Implementing and Evaluating feedback feature of Mind Monitoring Service for Elderly People at Home

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ABSTRACT

To support sustainable in-home long-term care, it is essential to monitor mental states of elderly people at home, and to encourage their ability of self-care. However, many challenges exist in practice, including limitations of human interventions, sensor-based monitoring, the daily recording and externalization of mental states. In the previous research, we have proposed Mind Monitoring Service, which aims to monitor mental states and promote self-care of elderly people at home. In the proposed service, a chatbot asks a user specific questions to acquire his/her mental state. Based on the answers, the service assesses the mental state. In this research, we develop a new feature of *weekly feedback*. The feature automatically reviews answers of past one week, and sends advice to improve the current situation. We conduct an experiment to evaluate the effectiveness. Through the experiment, it was confirmed that the weekly feedback encouraged self-care consciousness and increased motivation of subjects.

CCS CONCEPTS

• **Human-centered computing → Human computer interaction (HCI)**; **Ubiquitous and mobile computing systems and tools**; • **Applied computing → Health care information systems**.

KEYWORDS

in-home long-term care, elderly monitoring system, mental state, sensing, agent, chatbot

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1 INTRODUCTION

Japan is facing a super-aging society. The proportion of people over 65 years old in the total Japanese population was less than 5% in 1950, but it increased to 28.1% in 2018[2]. Under these circumstances, there are chronic shortage of nursing facilities and care workers. To cope with the problem, the Japanese government is shifting the policy from the conventional facility-based care into the *in-home long-term care*. The Ministry of Health, Labor and Welfare in Japan declares the *Community-based Integrated Care System*[12], which ensures the provision of health care, nursing care, prevention, housing, and livelihood support. The system consists of four principles: self-care, mutual care, public support, governmental aid. Due to the limitation of the security cost, the government especially expects elderly people to conduct the self-care under the system.

However, the self-care and independent living are not easy for most elderly people, as their physical abilities and cognitive functions are being declined. Moreover, elderly people have higher risk of mental depression, compared to those of younger ages due to their *lost experiences*[11]. Taking these facts into consideration, in the in-home long-term care, it is essential to monitor their "*mind*" and to provide appropriate supports according to the state of the "mind". In monitoring the psychological aspects of elderly people at home, we consider the following three challenges:

(P1)Limitations on human interventions and sensor-based monitoring : Traditionally, the mental states of elderly people have been assessed via human intervention such as inquiries and counseling by professionals. However, it is not realistic to conduct such interventions every day at home. Recently, the elderly monitoring systems using sensors and IoT come onto markets. However, they can only monitor externally observable events. Thus, the conventional monitoring systems do not cover internal mental states of elderly people.

(P2)Challenge in recording and externalizing mental state : Every mental illness of an elderly person (e.g., depression) is caused by various factors. The symptoms also vary from one person to another[9]. Thereby, to specify the mental illness is not easy. Furthermore, the elderly also cannot grasp their own mental states accurately and externalize the states.

(P3)Challenge in realizing mind monitoring and appropriate support based on the mental state : Considering (P1) and (P2), it is difficult for any third person to objectively grasp, record

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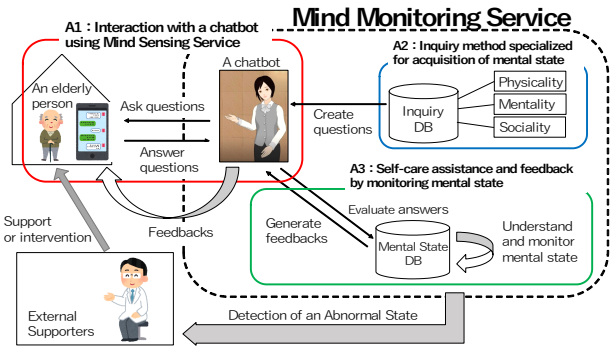

Figure 1: Overall Architecture

and monitor the mental states of elderly people at home. The elderly also have no opportunity to reflect their mental states. Therefore, it is yet challenging to support elderly people based on their internal mental states.

