Motivation and Field of Application

There is clinical evidence that the observation of spontaneous movements of newborns is predictive of neurological problems, which may lead to cerebral palsy and other developmental disabilities. Several experimental studies were carried out using sophisticated 3D motion capture but remained confined to academic settings for their complexity. This project aims at developing and testing a flexible, simple, stable, and low-cost system for early identification of infants at risk for motor disability.

General and Main Objectives

The overall purpose of this project is to develop innovative methods for measuring infant brain function and development, with a focus on tests that are simple, reliable, non-invasive, and universally applicable. A first step toward this goal is to improve and validate a low-cost video analysis system (MIMAS: Markerless Infant Motion Analysis System) of spontaneous movements of preterm/at term newborns for early detection of neurological problems, which may lead to cerebral palsy and other developmental disabilities. Early detection means early treatment with finalised physiotherapy and this is known to enhance significantly the chance of healthy development of the children at risk. The correlation of the clinical measures, MR morphological data, and MIMAS indicators will allow us to identify the range of normality of the movement indicators and their capability, through a suitable statistical validation, to provide a reliable early detection of neurological problems in newborns.

Learning Objectives (technical and analytical tools, experimental methodologies)

The students will learn:
- to extract relevant movement features from video recordings
- to analyze infants' motion
- to compare human data from different sources
- to use techniques of advanced statistical data analysis, data clustering, and dimensionality reduction techniques
- to improve their knowledge of Matlab and C++
- to work in an international team with people with different backgrounds (engineers, physicians, physical therapists)

Location

Neurolab, Dibris Unige Laboratorio congiunto Gaslini - IIT, Istituto Giannina Gaslini

Additional Information

Required skills: Matlab and C++ programming

Maximum number of students: 2