present the system overview based on the cloud services, and preliminary evaluation result on the effect of our proposed system.

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2. Method

2.1 System Overview

The reminiscence distribution platform is composed of Skype®for video phone, YouTube®for sharing videos, Google Picasa®for sharing photos and Google's Chrome Remote Desktop®to cope with problems of elderly's side. Fig.1 shows the system overview. [*1] We collected reminiscence photos of elderly residents and interviewed about these photos. The reminiscence video was made from the the interview and photos. Uploading photos on Picasa and reminiscence videos on YouTube can share videos and photos during interactive communication on Skype. In order to solve the problems of elderly side PC, the remote control facility such as Chrome Remote Desktop was introduced in our system.In addition to record the audio and video dialogue, Netralia Pty Ltd's VodBurner®was introduced.

2.2 Participants of the Remote Active Listening

The student volunteers communicated with elderly residents using our proposed system. It is difficult for elderly residents with severe dementia to concentrate the conversation with volunteer. Therefore, we asked to participate to caregivers in the remote active listening for supporting the active listening by using reminiscence photos and videos. Consequently, it helped caregivers to share resident's old memories in order to deepen their understanding resident's history of life.

2.3 Evaluation Method

The behavioral changes in the daily life of elderly residents are evaluated by using medical assessment methods:

*1 System and product names used in this paper are trademarks or registered trademarks of their respective companies.

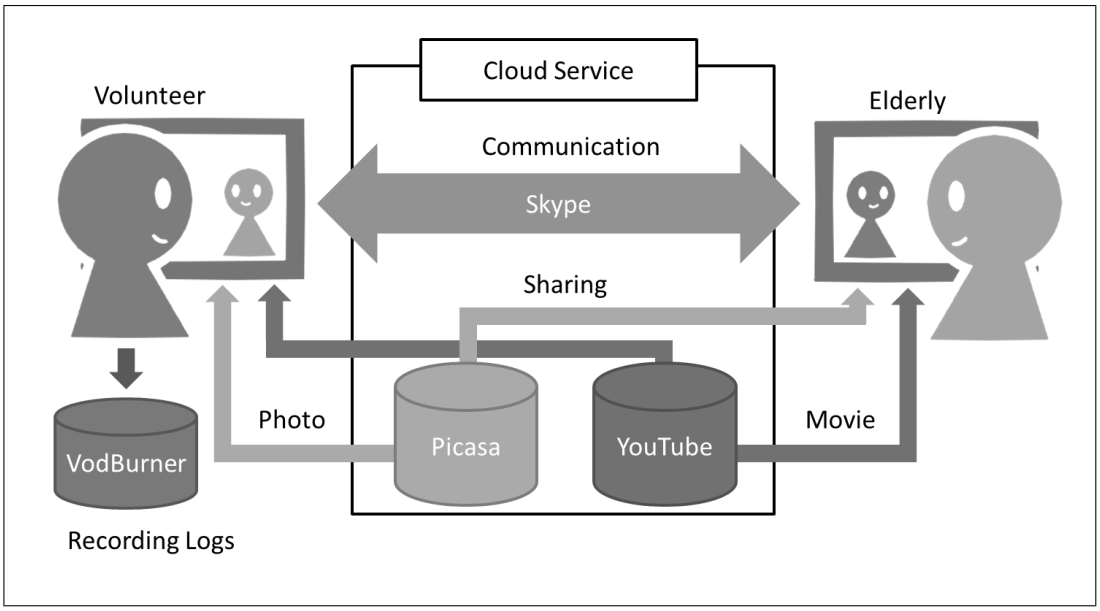

Figure 1: System Overview

NPI score, DBD scale and GBS scale. Medical evaluation uses NPI score, DBD scale and GBS scale. NPI is the measure of psychiatric symptoms with dementia [Hirono97]. DBD is the indicators of the care burden based on the evaluation of behavioral disorders. GBS is the effective measure of the pluralistic dementia evaluation [Gottfries82][Baumgarten90][Mizoguchi93]. We selected six items in GBS that were considered appropriate for assessing the state of the subject during the active listening in order to reduce the assessment cost of the caregivers. In order to investigate the correlation between above medical scale and the data obtained by using engineering methods, we also applied to the analysis of facial expression during the remote active listening using OMRON Corporation's OKAO Vision®[OMRON]. We evaluate the fundamental frequency of voices in the remote active listening based on previous study[Tsuji10]. These engineering assessment such as voice and facial expression will supplement the medical evaluation.