To overcome these challenges, we have proposed *Mind Monitoring Service*[5]. In the Mind Monitoring Service, we firstly introduce a continuous interaction platform between an elderly person and a chatbot. Secondly, the chatbot asks various questions to acquire the mental state. Finally, the service evaluates the "mind" of an elderly person based on the answers to the questions and realizes "mind" monitoring.

In the previous research[6], we have implemented the proposed service and conducted a demonstration experiment. Based on the result of the experiment, in this paper, we develop a new feature of *weekly feedback*, which automatically reviews answers of past one week and sends advice to improve the current situation. Besides, we conduct an experiment in order to evaluate the effectiveness of the feature.

2 MIND MONITORING SERVICE[5][6]

2.1 Overview

The Mind Monitoring Service is a new service which evaluates and monitors the mental state of an elderly person via communication with a chatbot. Figure 1 shows the overall architecture of the proposed service. The service consists of the following three approaches (A1) to (A3).

(A1) Interaction with a chatbot using Mind Sensing Service : The *Mind Sensing* ("kokoro" sensing in Japanese) is a new type of sensing technique being developed by our research group[7]. It aims to record the internal mind of a target person that cannot be observed externally by general sensors or IoT. In the Mind Sensing, a virtual agent (VA)[8] or a chatbot asks the person various questions to externalize his/her mind as words. The *Mind Sensing Service*[3] is a core Web service of the Mind Sensing, which defines and manages the questions flexibly, and automates the delivery of the questions. The proposed service utilizes the Mind Sensing Service and collects internal state of an elderly person at home, through interaction with a chatbot.

(A2) Inquiry method specialized for acquisition of mental state : In order to understand mental states of elderly people at home, we develop specific questions. For this purpose, we firstly introduce a framework characterizing mental health using three perspectives: *Physicality*, *Mentality*, and *Sociality*. Physicality evaluates the physical symptoms that can be seen objectively, such as fatigue, pain, sleep disorders. Mentality evaluates the subjective feelings such as emotions, moods, stress. Sociality evaluates the self-evaluations or behaviors of a target person, such as happiness, self-esteem, and social behavior. These three perspectives are taken by WHO's "health" definition[13]. Secondly, we create inquiries that reveal the current state for each of the three perspectives. We assume the target elderly person answers the questions with yes or no. The chatbot in (A1) asks these questions to an elderly person, and the service then records his/her answers to grasp the mental state of the target person.

(A3) Self-care assistance and feedback by monitoring mental state : By collecting the answers to the questions, the service evaluates the mental state of an elderly person. For this purpose, the service calculates *the degree of psychological health* by assigning the score to the answers. Analyzing the changes of the scores on a weekly or monthly basis enables the proposed service to monitor the mental state of the target person. Also, the service gives feedbacks based on the acquired mental states, in order to encourage self-reflection and spontaneous self-care of mental health. Furthermore, if an abnormal state which cannot be solved by self-care is detected, the service connects to an external supporter, and asks for appropriate instructions.

2.2 Demonstration experiment

In the previous research[6], we have conducted a demonstration experiment. The experiment was conducted for three months from November 1st, 2019 to January 31st, 2020. The subjects were eight men and women in the 50's to 80's.

We have implemented the proposed service for the experiment as follows. Firstly, we asked an expert to create seven questions which will be sent to users. Table 1 shows the questions. These questions ask the state of the past one week. "Survey item" in Table 1 indicates what to investigate by the question. In addition, "Category" in the Table 1 shows the results of classifying each question into the three perspectives described in **2.1** (A2). Secondly, we built a continuous interaction between an elderly person and a chatbot, using LINE[1] which is a well-known messaging application on smartphone. The chatbot sends one question in Table 1 once a day to the user. The user answers the question with two choices, yes or no. All of the seven questions can be covered in a week, so the chatbot sends the first question again from the next week. In other words, the chatbot will continue to send the same set of questions each week.

