

# Preface

The current years are characterized by an unprecedented challenge: the ageing of the World population. According to an estimate by the World Health Organization (“Global health and ageing”), the number of people aged 65 or older will triple, from 524 million in 2010 to 1.5 billion 2050. This means that older adults will increase from the 8 percent of the entire population to the 16 percent. We are witness of the increase of chronic diseases and health related emergencies. In addition, the curve of required medicine cost for the last 10 years of people’s life is more than the corresponding medical cost used for the rest of their life. Since Governments and healthcare organizations aim to develop medical systems which offer higher quality at lower costs, one of the questions at the heart of this workshop is then whether we can “flatter” or smoother the lifetime cost curve for the provided healthcare services.

Since its inception, Artificial Intelligence served medicine, and nowadays can serve assistive medicine in the support of older adults and their carers, during their treatments as well as at home, trying to extend the time they can autonomously spend in their preferred environment. In fact, the sensor networks technology and the new technology devices like smart phones, tablets, digital TVs, web cameras and all the smart gadgets that appear in the market open the way to the exploitation of years of research in computer vision, machine learning, reasoning, planning, data mining, ontologies, autonomous agents, robotics, to make sense of the data generated in pervasive environment, understand and recognize scenarios, make diagnosis, detect risks and emergencies, recognize depression and cognitive decline, etc.

In such context, what we call “NetMedicine”, i.e. every health related activity carried on through the Internet, has the potential to deal with the challenges imposed by the ageing of world population, especially for real-time health monitoring, teleconsultation, teleexpertise and second opinion over the Internet. Moreover, social networking facilitates the constitution of large communities of members sharing similar medical interest.

Thus, we organized the *4th International Workshop on Artificial Intelligence and Assistive Medicine* (AI-AM/NetMed 2015) which merges the soul of the first and second edition of the workshop (i.e. NetMedicine) with the need to face the challenges of the assistive medicine. The papers accepted for this one-day workshop give special emphasis in:

- Ubiquitous real-time assistive healthcare
- Ambient and active assisted living
- Ambient Intelligence
- Wearable and/or unobtrusive smart healthcare systems
- Multi-Agent architectures for patient monitoring and early diagnosis
- Fusion and interpretation of multimodal medical data and events
- Medical ontology modeling and evolution

- Semantically diagnosis modeling
- Reasoning with the uncertainty of medical data/knowledge
- Mining on medical data/knowledge
- Patient centric and evidence based decision support systems

This proceedings collect the contributions of the six accepted papers. In their *Argumentation for Traceable Reasoning in Teleexpertise*, Doumbouya et al. couple semantic modeling and argumentation to make traceable a decision process during an act of teleexpertise, allowing different medical specialists to remotely reason about the treatments for a patient. In *Length of Stay Prediction and Analysis through a Growing Neural Gas Model*, Lella et al. propose the adoption of neural networks to face an issue closely related to the increase of people affected by chronic disease and of health related emergencies: the prediction of the Length of Stay which is crucial for hospital bed and resource management. Rafael-Palou et al., with their *Monitoring People that Need Assistance through a Sensor-based System: Evaluation and First Results*, show the potentiality of AI and network technologies for activity recognition and emergency detection inside real dwellings, describing the results from two European projects. In *Ecologically Valid Trials of Elderly Unobtrusive Monitoring: Analysis and First Results*, Bilis et al. share the field with the previous paper, but focus on the evaluation of sensor measurements in ecologically valid environments, since the accuracy of such measurements in real environments is usually lower than in lab settings. Pakawanwong, with his *Visualizing the Brain Structure with a DT-MRI Minimum Spanning Tree*, presents a method for the visualization of fiber tract structures in the human brain, by searching the minimum spanning tree in a graph where the vertices are the brain voxels. In the last paper, *Using a Virtual Environment to Test a Mobile App for the Ambient Assisted Living*, Calvaresi et al. deal with the challenge of testing software systems for the AAL, proposing the use of 3D virtual environments to perform a pre-validation phase.

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