Tailorable Persuasive Agent: A Long-Term Framework for Persuasive Conversational Agents

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Abstract

Persuasion can be applied for computer systems in healthcare, education, environmental protection and many other fields. As one of means of providing persuasive messages to a user, a conversational agent can be an effective form because it can give a user nonverbal information and better impression. Persuasive computer systems can benefit its users encouraging them to change their problematic behavior. However, even if a user has changed the behavior, the possibility of relapse still exists and longitudinal support can be given. In our research, we focus on two aspects; one is adaptable and customizable persuasive methods according to an estimated user's context or his/her preferences and the other is a longitudinal behavior or attitude change being maintained after the first achievement. Based on these aspects, we propose Tailorable Persuasive Agent which integrates persuasion and interaction methods.

Author Keywords

Agents, persuasion

ACM Classification Keywords

H.5.m [Information interfaces and presentation (e.g., HCI)]: Miscellaneous.

Background and related work

According to Fogg, B.J., persuasion is "an attempt to change attitudes or behaviors or both" [2] and thanks to the prevalence of the Internet, persuasion can be adopted in computer systems effectively. Currently, a user can be persuaded by computer systems regardless of place and time using ubiquitous computing technologies.

Agent as a persuader
We are focusing on conversational agent as a method of persuasion because of its variety of expressions and a possibility of applications. We use the word "agent" as an interactive computer program with which a user is able to have a conversation.

Being accompanied by nonverbal communications, an agent is applied for user assistance (e.g. Shabette-Concier [1]), medical situations (e.g. [1]), and many other applications. That is, an agent can deliver nonverbal information such as facial expressions and emotions if the agent is expressed as an embodied virtual character which has a specific appearance or personality.

Existing research have been discussing constructing relationship between a conversational agent and a user. For instance, Zanbaka, C. et al. have compared persuasiveness of three types of agents changing their reality and resemblance to human beings [7].

Our purpose
In this research, our main focus is encouraging users to interact with an agent voluntarily when they are using a persuasive computer system (a persuasive application). We propose Tailorable Persuasive Agent (TPA) in order to construct a set of strategies for constructing longitudinal relationship with users. TPA includes three elements related to adapting conversations and customizable features of an agent in a semi-automated manner. That is, a persuasive application lets users choose their favorite agents and a content of conversations changes according to the users' current behavior.

Tailorable Persuasive Agent

We propose Tailorable Persuasive Agent which encloses three elements with a set of persuasive strategies. We describe each of them along with our previous and future work.

Letting users choosing their favorite agent (FA)
This element relates to making an agent selectable as a user likes.

The background of this element is credibility of a persuasive application. According to Fogg, B. J., credibility can be considered as "believability" and four types of credibility exist [2]. For example, presumed credibility comes from general assumptions in peoples' mind. We have developed hypothesis that a user can interact with an agent more actively when the agent is his/her favorite character because of increased credibility.

We have conducted an experiment and compared participants who can choose their favorite agent and those who cannot. As a result, choosing an agent only by its appearance has had a room for further exploration.

As a future work, we are planning to examine another situation. One is making personality of agents selectable. This is because if the agent is a famous character, the appearance and the personality has related closely.

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[1]http://www.nttdocomo.co.jp/english/service/customize/index.html#p01

Adapting persuasive conversation to each user (AP)
The *AP* corresponds to adapting persuasion to a user. Two main methods of achieving this adaptation are included: modeling users and utilizing characteristics of social relationships.

A user model comes from user's qualitative contexts obtained from replies from them. This adaptation means that a persuasive application changes a persuasion strategy according to the user's current situations. The user's situations include a degree of achievement of the target and consciousness of related topics of the target. According to Prochaska, J. O. et al., an individual's behavior can be modeled as five stages and the most effective treatment differs between these stages (transtheoretical model) [5]. Thus, we utilize such a behavioral modeling to give users effective persuasion and encourage them to become "independent from eternally continuous persuasion".

However, reply from users become noisy when they are bored with the limited variety of conversation because they can start replying just by curiosity. Therefore, we have been handling this problem referring relationship with other individuals. In order to increase the number of "real" responses to the conversation, we have examined existence of others in a specific group [6]. This improvement is based on a hypothesis that what is correct in the society can be bias and an individual manages to his/her impression given to others (e.g. [4]). That is, the existence of others can affect user's answers. The design of conversations is based on a sharing function which enables a user to know answers given by other users as for a specific kind of conversation. Such conversations are not related to user's privacy information but related to the target behavior.

Currently, we are searching for an effective user model referring related work.

Supporting the user's continuous achievement (SCA)
This element includes supportive methods of a persuasive conversational agent which are targeted for users who have achieved the target. This element can be considered as an advanced form of the *AP*. As a desirable state, being aware of significance or interest of changing behavior or attitude can motivate users to a longitudinal behavior change.

We can combine multiple psychological methods in order to achieve the adaptation. For example, He, H. A. et al. have proposed motivational framework based on the transtheoretical model considering individuals' difference. They also have mentioned persuasive feedback for those who have changed their behavior for more than 6 months (maintenance stage) [3].

We are planning to focus on the Maintenance stage in an aspect of conversational agent and construct conversation based on retrieved the user model and support maintenance of the behavior change including decision makings needed for the longitudinal achievement.

Objective for Attending the Doctoral School
We want to discuss applications of conversational agents for ubiquitous computing internationally with other researchers in multiple fields. Impression of conversational agents relates to not only individual preferences but also cultural backgrounds. Besides, we have discussed with a researcher close to us in another research field and such a discussion gives an inspiration to our research. From the experience, we would like to find and utilize knowledge from different aspects as a result from the discussions in the future work.

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