Title (tentative): Gesture recognition for Serious Games using Deep Learning

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Description

Motivation and application domain
The aim is to improve the quality of life of older people, especially apathetic patients with Alzheimer disease through Serious Games (SG), e.g. a virtual coach with an avatar. The user should be able to interact freely, when s/he moves at home. Older people with dementia meet many difficulties in using regularly and efficiently SG in their cognitive training. The challenge is to understand the user motion, her/his gestures to obtain a seamlessly and intuitive interaction for the SG.

General objectives and main activities
This internship consists in the improvement of the gesture recognition process using RGB sensors and new machine learning techniques, such as Deep Convolutional Neural Network (CNN) to enhance the performance of interactive systems (i.e. Serious Game) for older adults. For instance, recent advancements in CNNs have made possible the detection of the user skeleton from RGB. But, these methods fail when people are in close proximity. Many techniques have already been proposed for detecting people in specific environment (e.g. low people density in laboratory) using the cooperation of several sensors. Despite these studies, gesture recognition is still brittle with RGB cameras and often depends on the scene conditions (e.g. number of people, lighting, occlusion, and people interactions).

To validate the internship we will assess the proposed approach on homecare pilots from Nice Hospital to evaluate technologies to keep older adults functioning at higher levels and living independently.

Training Objectives (technical/analytical tools, experimental methodologies)
The goal for the trainee is to learn advanced functionalities in computer vision and artificial intelligence, involving the latest techniques in machine learning using Deep CNN. The student will have opportunities to train his/her network on a large GPU farm.

The goal is also to have a research experience, going beyond the State-of-the-art in machine learning by combining the output of CNN with logical inference. This work should lead to the publication of a paper in an international conference.

Place(s) where the thesis work will be carried out: DIBRIS (Genova) and Stars team Inria (Sophia Antipolis, France)

Additional information
Pre-requisite abilities/skills: Computer Vision, Strong background in C++ programming, Linux, debugging tools, Artificial Intelligence and Machine Learning.

Maximum number of students: 2