Figure 2 shows the actual screen of the proposed service implemented on LINE. The user can answer the question from the chatbot just by pushing the button of the screen. When the user answers the question, the chatbot sends an additional question for the purpose of investigating the user's situation in more detail. For

Question	Survey Item	Category
Have you slept well in the past week?	Sleep	Physicality
Have you felt sick, pain, or tired during the past week?	Health	Physicality
Have you had something fun in the past week?	Emotion	Mentality
Have you felt you could not remember something, or forgotten something in the past week?	Memory	Mentality
Have you felt anxiety or unwell during the past week?	Psychology	Mentality
Have you felt not motivated or appetite in the past week?	Motivation	Sociality
Have you had many opportunities to go out, to talk and to have hobbies in the past week?	Socialization	Sociality

Table 1: Seven Questions

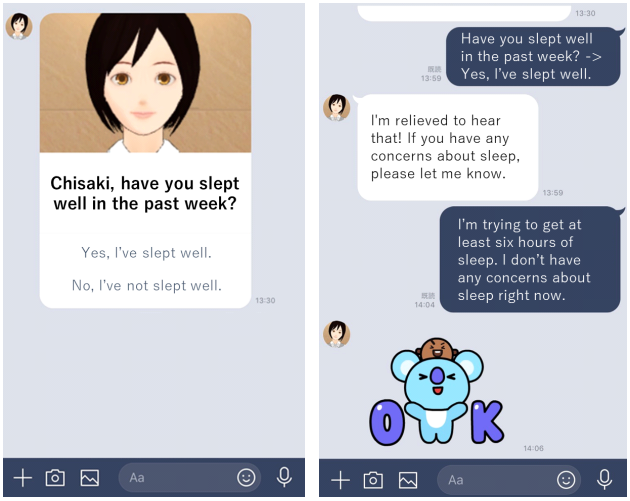

Figure 2: Actual LINE Screen

example, Figure 2 shows the case where the user answers "Yes, I've slept well." to the question, "Have you slept well in the past week?". After understanding a good sleep condition of the user, the chatbot sends an additional question to ask any concerns regarding sleep.

In order to evaluate the proposed service, after the experiment, we calculated the response rate of the questions and visualized the mental states of the subjects based on the answers. We also sent questionnaire to the subjects. For the visualization of the mental states, we assigned the score of +1, -1 to a positive answer and a negative answer respectively. By aggregating these scores for each of the three categories described in **2.1** (A2), we grasped the degree of psychological health for each subject.

In the proposed service, we assume the service sends a feedback based on the mental state at weekly or monthly interval. However, we could not implement the feedback feature by the time that the experiment started. Therefore, in the demonstration experiment, we decided to carry out and evaluate only the feature of monitoring the mental state in **2.1** (A3).

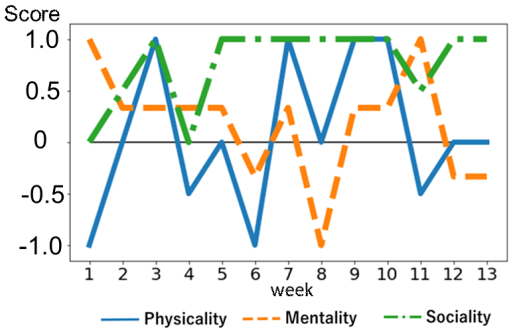

Figure 3: Mental States Data

2.3 Results of the demonstration experiment

During the experiment, five of eight subjects answered more than 80% of the questions from the chatbot. Moreover, we were able to visualize the mental states data of the subjects by collecting and scoring the answers to the questions. We show one subject's data in Figure 3. The vertical line shows the scores and the horizontal line shows the number of weeks. As seen in Figure 3, we can confirm changes of the mental states by week or overall characteristic of the user's internal states, which cannot be obtained by conventional monitoring systems. From these results, we were able to confirm the effectiveness of the proposed service.

