Chapter 4
Early Detection of Dementia: Advances, Challenges, and Future Prospects

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ABSTRACT

Early detection and prediction of dementia through unobtrusive techniques or obtrusive tests is still in exploratory status and despite the increase of interest in recent years, many challenges remain open in designing methodologies that can accurately predict its onset. This chapter addresses the problem of the early detection

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of dementia from two points of view: Detection based on unobtrusive paradigms both in lab and home environments (behavioral monitoring, serious games, home based assisted living applications in telemedicine) and detection based on neuroimaging approaches. The chapter also provides information on setting up ecologically valid home labs for dementia related experiments. Consequently, the aim of this chapter is to provide an overview of a complete methodology of how researchers can possibly detect or predict the onset of dementia through the current state-of-the-art, underline open challenges and illustrate future work in the field.

INTRODUCTION

Chronic illnesses impose a great burden on the lives of citizens worldwide. In modern health-care, decentralisation, de-hospitalization and self-management of diseases at home are crucial factors for improving the every-day life of the patients and the people close to them. People in general tend to dislike obtrusive monitoring on their daily activities, so the challenge for home care solutions is to implement systems that provide clinicians with adequate and concise information on their patients’ health status while at the same time be unobtrusive and easy to use (Golle & Partridge, 2009; Röcker, Hinske, & Magerkurth, 2007). Based on sets of multimodal monitoring parameters and measuring scales feeding reconfigurable event detection mechanisms used for risk assessment and analysis, AAL systems aim to early detect symptoms that predict decline, avoid emergencies and secondary effects and, ultimately, prolong the period that patients can remain safely cared at home. In this chapter the authors aim at providing a description of current trends in context-aware ambient monitoring for the early detection of dementia and prediction of deterioration, as well as provide a background for minimally obtrusive neuroimaging approaches on prediction of dementia.

BACKGROUND

The current applied paradigm for dementia, revolves around patients in the later stages of the disease, where the patient is beyond the stage of the application of delaying/preventive measures. This follows as a result of the delay in seeking care from the majority of patients and caregivers, until the disease has progressed (Boise, Morgan, Kaye, & Camicioli, 1999). There is a gap in the clinical paradigm which does not include the need for the application of methodologies for early detection of dementia, at the onset of the very first symptoms. This is further exacerbated by the fact that most physicians delay providing a diagnosis as they perceive dementia...
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