Viewer ID Systems: a complex trade-off

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INTRODUCTION

The World Health Organization (W.H.O.) reports an increasing rate of 2,7% per year in the group of people aged more than 60 years old (with a prediction of 20% of people in this group in 2050). As people get older, they tend to be large TV consumers with the potential advantage of companionship and valued source of information. The interactivity present in a raising number of pay-tv platforms can help this media play an even more important role when offering features such as: automatic audio volume adjustment, audio description, personalized health care systems and community communication services. Currently, these features have the ability to enhance the elderly viewing experience and their global quality of life. However, considering a typical usage scenario with multiple unidentified viewers using the same Set Top-Box (STB) there is an interesting advantage to have a reliable and automatic viewer identification method (vID), allowing each user to benefit in a personalized way from the aforementioned features.

ELDERLY IDENTIFICATION IN iTV SYSTEMS

Regarding the available technical solutions to implement a vID system, we decided to study the following methods: i) speaker recognition (with a built in microphone in the remote control); ii) finger print (with a reader over the remote); iii) wireless tag (attached to a dressing accessory, e.g. a bracelet); iv) controlled face recognition (the user needs to press a button in the remote to activate the recognition process); v) pervasive face recognition (with an always-on recognition camera).

Defining the vID method more suitable for each specific set of user's characteristics was a complex task that relied on: i) understanding elderly needs, their limitations, motivations and behaviors when they are in front of the TV set; ii) prototyping a set of viewer identification methods and; iii) running a longitudinal study with the participation of elderly users. It was decided to perform this study at the participants' homes as recommended e.g. by Obrist and Tscheligi [3] and Harboe et al. [2]. We started our research with a set of five exploratory interviews, made to randomly selected participants, with the aim to tune the interviewing style and getting a better knowledge about the target users. In these interviews we had the opportunity to explain the concept behind iTV applications (with a focus on wellness) and about the benefits of having an associated vID system. With this preliminary approach we confirmed the need to have a relaxed and enthusiastic environment in the interviews; to create a tangible prototype and; to test it amongst participants with high digital literacy and younger. After, we developed a prototype to simulate a first set of two vID methods (a wireless tag inserted in a bracelet and a RFID card) that allowed participants to be automatically recognised in an existent iTV application targeted to elderly users (the used application was developed under iNeighbour TV project[1]). Then we tested this prototype with 9 participants and we cannot identify a clear trend regarding a specific vID method. Consequently, it was decided to design a decision matrix (Figure 1) that considers user factors related, for example, with living context and user's physical special needs. The matrix considers these factors for each vID method. User factors were very complex to define and measure, since elders are heterogeneous users with a large spectrum of physical and psychological characteristics. Thus, it was necessary to select elderly physical and psychological functional classification concepts from gerontology. We defined the following parameters as matrix entries (Figure 1): i) users' ICT knowledge (high, medium; low) measured according to the European Commission Report; ii) visual acuity; to measure this parameter we used the Jaeger Eye Chart (JEC) test and the results were represented in a 3 level scale: high, medium; low; iii) hearing acuity, measured using the whisper test; the results were represented in a 3 level scale: high - no hearing problem; medium - hearing problem not affecting system usage; low - severe hearing problem; iv) orientation, which is a parameter related with persons' psychological capabilities. To gather data to evaluate this factor a set of questions about person's address and current year was used; v) voice ability; also measured in a scale of three values; vi) memory; as in the previous parameter, this was measured using a similar three value scale. To gather this information we used a set of questions about issues referred in a previous

conversation with the participant; vii) fine motor skills; to measure this type of participants' skills, the Nine Hole Peg Test was used; viii) mobility; to evaluate this parameter we used the timed "Up & Go" test, also measured in a scale: high, medium, low.
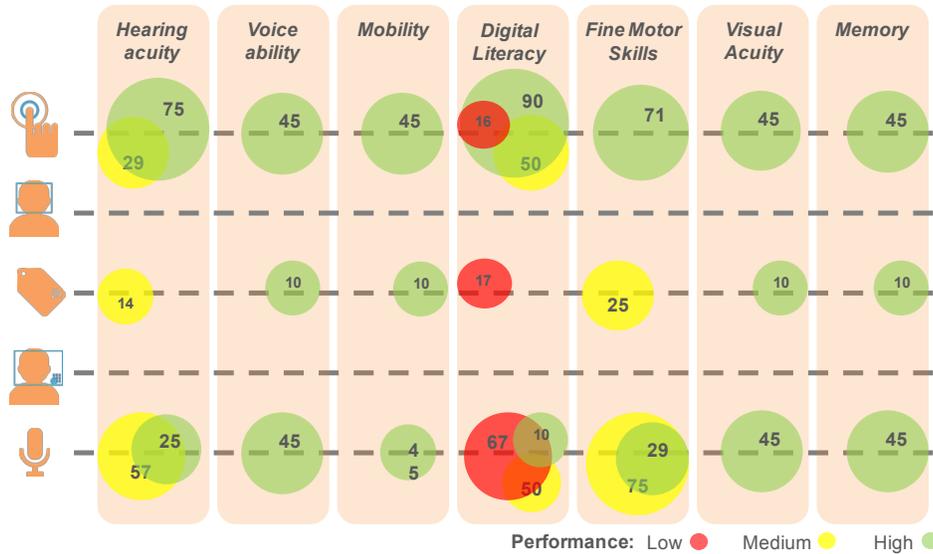

Figure 1 - Decision Matrix

After building the matrix it is necessary to fill in the cells with the percentage of preference for each type of method from each type of user. Only after a full completion of this stage, the matrix will be settled to help decide which vID method is the most suited to a specific usage context. In order to populate the cells, a prototype based on the Wizard of Oz approach was developed. With this approach participants were led to think they were interacting freely with the system, but actually there was a researcher manipulating it through the prototype, by remotely controlling the ID process. This approach was used to simplify the development phase. Until now, to fill the matrix, a set of eleven tests was conducted at participants' homes where they tried all vID methods. These sessions also included the functional tests described in previous section, in order to classify the participants according to all decision matrix parameters. Using the results of the small set of tests already conducted, it is possible to observe that if a person has a high literacy level he/she will probably choose a vID based on a finger print reader in the remote control (FP). The same happens, if the person has a high Fine Motor Skill. However, if the person has a medium "Fine Motor Skill" he/she tends to prefer the Speaker Recognition (SR) with a microphone installed in the remote control.

CONCLUSIONS AND FUTURE WORK

This work aimed to design a decision matrix to ease the process of finding the vID method most suited to a specific user in a particular context. After a set of exploratory interviews, a first prototype was developed and tested with elderly. The results showed that each user, in a specific context, tends to prefer a particular method. This lead to the design of a decision matrix that we wish to fill in with data gathered from the tests of a Wizard of Oz based prototype. At the moment, it was only possible to fill in some matrix cells. For example, regarding the level of voice ability we only had participants scoring in the highest level so we cannot fill in the cells corresponding to medium and low level. Despite that, the results gathered so far allow us to be strongly motivated to endeavour this type of methodology in a future research project where a large number of participants will be recruited. Future work will also encompass the visual representation of the outcomes of the matrix in order that their potential users, e.g. iTV providers or caregivers' networks, can benefit from this work.

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