

# A Teachable Agent for Intergenerational Private Social Networks

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## Abstract

As the population is rapidly aging, the intergenerational communication problem has attracted researchers all around the world. In this paper, we design a teachable agent in an intergenerational private social network to provide opportunities for the young and the old generations to find more common topics and interests. Besides the basic functions shared by most social network services, we provide two additional features which are specially designed for the elderly: Timeline based autobiography and topic match. The timeline based autobiography feature fulfills the needs of the elderly that they prefer to recall the past experience and to convey useful lessons to young people. The topic match feature helps the youngster to find their posts which the elderly would like to read from other social network services.

**Keyword:** Intergenerational Communication, Private Social Network, Teachable Agent, Silver Assistant.

## I. Introduction

It has been reported that intergeneration communication typically takes two form, mesmerizing and painful experience. The elderly often talk about their past in the conversation, and as a special form

of reminiscing, painful experience sharing is additionally associated with providing lesson learnt and guidance to the young people [1]. Therefore, we need to find a way to improve the intergenerational communication. Teachable Agents are computer agents whose aim is to help students learn through the learning by teaching approach. Rather than taking on the classic role of a teacher and spoon-feeding knowledge to learners, a teachable agent is designed as a naive learner who instead needs to be taught. A teachable agent mainly has three kinds of capabilities, to learn, to practice what has been taught, and to be affective during the interaction with users. We believe that these capabilities not only attract young generations to teach the agent, but may also provide an effective interaction with the elderly, and further have the potential to improve the intergenerational communication qualities. Therefore, in this paper, we aim to design a teachable agent in an intergenerational private social network in order to provide opportunities for young generation and old generation to find more common topic and interests.

## **II. Related Work**

Past research in the context of western culture has shown that several factors affect the communication satisfaction. A study [2] based on Bulgarian and American population suggested the factors that can predict communication satisfaction include communication avoidance from both sides, politeness, and communication respect. In [3], it claimed that mutuality is associated with higher level of happiness, relaxation, and lower frustration. Research done in Chinese culture context generally resonated with the findings above in western culture, with a few new findings. It was discovered in [4] that helping conversations in which the young ask for advice from the elderly generally resulted in higher mutual satisfaction, due to existence of common topic and attitude of learning from older people's experience. Contrarily, respect, as a core value in Chinese intergeneration communication due to Xiao, was considered essentially in every conversation. Another important finding in intergeneration communication is that young people rated their satisfaction or dissatisfaction with the result that young people rated intergeneration interactions as

less satisfying overall than communicating with same-age-peers. Moreover, in most cases, it was the older person who was reportedly converging or attuning to the conversational needs of the young person [5]. When communicating with youths, the elderly have reported feeling patronized by what they perceive as ageist sentiments [6]. A report from the Research on Age Discrimination Project (RoAD) in which members of the elderly are interviewed proves this point, providing accounts of the harm experienced by the elderly, when excluded from an event based on their children's assumption that they would not enjoy it. Similar emotions were experienced when elders were made the subject of ageist humor [7]. One of the most common and long held assumptions by society about the elderly is their lack of ability and willingness to master or adopt new technology compared to younger generations [8]. Many of instances of ageism are unintended and carried out by a variety of family members including youths who are often unaware of their behaviour. To sum up, young generations have a dominant role in intergenerational communication. They tend to not attach importance to elderly, and have Stereotype that elderly people lack ability and willingness to master or adopt new technology. We should attract or persuade young people to spend more time with elderly and improve the communication satisfaction.

Existing social networks as a communication tool should have helped on the intergenerational communication. However, the existing social networks such as QQ, Skype, WeChat, Facebook, Twitter have limitations to use in this situation. For elderly, the interface of existing platforms is not designed for the intergenerational communication problem. They are not intuitive and simple enough for them to use. For young generations, they are quite busy and may easily ignore the elderly's needs. Moreover, some of them even don't know what to talk about with their parents. Based on the above findings, we aim to design an intergenerational social network with teachable agents as mediation to mutually interact with both elderly and youngster.

### **III. The Motion Planning Algorithm**

### A. *Basic Functions Design*

As a private social network, people can exchange information in our platform. Our system has basic functions such as uploading text, pictures, and videos to the platform. They can specify that who can view their posts. Meanwhile, they can also check updates from their friends. The interface design the system is as Figure 1.

