Chapter 13

A Companionable Agent

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ABSTRACT

Companions are agents devised to accompany users day by day building long-term relationships with them. They do not only assist users for particular tasks in sporadic times, but they provide more support and have more information to adapt themselves to each user’s needs. Currently, these agents and their possibilities are being researched as a part of an EU project, which is described in this chapter.

INTRODUCTION

We describe a system developed as part of an EU project that aims to change the way we think about the relationships of people to computers and the Internet by developing a virtual conversational ‘Companion’. This will be an agent or ‘presence’ that stays with the user for long periods of time, developing a relationship and ‘knowing’ its owners preferences and wishes. The Companion communicates with the user primarily through speech, but also using other technologies such as touch screens and sensors.

This chapter describes the functionality and system modules of the Senior Companion (SC), one of two initial prototypes built in the first two years of the project. The SC provides a multimodal interface for eliciting, retrieving and inferring over personal information from elderly users by means of conversation about their photographs.

The Companion, through conversation, elicits their life memories and reminiscences, often prompted by discussion of their photographs; the aim is that the Companion should come to know a great deal about its user, their tastes, likes, dislikes, emotional reactions etc, through long periods of conversation. It is assumed that most life information will soon be stored on the Internet (as in the [Memories for Life] project) and we are linking the SC directly to photo inventories.
in Facebook, a matter we discuss in more detail below. The overall aim of the SC is to produce a coherent life narrative for its user from these materials, although its short-term goals, reported here are to assist, amuse, entertain and gain the trust of the user. The Senior Companion uses a hybrid approach to dialogue management as well as intelligent adaptation of the user’s emotional state which plays an important part in gaining the user’s trust.

The technical content of the project is to use a number of types of machine learning (ML) to achieve these ends in original ways, initially using a methodology developed in earlier research: first, by means of an Information Extraction (IE) approach to deriving content from user input utterances (Catizone et al., 2002); secondly, using a training method for attaching Dialogue Acts (DA) to these utterances (Webb et al., 2008) and lastly, using a specific type of dialogue manager (DM) that uses Dialogue Action Forms (DAF) to determine the context of any utterance, and a stack of these DAFs as the virtual machine that models the ongoing dialogue by means of a shared user and Companion initiative and generates appropriate responses (Catizone et al., 2003).

The SC is not a robot and could be embodied in a screen, a handbag or a mobile phone while retaining the same “personality”: it is more a very high level conversational internet agent, dedicated to a single user over the long term.

This chapter is organized as follows: firstly, it describes the current SC prototype’s functionality. Next, it sets out the SC architecture and modules, focusing on the Natural Language Understanding module and the Dialogue Manager and the short term plans to enhance Dialogue Management performance with direct Internet access and initial ML experiments. Finally, it describes the experimental work done by linking the DM to emotional considerations.

2. THE SENIOR COMPANION SYSTEM

The Senior Companion (SC) prototype (Wilks, 2007, 2008; Wilks et al., 2008) was designed to make a rapid advance in the first two years of a project so as to be the basis for a second round of prototypes embodying more advanced ML. This strategy was deliberately chosen to avoid a well-known problem with experimental AI systems: that a whole project is spent in design so that a prototype never emerges until the very end, which is then never fully evaluated and, most importantly, nothing is ever built upon the experience obtained in its construction.

The central function of the SC is engaging the user in discussion about their photographs: where and when they were taken, details about the people in them and their relationship to the user and each other. The SC extracts and stores facts obtained from the user’s input and is able to pick up discussion with the user where the system left off in later user sessions. In addition to allowing reminiscing, the SC also permits the user to do basic photo management including selecting particular images or groups of images by pointing and organizing the photos by means of a dialogue.

Once a photo is loaded, it is processed with face recognition software to identify any faces in it. The recognition software, OpenCV\textsuperscript{1}, provides positional information by identifying the face coordinates and this information is exploited in the Dialogue Manager by making explicit reference to the position of people in the photograph (the person on the left, right, center, etc.) as well as recognizing when there are groups of people. The system discusses properties of the photo as well as properties and relationships of the people in the photos.

The SC also contains a news reading feature which adds an interesting accompaniment to the photo domain and demonstrates the ability of the system to handle more than one kind of ap-