Chapter 12
An Ambient Intelligence System for the Monitoring, Empowerment, and Disease Evolution Prediction for Patients with Mild Cognitive Impairment

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ABSTRACT

This chapter addresses the critical issue of exploration and integration of environmental factors as well as the effect of activities of daily living with medical and biological factors in order to monitor and predict AD/MCI disease progression and evolution. Thus, traditional approaches to clinical research and practice requires population statistics and therefore takes into account only the average biological behaviour of the disease, independently of the person specific clinical history, environmental factors, as well as the daily activity interactions in relation to historical data. The proposed system will use IT-based tools (including also 3D gaming environments) in order to address specific cognitive and physical/motor parameters and ADLs (activities of daily living) factors within AD, and MCI domain and aim at improving their diagnosis, evaluating their variations along the progress of an Alzheimer disease and its different steps, and supporting the stimulation/training of the patient affected by the disease.

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INTRODUCTION

The age structure of the EU population is projected to change dramatically, as shown in the population pyramids presented below by Eurostat [Age structure of population in EU 27, 2012]. Thus, the population aged 65 and above will increase very markedly throughout the projection period, almost tripling from 23.7 million in 2010 to 62.4 million in 2060.

This ageing trend has severe implications for the prevalence of age-related declines in physical and cognitive abilities, which will cause inevitably breakdowns in self-management and hinder older peoples’ chance to live independently. Especially, disorders of the central nervous system are important causes of morbidity and mortality worldwide and have a highly significant impact on societal welfare. Many of these disorders remain untreated despite recent progress in understanding their pathogenesis, and the need for further research is as great as ever.

Moreover, on 22 September 2011 and during the Summit on Non Communicable Diseases (including cardiovascular diseases, cancer, chronic respiratory diseases and diabetes, as well as others NCDs such as neuropsychiatric disorders and arthritis) that was organised by the United Nations, the final political declaration of the summit specifically recognized neurological diseases, including Alzheimer’s disease (Alzheimer’s Disease International (ADI) has become a Full Partner in the NCD Alliance with the other four disease areas) and other dementias, as an important cause of morbidity that contribute to the global NCD burden and that NCD prevention programmes and

Figure 1. Age structure of population in EU 27 (The 2012 ageing report)
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