On the other hand, the opinions were divided about the questions in the questionnaire, "Is the conversation with the chatbot useful?" and "Does the conversation with the chatbot make you feel better?". This means we could not verify if the interaction with the chatbot is useful for maintaining and improving the mental states of the elderly. One possible cause of this result is that we could not implement the feedback feature, and the service could not provide useful advices according to the user's situation.

Therefore, in this paper, we implement a new feature of *weekly feedback* in order to make the proposed service more useful for the elderly. The weekly feedback reviews the answers of the past one week and provides advice automatically according to the mental state. We also conduct an experiment using this feature and measure the effects of the feedback.

3 IMPLEMENTATION OF WEEKLY FEEDBACK

3.1 Design

The feedback feature evaluates the mental state of the user in a certain span and sends further inquiries or advices according to the state. The purpose of the feedback is to promote the user's self-reflection and spontaneous mental health care. In this paper, we implement a new feature of weekly feedback which automatically reviews answers of past one week, and sends advice to improve the current situation.

For the implementation, we divide the feature into two parts: **scoring the answers** that numerically quantifies the one week's mental states of the user, and **creating a feedback message** that generates a message according to the scoring results. We describe the details of each part below.

3.2 Scoring the answers

In the previous research[6], we assigned the score of +1, -1 to a positive answer and a negative answer respectively. However, in order to capture the user's state in more detail, it would be better not to use a simple binary score, but to assess user's answers from several aspects. Therefore, we introduce the following new three scoring methods.

(i) Score_answer : The binary score of the answer. We assigned +1 for a positive answer and -1 for a negative answer.

(ii) Score_observation : The score obtained by observing how the answer has changed from the previous week. When the user answered positively in the previous week, if the answer remains positive in the target week, +1 will be assigned to the answer. If the answer turns negative, -0.5 will be assigned. Similarly, when the user answered negatively in the previous week, if the answer remains negative in the target week, -1 will be assigned to the answer. If the answer turns positive, +0.5 will be assigned.

(iii) Score_sentiment : The analytic score of sentiment for the user's answers to an additional question from the chatbot. If the user answers the additional question after answering the first yes-no question, the service analyzes the text sentences and calculates the sentiment using Microsoft Azure Text Analytics API[4]. The score is normalized so that it takes a value from -1 to +1 (+1 means the most positive).

The total score of the answer is calculated by the weighted sum of the above three scores.

$$S_{total} = w_1 \cdot S_{answer} + w_2 \cdot S_{observation} + w_3 \cdot S_{sentiment} \quad (w_1 + w_2 + w_3 = 1)$$

In this time, we set $w_1 = w_2 = w_3 = \frac{1}{3}$, and calculate the total score as the average of the three scores.

3.3 creating a feedback message

Based on the scoring methods in **3.2**, the service firstly selects one question from the seven questions which were sent in a week. Here, the service picks up the question whose score is the worst.

Secondly, the service creates a feedback message related to the content of the selected question. In order to generate natural sentences, we structure the feedback message from four paragraphs: *Greeting*, *Reflection*, *Advice*, and *Conclusion*. More specifically, in the greeting paragraph, the chatbot greets the user according to the season or climate. In the refection paragraph, the chatbot shows how the user answered the selected question in order to get the user to look back him- or herself. The advice paragraph gives the user useful information about the content of the question. We refer to the information of the "Kenko-Choju Net"[10], which provides a lot of information about health and longevity for Japanese elderly people. Lastly, in the conclusion paragraph, the chatbot gives a closing remark, such as "Let's do our best again this week.".

Figure 4 shows an example of a feedback message. In this feedback, the question about "psychology" was picked up. The sentences of each paragraph are pre-defined, and the service combines these paragraphs according to user contexts so that the service can provide appropriate feedbacks to the user.

