Purpose Alzheimer Disease (AD) International's last report[1] points out the emergency of hindering the progress of AD and reducing its societal and economical burden. Its prevalence will reach more than 35 million people worldwide by 2010 and is expected to nearly double every 20 years. Without cure, the only way to struggle is to improve its management. However no reliable, cost-effective screening tool is available yet; patients are diagnosed after having reached the state of dementia whereas the others are misclassified as mild cognitively impaired. Thus, we have developed an adaptive multidimensional data processing methodology to detect the transition or prodromal stage[2] from normal aging to AD looking for perseveration in task, difficulties performing activities of daily living (ADLs), restlessness at nightfall, spatiotemporal disorientation, wandering... **Method** This automatic and unsupervised method is in line with the HIS project (Grenoble), for a decade. Besides, two elderly women have already been monitored with such a sensor network at home. The methodology used for data processing hinges on four steps (*Figure 1*): data collection, fusion, mining and alarm triggering[3-4]. Its particularity lies in the coupling of both environmental (location, weather, item use), physiological (cardiorespiratory signal) and behavioural (actimetry) data completed by contextual knowledge (modifications in behaviour, health state observed by the circle, medical records). **Results & Discussion** Data are recorded continuously to monitor the sequence of ADL and the cardiorespiratory signal whereas the contextual knowledge is used to modulate the degree of alertness. A learning phase is necessary to establish an individual typical profile. This phase is all the more important, that each person acts differently with their own rhythm and habits. The profile is adaptive and thus is likely to evolve moderately in time. During data processing, a probabilistic reconstruction step compensates for missing data. Then a multi-scale analysis is performed to detect both short and long-term changes. As the day passes, occurrence of ADL are detected and compared to the expected pattern. For long-term monitoring, the evolutions of the time needed to perform ADL, physiological parameters, amount of activity and social interaction are followed-up. Important discrepancies trigger alerts to the caregivers or family depending on the alarm intensity.

References

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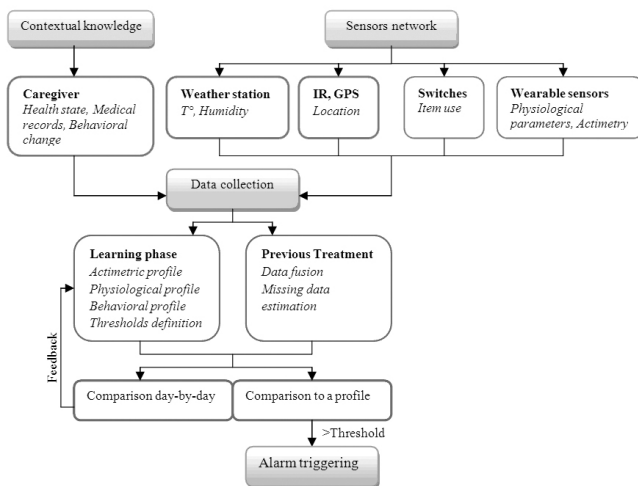
Figure 1. Four step methodology of data processing in AD detection