2.4 Experiment Protocol

In order to study the usefulness of the platform, the remote active listenings were conducted with the consent of the family, the doctors and caregiver. In order to compare with the previous study, the remote active listening with video and without video were conducted and compared. Each session was carried out for twenty minutes between 14:00 and 15:20 on weelday from Nov. 15 to Dec. 25. For subjects, 20 mins reminiscence videos was produced by using their old photos and episodes obtained from interviews (Fig.2). Subjects and volunteers conducted remote active listening. The two kinds of remote active listening were conducted. One is the remote active listening using the reminiscence video and the videos of old life for reminiding their memories. The sedond one is the remote active listening without videos. The remote active listening was conducted between about five times during a month. Evaluation by the NPI was conducted before the experiment and after one month of the end of experimental term. Evaluation by the GBS was conducted am(before the remote active listening), during the remote active listening and evening(after the remote active listening). The study protocol was approved by the Kyoto Institute of Technology Ethics Committee for Scientific Research Involving Human Subjects.

Figure 2: The Reminiscence Video

2.4.1 Subjects

Tab.1 shows the subject's overview. Care level between 1 and 5 based on assessment of care requirements is used on Japanese nursing-care insurance system. The cognitive level (1,2a,2b,3a,3b,4 and M) is the degree of the dementia. Subject A of the experiment was interrupted due to bad health. Subjects other than subject C joined preliminary remote active listening with caregiver. caregivers assessed the subjects in the GBS and NPI at the start of the remote active listening.

Table 1: Subjects

Subjects	Age	Sex	Care Level	Cognitive Level
A	74	female	2	2b
B	90	female	1	2b
C	81	male	1	2b
D	94	female	4	3a
E	84	female	2	3a

3. Result

The remote active listening conducted 31 times and each session was about 15 minuets. Many of these logs are under analyzing. Therefore, in this paper, we introduces the preliminary results of GBS scale of subject D and E. Following results are the case of subject D and E. Both of them had a mild form of the dementia.

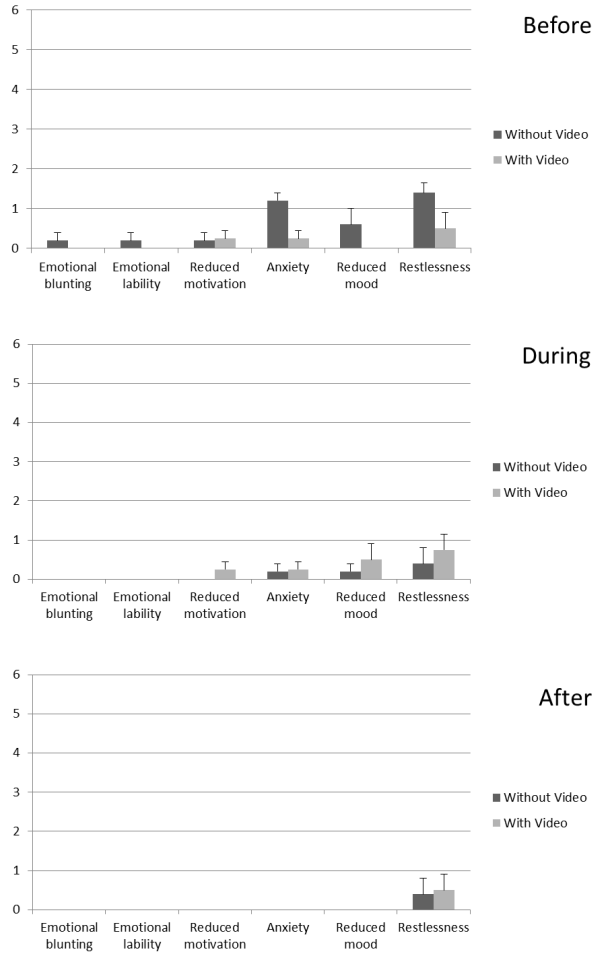

Figure 3: The Subject D's GBS Result of The Remote Active Listening

Fig.3 shows the average of the subject D's GBS result of the remote active listening. Caregiver reported that subject D looked forward to the remote active listening. Before the remote active listening, Anxiety and Restlessness show a higher point and other items also show the value. During the remote active listening, except Reduced mood and Restlessness on using video, all item's value are decreased. After the remote active listening, except Restlessness, all item's value disappeared.

