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Resumen:

Residences for geriatric patients are usually understaffed, with each caregiver being in charge of several residents. A caregiver must assess the well being of residents and report to the medical staff if there is something unusual with a resident. Deviations from the routine will trigger an alarm, and automatic tools can help in making timely decisions. In this paper, we explore three visualization metaphors aiming at providing caregivers with an individualized overview of the activities carried out by residents in a given time frame. We postulate that this overview is sufficient to distinguish between normal and abnormal periods of time when visually compared in groups. We also present two automated approaches, data driven and knowledge driven respectively, to detect abnormalities. The visualization and the automated approaches are tested on a naturalistic dataset obtained from a long-term personalized sensing and annotation campaign in a residence for geriatric patients. Data is of two types, obtained from IoT infrastructure and wearables and from manual annotations made by the staff. Both approaches were empirically evaluated and validated in the paper. A side product of this research is a large repository of cleansed data from the sensing and annotation campaign for 45 older adults over a period of 39 months.

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Detecting abnormal behaviours of institutionalized older adults through a hybrid-inference approach

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ABSTRACT

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1. Introduction

Institutionalized older adults living in residences for geriatric patients [1], demand specialized and personalized care, depending on their mental and physical decline and other conditions exhibited [2]. The Internet of Things (IoT) enables the development of Assistive Technologies (AT) [3] to locally or remotely monitor patients through sensors [4], devices [5] and applications [6]. These AT have permeated to the domain of older adult healthcare. Sensors, devices and applications enable the generation of life-logging [7] and healthcare records from older adults. Diverse types of data from various sensor sources embedded in the environment are produced automatically. This structured data has an intrinsic value and can be supplemented with relevant and unstructured information about older adults (visits, food, showers, etc.) recorded manually by the caregiver. Taken together, data gathered from automatic and manual sources are diverse and vast. Moreover, after the data is processed and analysed correctly [8], its intrinsic value increases. The study and analysis of large amounts of data from mixed data sources pose certain challenges [9]. The challenge of *variety* is tackled in this work: it relies on the combining of old-fashioned and new forms of data, as well as the transformation of unstructured and semi-structured data through the use of effective processing platforms equipped with data mining, machine learning and semantic techniques.

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