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Monitoring elderly activities at home

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N. Zouba, F. Bremond, A. Anfosso, M. Thonnat, E. Pascual, O. Guerin. *Monitoring elderly activities at home*. The elderly population is expected to grow dramatically over the next 20 years. As people grow older, they need more healthcare assistance. Without receiving sufficient care, elderly are at risk of losing their autonomy. Thus a system permitting elderly to live safely at home is more than needed. Medical professionals believe that one of the best ways to detect emerging physical and mental health problems (before it becomes critical – particularly for the elderly) is to look for changes in their activities of daily living (ADLs). For this purpose, we propose a monitoring system which aims at detecting activities of daily living (ADLs) at home. In particular, the goal is to collect and combine multisensor information to detect activities and assess behavioral trends to provide user services at different levels: (i) the elderly will feel safer at home, and (ii) the care provider will be able to provide better support via the monitoring of health trends. To reach this goal, we have designed a video understanding platform including an event recognition algorithm¹. Related work includes developing and employing a variety of sensors for monitoring activities at home, including video cameras to assist person with dementia during handwashing², and embedded sensors³ for activity recognition. **Methods** We propose to combine video cameras with few sensors embedded in the home infrastructure in order to recognize activities of interest at home. We propose also to describe activities with in formal models by using a dedicated description language¹. The proposed system includes detecting people, tracking people as they move, recognizing events of interest and identifying a behavioral profile of a person. The potential benefit to the elderly people is that they could enjoy an increased quality of life by remaining within their own homes. The laboratory GERHOME (Figure 1) equipped with many sensors and composed of two rooms has been build at the CSTB to validate the monitoring system and to explore the ADLs that can be recognized automatically by a computer system. While living in the laboratory, fourteen elderly volunteers (aged from 60 to 85 years) have been observed during 4 hours and were asked to perform a set of household activities such as preparing meal, taking meal, and washing dishes. **Results and discussion** As an illustration, the recognition of the “tacking meal” activity is shown in Figure 2. Results comparing 2 elderly volunteers (male of 64 years and female of 85 years) among the 14 elderly volunteers, observed during 4 hours, show the greater ADLs ability of the 64 years old adult as compared to those of the 85 years old (Figure 3): - the younger elderly person was "bending" twice more often than the older one (NDI=33%), and in a quicker way (NDA=60%), showing greater dynamism for the younger volunteer; - the younger elderly person (64 years old) was using more the "upper cupboard" than the other one of 85 years (NDI=42%), and in a quicker way (NDA=65%).

References

1. N. Zouba, F. Bremond and M. Thonnat. Multisensor fusion for monitoring elderly activities at home AVSS 09
2. Hoey J, Bertoldi AV, Mihailidis A. Assisting persons with dementia during hand-washing using a partially observable Markov decision process ICVS 2007
3. Wang S, Pentney W, Popescu AM, Choudhury T, Philipose M. Common sense based joint training of human activity recognizers IJCAI 2007

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Figure 1 Gerhome laboratory pictures

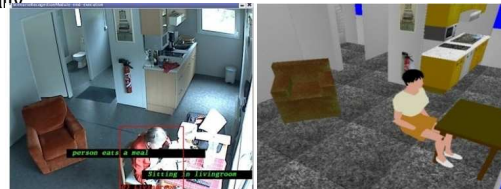


Figure 2 Recognition of “tacking meal” activity

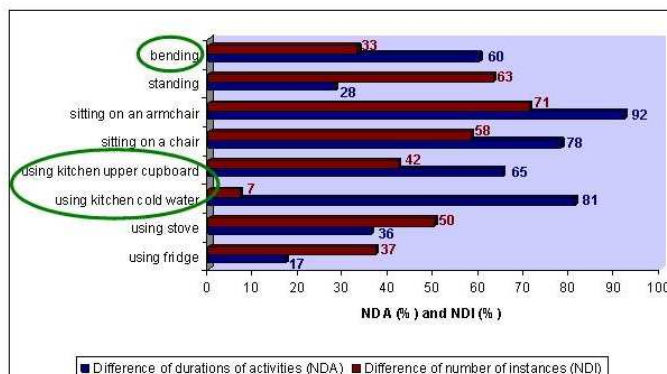


Figure 3 Results of the recognition comparing 2 elderly volunteers