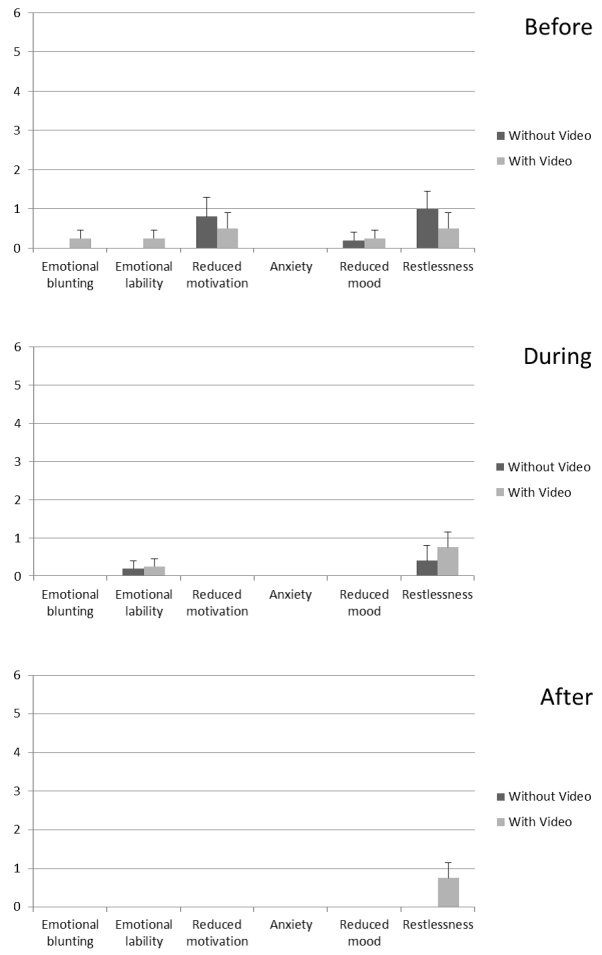

Figure 4: The Subject E's GBS Result of The Remote Active Listening

The videos of old life was mainly used for subject E. Subject E went out the room during the remote active listening. She said that she don't want to see the video that her video. However, she seemed to be enjoying the remote active listening using the videos of old life. Fig.4 shows the average of the subject E's GBS result of the remote active listening. Before the remote active listening, Emotional blunting, Emotional lability, Reduced motivation and Restlessness show a little higher point. During the remote active listening, except Emotional lability and Restlessness, all item's value disappeared. After the remote active listening, except Restlessness on using video, all item's value disappeared.

4. Discussion & Conclusion

Caregiver reported that subject D looked forward to the remote active listening. In both of subject D and E, most of item values after remote active listening have improved. Increasing value of Restlessness after the remote active listening is considered that it caused by the more excitement of talk. Therefore, this remote active listening system seems to effective to make elderly's communication more comfortable. This may indicate that the remote active listening using a video activates the elderly people. We will analyze the other subject's GBS. We are analyzing the facial expression and voice now. Fig.5 shows the sample of the feature points of the facial expression extracted by OKAO vision. It can analyze the facial expression, for example, the direction of the pupil, opening and closing of the mouth and smile.

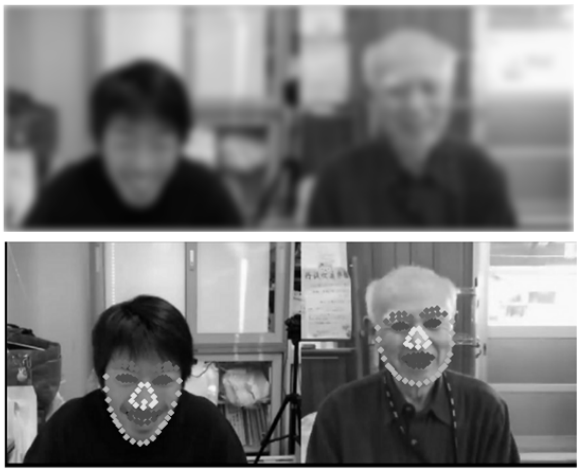

Figure 5: Interaction Window and The Feature Point of Facial Expression

We continue to increase the video of the remote active learning and analyze. We will strengthen cooperation with educational institutions and care houses in remote locations. Furthermore, we will work with the care house and local community.

5. Acknowledgment

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