Figure 4: Example of a Feedback Message

3.4 Operation of weekly feedback

For the actual operation of the weekly feedback, we automate the two processes of scoring the answers and creating a feedback message by Python programs, so that they will be executed regularly.

The service conducts the process of scoring the answers at designated time on a daily basis, and executes creating and sending a feedback message at 20:00 on Saturday. Thus, the user will receive a feedback message from the chatbot at 20:00 every Saturday.

4 EXPERIMENTAL EVALUATION

4.1 Outline

We have performed an experiment using the feature of weekly feedback. The purpose of the experiment is to clarify the effects and problems of the feedback.

The experiment was conducted with thirteen subjects for two months from May 2020 to June 2020. The subjects were two men and four women in the 50s to 80s, a man and a woman in the 40s, and five men in the 20s. Originally, the proposed service was intended for the elderly generation, but we also recruited young subjects in the experiment in order to get a lot of opinions.

The subjects have been using the proposed service since the previous experiment. Therefore, in this experiment, we evaluate the effects of the weekly feedback by comparing with the previous two months from March 2020 to April 2020, when the service did not have the feedback feature. Namely, we investigate how the subjects have been changed or been affected by receiving the feedback message. We show the results of the experiment by calculating the response rates before and after implementing the feedback feature, presenting the responses from the subjects to the feedback message, and the questionnaire after the experiment.

The experiment has been approved by the Research Ethics Committee of Kobe University Graduate School of System Informatics (No. R01-02).

4.2 Results

4.2.1 **The changes of the response rates.** Table 2 shows the response rate of each subject for the two periods before and after the implementation of the feedback feature. The response rate is calculated by the ratio of the number of questions answered by the subject to the number of questions sent by the chatbot.

Subject	Age	Gender	Rate(March-April)	Rate(May-June)
A	70〜79	M	98.4%	96.6%
B	60〜69	M	80.3%	98.3%
C	80〜89	F	95.1%	93.3%
D	70〜79	F	41.0%	45.0%
E	70〜79	F	19.7%	32.0%
F	50〜59	F	98.4%	100.0%
G	40〜49	M	90.2%	100.0%
H	40〜49	F	100.0%	100.0%
I	20〜29	M	91.8%	96.6%
J	20〜29	M	82.0%	81.0%
K	20〜29	M	93.4%	98.3%
L	20〜29	M	96.7%	97.0%
M	20〜29	M	90.2%	94.9%

Table 2: Response rates of the subjects

As seen in Table 2, the response rates of eight subjects have improved. In particular, about subject B and subject E, we can see more than 10% of the improvement. On the other hand, the response rates of some subjects have decreased or not changed. However, the degree of decrease is very slight. Considering all of the subjects, the response rates would have improved after implementing the weekly feedback.

4.2.2 **Responses to the feedback message.** When the chatbot sent a feedback message, some subjects responded to the message. As an example, we show the actual feedback message which was sent to subject F below.

> Hello, Ms.F! It is a comfortable climate, isn't it?
> Last week, you said you had not had many opportunities to go out, to talk and to have hobbies. How is the situation after that?
> Speaking or singing can move the muscles around your mouth and help maintain muscle strength.
> Please keep it in mind! And let's do our best again this week.

Subject F responded to the feedback as follows.

> I totally agree with you. Fortunately, I live with my family, so I sometimes have opportunities to talk with someone. But it's just a daily conversation. In this week, I will try to eat well, to learn many things and to laugh a lot! Thank you very much.

It is clearly seen that subject F looked back on her own behavior and tried to keep the advice in mind. In other examples, there were subjects who responded to the feedback messages such as, "Thank you for your concern.", "I really appropriate your messages.".

4.2.3 **Results of questionnaire.** After the experiment, we sent a questionnaire to the subjects in order to evaluate the effects of the weekly feedback. In the questionnaire, we asked the subjects if the self-care consciousness has improved by the feedback, and if the usefulness of the proposed service has improved owing to the weekly feedback.

Figure 5 shows the questions and results of the questionnaire. The answers were obtained from eleven subjects except for subject C and subject E.

