A Dataset for Estimating Participant Inspiration in Meetings toward AI-Based Meeting Support System to Improve Worker Wellbeing

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Abstract

Various meetings are carried out in intellectual production activities and workers have to spend much time to create ideas. In creative meetings, it is sometime difficult for the meeting moderators and facilitators to efficiently conduct the meetings because the participants are required to come up with new ideas one after another and some participants hesitate to express unconventional ideas. Therefore, we propose to develop an AI-based meeting support system that estimates participants' inspiration and helps to generate comfortable meeting environments for improvement of worker wellbeing. Participants' inspiration is assumed to be estimated based on their speech and micro behaviors including smiles and nods. In this paper, a dataset we collected for the development of the proposed system is reported. The dataset consists of participants' brain blood flows measured near-infrared spectrometers, micro behavior annotated from video recording, and inspiration the participants reported with buttons. The data for 1020 min was collected by conducting simulation meetings. In future work, we plan to train an LSTM (long short-term memory) based neural network model to realize the proposed system.

Introduction

Meetings play a very important role in intellectual production activities and carried out on a daily basis. Approximately 11 million meetings are reportedly conducted each day in the U.S. and time spent in meetings is increasing every year (Rogelberg, Scott, and Kello 2007). Creative meetings which are conducted to create new ideas and explore creative solutions often require a huge amount of time because the participants need to create new ideas one after another. In many cases, it is difficult for the moderators and facilitators to conduct creative meetings effectively because they are not always able to gain a wealth of excellent ideas and some participants hesitate to express unconventional ideas. In this study, we propose to develop an AI-based meeting support system that estimates the participants' inspiration and helps to generate comfortable meeting environments for improvement of worker wellbeing. In this paper, a dataset we collected for the development of the proposed system is reported.

Related Work

In this study, "inspiration" is defined as insightful learning accompanied by aha experiences. An aha experience is a phenomenon in which people suddenly obtain a clear insight or solution to a problem (Topolinski and Reber 2010). We propose to use participants' nods and smiles as cues for detection of the inspiration. Nods and smiles are reported to be important factors that affect the quality and efficiency of meetings (Watanabe et al. 2021). Nodding indicates that the person empathize with and understanding what the speaker is saying. Smiling is an indicating positive emotions.

In previous work, we reported a deep neural network model called "FUWAKIRA" that estimates the conversational mood from speech data with four adjective pairs: serious-easy, aggressive-calm, tidy-messy, and happy-gloomy (Yamagata et al. 2023). Conversational mood is considered to have a significant influence on smooth progress of meetings especially conducted by Japanese people who are known for their respect for harmony.

From the above, we expect that participants' inspiration can be estimated from the participants' micro behaviors which are smile and nodding, and the estimation result of by FUWAKIRA, and include them in the dataset in this study.

Method and Results

As the first step toward the development of the proposed system, we conducted simulated meeting and recorded brain blood flows, the faces and voice of the participants. The schematic diagram of the experimental setup is shown in Fig.

1. Each participant wore a near-infrared spectrometers (HOT-2000, NeU Corp.), NIRS, on the head to measure brain blood flows that were expected to be the ground truth of the inspiration. Each meeting is conducted with three participants and a moderator. The length of each meeting was 20 min. The participants discussed a given theme that does not contain clear answers and solutions. Each participant conducted two meetings with different themes (i.e. 40 min in total). The participants were instructed to press a key on the keyboard of the PC (1: weak inspiration or 2: strong inspiration) when they felt their own inspiration. The participants were allowed to use their smart phones anytime to check information related to the given theme. The moderator sometimes gave some information to get the conversation going when the participants got stuck in conversation. Eventually, 30 people (26 males and 4 females) with an average age of 24.8 (SD = 8.79) participated in the experiments and 1020 min of meeting data were collected.

After all the simulated meetings were finished, annotation of timings of micro behaviors were manually conducted. The targeted micro behaviors were "speech," "nod," and "smile." They were annotated every 10 s with 0, 1, or 2 according to each intensity (0: nothing, 1: weak, 2: strong). A part of the dataset for a participant is shown in Fig. 2. These graphs show each data obtained in a simulated meeting at the same timing. The indicators of speech, nod, and smile appeared a little later the indicators of inspiration, suggesting that there is certain relationship between the indicators. We have been attempting to investigate the relationship between inspiration and not only micro behaviors but also brain blood flows using machine learning techniques.

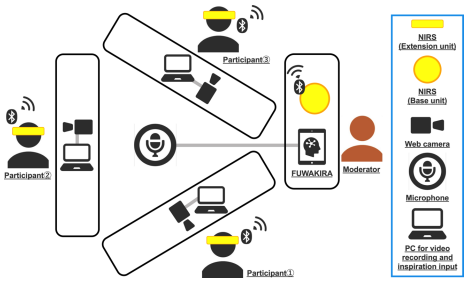

Figure 1: Schematic diagram of the experimental setup.

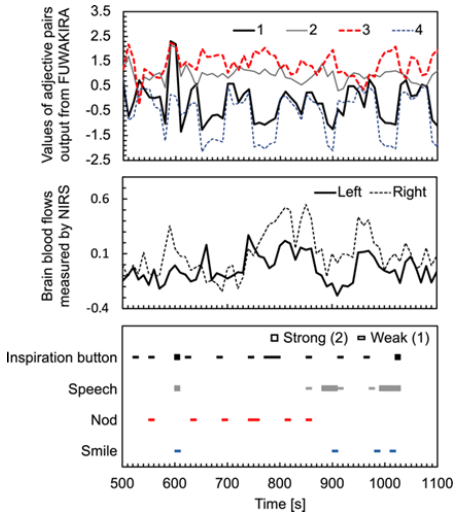

Figure 2: Example of collected data for a participant in a simulated meeting. (Top) Values of four adjective pairs for conversational mood. (Middle) Brain blood flows measured by NIRS. (Bottom) The timings of when the inspiration buttons were pressed inspiration button and of when the micro behavior observed.

Conclusions

This paper describes the dataset we collected by conducting simulated meeting experiments to create an AI-based meeting support system that estimates inspiration of meeting participants and helps to generate comfortable meeting environments for improvement of worker wellbeing. It is expected that the reduction of individual workloads through more efficient meetings will lead to the prevention of overwork, thereby increasing the wellbeing of both society and individuals. We are currently working on developing an LSTM based machine learning model to estimate the inspiration timing of each participants in meetings.

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