

Improving the Language Active Learning with Multiagent Systems

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Abstract. Nowadays, there is a growing need for providing novel solutions to facilitate active learning in dependency environments. This paper present a multiagent architecture that incorporates agents specifically designed to provide advanced interfaces for elderly and dependent people that can be executed on mobile devices. The architecture has been initially oriented to language learning in courses for elderly people and has been tested in a real environment. The structure of the architecture and the preliminary results obtained are presented within this paper.

Keywords: Ambient Intelligence, language learning, Multiagent systems, elderly people.

1 Introduction

The growth of the information technologies has affected the educational environments and facilitates novel solutions. One of the segments of the population which will benefit with the advent of systems based on Ambient Intelligence will be the elderly and people with disabilities [8], contributing to improve their quality of life [10]. Ambient Intelligence evolves from the ubiquitous computing [4], and constitutes the most promising technological approach to meet the challenge of developing strategies in dependency environments [17].

This work presents an innovative methodology, based on the Ambient Intelligence (AmI) paradigm [5] [15], for formal teaching of languages oriented to dependent people. The paper focuses in the combination of the new information technologies along with the traditional teaching. In this way it will be possible to combine the advantages of the face to face teaching with the advantages of distance learning. It will be necessary to upgrade the systems of evaluation/accreditation to assess the knowledge or skills acquired during the learning process. To achieve this objective, we propose the use artificial intelligence techniques, intelligent agents and wireless communications.

Different authors [3] [9] [18] consider that in the near future, the educational institutions will be provided with intelligent systems specifically designed to facilitate the interaction with the human users. These intelligent systems will be able to personalize the services offered to the users, depending on their concrete profiles. It is

necessary to improve the supply of services, as well as the way to offer them. Trends situate the user surrounded of technology that facilitates new and personalized services. Multiagent systems and architectures based on mobile devices have been recently explored as a system of interaction with the elderly and dependent [1]. These systems can provide support in the daily lives of dependent people [20], providing a cognitive and physical support for the assisted person [2]. They can also provide mechanisms for establishing new strategies for learning interaction, which greatly facilitates the teaching, particularly languages learning.

The rest of the paper is structured as follows: Next section introduces the problem that motivates most of this research. Section 3 presents the multiagent architecture proposed to resolve the problem. Section 4 describes a case study to test the proposal and, finally, Section 5 presents the results and conclusions obtained.

2 Ambient Intelligence in Educational Environments

There is an ever growing need to supply constant care and support to the disabled and elderly and the drive to find more effective ways to provide such care has become a major challenge for the scientific community [4]. During the last three decades the number of Europeans over 60 years old has risen by about 50%. Today they represent more than 25% of the population and it is estimated that in 20 years this percentage will rise to one third of the population, meaning 100 millions of citizens [4]. In the USA, people over 65 years old are the fastest growing segment of the population [1] and it is expected that in 2020 they will represent about 1 of 6 citizens totaling 69 million by 2030. Furthermore, over 20% of people over 85 years old have a limited capacity for independent living, requiring continuous monitoring and daily care [2]. Some estimations of the World Health Organization show that in 2025 there will be more than 1000 million people aged over 60 in the world, so if this trend continues, by 2050 will be double, with about the 80% concentrated in developed countries [18].

Education is the cornerstone of any society and it is the base of most of the values and characteristics of that society. The new knowledge society offers significant opportunities for AmI applications, especially in the fields of education and learning [17]. The new communication technologies propose a new paradigm focused on integrating learning techniques based on active learning (learning by doing things, exchange of information with other users and the sharing of resources), with techniques based on passive learning (learning by seeing and hearing, Montessori, etc.) [7]. While the traditional paradigm, based on a model focused on face to face education, sets as fundamental teaching method the role of the teachers and their knowledge, the paradigm based on a learning model highlights the role of the students. In this second paradigm the students play an active role, and build, according to a personalized action plan, their own knowledge. Moreover, they can establish their own work rhythm and style. The active methodology proposes learning with all senses (sight, hearing, touch, smell and taste), learn through all possible methods (school, networking, etc.), and have access to knowledge without space or time restrictions (anywhere and at any time).

There are different studies that have used the Ambient Intelligence to facilitate learning. In [4], Bomsdorf shows the need to adapt intelligent environments to