From Q1 in Figure 5, most of the subjects felt that what the chatbot pointed out in the feedback could apply to themselves. From Q2, we can see that the subjects felt they were able to look back their own states thanks to the feedback. Besides, we can confirm from Q3 that most subjects tried to keep the advice in mind. On the other hand, some subjects answered that they were not able to put the chatbot's advice into practice. When we asked the subjects the reason why they could not put the advice into practice, they said it was difficult to change their actions because they were used to their usual lifestyle.

About Q4, nine subjects answered that their motivation to answer daily questions has improved by receiving the feedback message. Moreover, according to Q5, many subjects felt pleased to receive the feedback message. We asked the subjects why they felt pleased to receive the feedback, by the vote that allows multiple answers in Q6. As a result, the top reasons were "Because the chatbot gives advices based on your answers.", and "Because you can feel the chatbot always cares about yourself.". In contrast, the reason "Because the advice from the chatbot is useful." was not voted by any subjects. It means this reason is not directly related to the pleasure of the feedback message.

At the end of the questionnaire, we asked opinions and comments about the weekly feedback message. We obtained various comments from the subjects. They are, for example, "I was a little glad because I felt like the chatbot reads my messages.", "It would be better if the chatbot gives me information about my concerns.", "I would like the chatbot to ask questions about the topic which I have talked so far in the dialogue.".

4.3 Discussion

Firstly, from the changes of the response rates, we can conjecture that the weekly feedback feature gives good effects to subject's motivation. This is also confirmed by the results of Q4 in the questionnaire. Moreover, we can presume that the feedback was able to promote the subject's self-reflection and self-care consciousness from the results of Q2 and Q3. These results show that to provide an objective evaluation of mental states is effective for the subjects.

Additionally, it is also clear that the feedback message gave the subjects a generally positive impression, because many subjects felt pleased to receive the message. In particular, we should note that the subjects felt pleased to receive the feedback because they thought the chatbot gave advices based on their answers and cared about them. This means the feedback gives the subjects the sense of being constantly monitored and makes them feel safe. In other words, the feeling of relief may affect the pleasure and the satisfaction of the feedback message.

Question		Strongly Agree	Agree	Disagree	Strongly Disagree
Q1	Do you think what the chatbot pointed out in the feedback could apply to yourself?	4	5	2	0
Q2	Do you think you were able to look back on yourself owing to the feedback?	0	8	2	1
Q3	Do you think you were able to put the feedback into practice?	2	7	1	1
Q4	Do you think you became to answer the daily questions actively by receiving the feedback?	2	7	1	1
Q5	Do you think you felt pleased to receive the feedback?	5	4	1	1

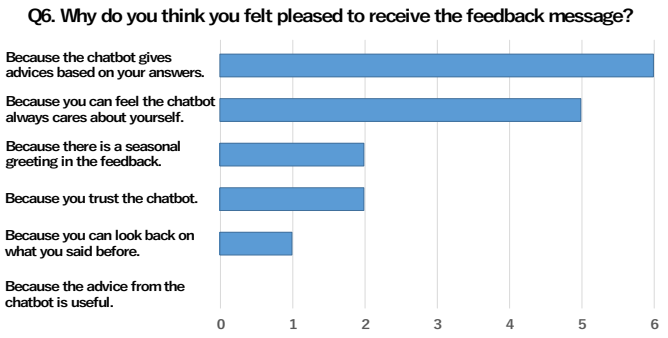

Figure 5: Questionnaire and Results

On the other hand, to evaluate how much the self-care consciousness of the subject has changed or the message from the chatbot can relieve the subject's feelings, we need more empirical studies. Besides, we also found some issues regarding the feedback message. One of the major issue is the effectiveness of the advice. No subjects answered that "The advice from the chatbot is useful." in Q6. In this implementation, the feedback was designed to provide useful information for health or longevity. However, we found just providing general health information was not very useful for the subjects. In order to give the advice which is truly useful to the user, it is necessary to discover what the person is usually interested in, through the dialogue. It's also needed to provide specialized information with regard to user's interest. We would like to study personal adaptation of the advice as a future work.

