Title (tentative): Engagement assessment for Serious Games using Deep Learning

Thesis advisor(s): Solari Fabio, Manuela Chessa, Francois Bremond (Inria, Sophia Antipolis, France)

E-mail: Fabio.Solari@unige.it

Address: Via Dodecaneso, 35 - 16146 Genova 303

Phone: (+39) 010 353 6756

**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. We propose a virtual agent that can enhance the performance and engagement of the player using engaging strategies.

**General objectives and main activities**

This internship consists in the improvement of the engagement 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 Convolutional Neural Networks have made possible the detection of the user skeleton from RGB videos. But there is a need to go beyond human detection to analyze appearance and dynamics of both face and body, towards recognition of identity, gender, age, as well as mental and social states to allow for successful holistic analysis of humans, beneficial in the early detection of frailty symptoms for health care and better interaction with automated interactive systems. 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