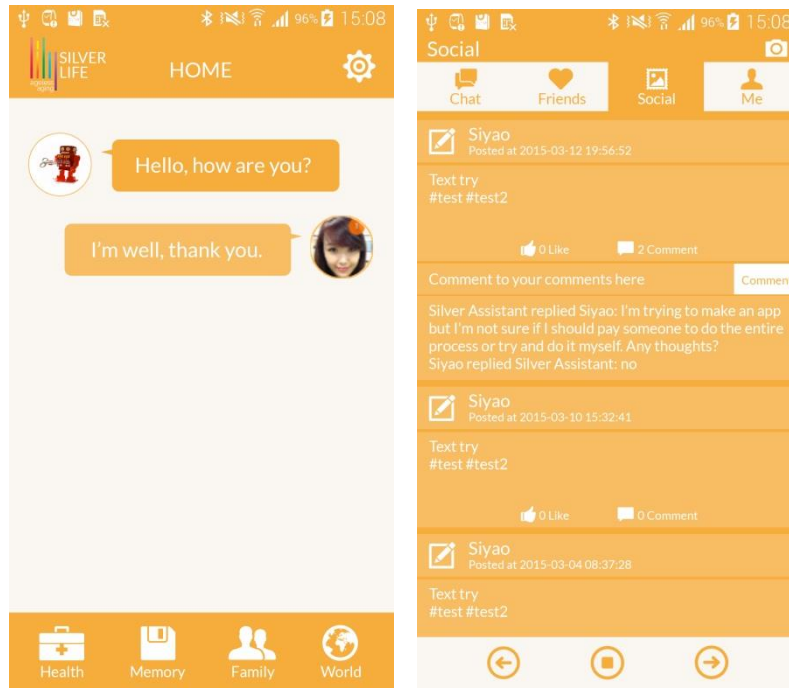


Figure 1. Interface Design of the Intergenerational Social Network

### B. *Timeline-based Autobiography for Elderly*

Besides the basic functions, we also design advanced features to provide elderly an easy-to-use application. Concerning the elderly's preference of recalling the past experience and their tendency to convey useful lessons to young people, we design a dummy naïve teachable agent to ask them questions on their experiences and assist them to make an autobiography through uploading pictures. The structure of the uploaded pictures is as Figure 2.

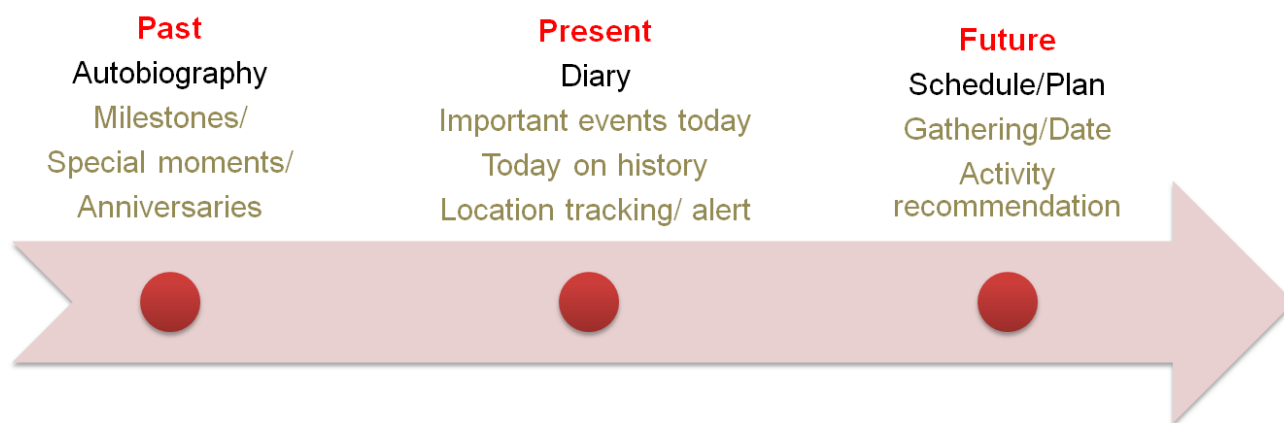


Figure 2. Time-based Autobiography

The teachable agent will record elderly's answers and tags. Given the keywords extracted from the description of a post, we find related questions and pass the questions to a teachable agent. A teachable agent will interact with the original poster by asking questions related to the post.

In order to guarantee that the teachable agent can ask interesting and meaningful questions to the elderly, we crawled the questions together with the descriptions from the famous community-driven Q&A site **Yahoo! Answers** (<https://sg.answers.yahoo.com>). The collected XXX questions fall into 25 categories. We simply used a set of keywords to filter out XXX inappropriate questions. After that, we used Apache Lucene to index the remaining questions. Consequently, given a set of keywords, we can efficiently look up the index and retrieve the relevant questions.

### *C. Topic Match for Facilitating Young Generations to Interact with Elderly*

From the perspective of youngsters, we also designed features to help them interact with elderly more effectively. The youth may be active and have many posts in other social networks, like Facebook. When their parents haven't heard from them for a long time, the system will automatically give some suggestions on which posts in other networks, say Facebook, could be forwarded to our platform based on the topics of recent posts of the parents. In other words, the system will find shared topics between the elderly and the youth. Based on these topics, the system will select some posts of the youth from other social networks and suggest the youth to post them in our platform.

Specifically, we adopt the latent Dirichlet allocation (LDA) model in our system. The LDA model represents each post as a mixture of topics, which is represented as a topic probability distribution. We first collect tweets from Twitter and posts from Facebook to train the model to learn the various distributions (the set of topics, the topic of each word, etc.). Then we can evaluate the relevance of two posts by computing the cosine similarity between the topic distributions of the two posts. To train the LDA model, we collect tweets from Twitter and posts from Facebook

#### **IV. Integrating the Private Social Network Design into Silver Assistant Platform for Elderly**

Our system design has been integrated into a silver assistant platform produced by Joint NTU-UBC Research Centre of Excellence in Active Living for the Elderly (LILY), Nanyang Technological University. The mobile app named SILVER LIFE is intended to serve as a companion for the elderly people in the home environment. With the ability to understand the elderly, be aware of the home environment, possess high-level reasoning and learning capabilities, the virtual companion is able to provide information and recommendation on healthcare products, services, skills and activities, chit-chat with the elderly using natural language, provide affective support to the elderly and connect with friends and family reactively and proactively. Currently we implement it in a mobile version, and we will upgrade existing version to pad and web version to fulfill elderly's needs.

#### **VII. Conclusions**

In this paper, we design a teachable agent in an intergenerational private social network in order to provide opportunities for young generation and old generation to find more common topic and interests. We specially design two features for the elderly: The timeline based autobiography and topic match for facilitating young generations to interact with elderly. We have integrated into a silver assistant platform.

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