5 CONCLUSION

In this paper, we have developed a new feature of weekly feedback, which automatically reviews answers of past one week and sends advice to improve the current situation. We also have conducted an experiment in order to evaluate the effectiveness of the feature. The experimental results show that the weekly feedback encouraged self-care consciousness and increased motivation of the subjects. Besides, through the experiment, we were able to obtain various opinions and comments to the feedback message from the subjects.

In our future work, we try to develop more useful feedback message for the user. We also conduct an extensive experiment in longer span with many elderly people to improve the proposed service.

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REFERENCES

[1] LINE Corporation. [n.d.]. LINE. https://line.me/en/.
[2] Government of Japan. 2019. Annual Report on the Aging Society (2019). http://www.cao.go.jp/.
[3] Haruhisa Maeda, Sachio Saiki, Masahide Nakamura, and Kiyoshi Yasuda. 2019. Rule-Based Inquiry Service to Elderly at Home for Efficient Mind Sensing. In *21st International Conference on Information Integration and Web-based Applications & Services (iiWAS2019)*. 666–670. Munich, Germany.
[4] Microsoft Azure. [n.d.]. Text Analytics. https://azure.microsoft.com/en-ca/services/cognitive-services/text-analytics/.
[5] Chisaki Miura, Haruhisa Maeda, Sachio Saiki, Masahide Nakamura, and Kiyoshi Yasuda. 2019. Prototyping and Preliminary Evaluation of Mind Monitoring Service for Elderly People at Home. In *21st International Conference on Information Integration and Web-based Applications & Services (iiWAS2019)*. 439–445. Munich, Germany.
[6] Chisaki Miura, Haruhisa Maeda, Sachio Saiki, Masahide Nakamura, and Kiyoshi Yasuda. 2020. Empirical Evaluation of Mind Monitoring Service for Elderly People at Home Using LINE Chatbot. In *IEICE Technical Report*, Vol. 119. 139–144.
[7] Masahide Nakamura, Kenji Hatano, Jun Miyazaki, Kiyoshi Yasuda, Noriaki Kuwahara, Hiroaki Kazui, Sachio Saiki, Seiki Tokunaga, Mihoko Otake, Naoki Kodama, and Naoko Kosugi. 2019-2023. Developing a System for Self-care and Mutual-aids of Elderly People at Home Based on Externalization of Internal States. *JSPS KAKENHI, Grant-in-Aid for Scientific Research (A)* 19H01138 (2019-2023).
[8] Shota Nakatani, Sachio Saiki, Masahide Nakamura, and Kiyoshi Yasuda. 2018. Generating Personalized Virtual Agent in Speech Dialogue System for People with Dementia. In *Digital Human Modeling 2018 (DHM 2018), Held as Part of HCI International 2018*, Vol. LNCS 10917. Springer, 326–337. Las Vegas, USA.
[9] Masatoshi Takeda and Toshihisa Tanaka. 2007. *E de Miru Kokoro no Hokenshitu(Mental clinic with pictures)*. Alta Publishing Co., Ltd.
[10] The Japan Foundation for Aging and Health. [n.d.]. Kenko-Choju Net. https://www.tyojyu.or.jp/net/.
[11] The Ministry of Health, Labor and Welfare in Japan. 2009. Depression prevention and support manual (revised version). https://www.mhlw.go.jp/topics/2009/05/dl/tp0501-1i.pdf.
[12] The Ministry of Health, Labor and Welfare in Japan. 2013. Community-based Integrated Care System. https://www.mhlw.go.jp/stf/seisakunitsuite/bunya/hukushi_kaigo/kaigo_koureisha/.
[13] World Health Organization. 1946. Constitution of the World Health Organization. https://www.who.int/.