UNIVERSITY OF GENOA
DEPARTMENT OF INFORMATICS, BIOENGINEERING, ROBOTICS AND SYSTEMS ENGINEERING
MASTER'S PROGRAM IN BIOENGINEERING

Thesis Project Form

Title (tentative): A software to train and test the ability to detect abnormal motion patterns in infants

Thesis advisor(s): Casadio Maura, Matteo moro Francesca Odone Andrea Canessa

E-mail: Maura.Casadio@unige.it

Address: Via Opera Pia 13, 16145 Genova (ITALY)

Phone: (+39) 010 33 52749

Description

Motivation and application domain

The analysis of infants' spontaneous movements is essential for an early diagnosis of neuro-motor disorders, especially for preterm birth. In fact, the 5-15\% of the premature babies born with a birth weight of less than 1500g have motor alterations and 25-50\% of them have develop behavioral and/or learning deficits. An early diagnosis of pathological cases would allow the start of early rehabilitation treatment that could significantly increase the likelihood and extent of recovery. Starting from the 90's, the study of preterm and term infants motion provided evidences of a qualitative correspondence between anomalies in the motion patterns and neurological dysfunctions. This was the starting point for the development of Prechtl's General Movement Assessment (GMA). General Movements (GMs) are spontaneous movements of variable amplitude and speed involving different parts of the body that could reflect the state of neuro-motor development. Unfortunately, GMs are difficult to detect and trained physicians are needed to complete the task. Moreover, in this field it is not easy to find a sufficient amount of data to properly train physicians in order to correctly recognize GMs.

General objectives and main activities

The goal of this thesis is the implementation of a virtual model of an infant (with Unity 3D). The project will start with the study of real video acquisitions of preterm infants in order to detect significant body parts and track their trajectory across time. The characterization of infants motion will be adopted to move the virtual model [1].

Training Objectives (technical/analytical tools, experimental methodologies)

The student will learn:
1. Computer vision techniques in order to analyze images and videos;
2. How to use algorithms based on deep learning to estimate the pose of the people in the images;
3. How to use unity 3D for the implementation of the simulator;
4. Improve the knowledge of Matlab.

Place(s) where the thesis work will be carried out:

Additional information

Maximum number of students: 1