2023-06786 - [Trainee] - Deep Learning for Infant Motion Classification

Level of qualifications required: Bachelor's degree or equivalent
Function: Internship Research

About the research centre or Inria department
Grenoble Rhône-Alpes Research Center groups together a few less than 800 people in 39 research teams and 8 research support departments.
Staff is located on 5 campuses in Grenoble and Lyon, in close collaboration with labs, research and higher education institutions in Grenoble and Lyon, but also with the economic players in these areas.

Present in the fields of software, high-performance computing, Internet of things, image and data, but also simulation in oceanography and biology, it participates at the best level of international scientific achievements and collaborations in both Europe and the rest of the world.

Context
Context:
Medical motion analysis is a valuable clinical tool for evaluating an individual's state of health. One of the most common motor disorders in childhood is cerebral palsy (CP), which can be detected by means of infant motion analysis [1]. Trained experts can identify infants at high risk of developing CP solely based on the assessment of general movements (GMA) [2], i.e., they evaluate the quality of general movements (GMA) from videos of spontaneously moving infants. GMA provides excellent reliability, but becoming a skilled GMA expert requires time and regular practice [1]. An automation of GMA can support clinicians in identifying high-risk infants as early as possible in order not to miss an opportunity for early therapy.

Assignment
Objectives
The goal of the internship is to be able to predict the GMA rating of an infant from a sequence of 3D poses. The method should, in addition to give a prediction, also state its associated confidence. Additionally, the exploration of the activation layers should provide an identification of which specific motions are relevant for the classification.

First, a study of how existing architectures perform on the classification task will be conducted, by focusing on the transformers architectures. Then, the intern will explore new variants / architectures to improve the state of the art results.

Data corpus
An internal dataset is available containing the motion sequences of the infants and their medical GMA obtained with [3,4].

References:

Main activities
Observe, think, act

Skills
Candidate Profile:
- Master student – preferably in Computer Science or Applied Mathematics.
- Creative and highly motivated
- Solid programming skills
- Fluent English or French spoken.
- Prior courses or knowledge in the areas of temporal series, machine learning and deep learning are a plus

**Benefits package**
- Subsidised meals
- Partial reimbursement of public transport costs
- Professional equipment available (videoconferencing, loan of computer equipment, etc.)
- Social, cultural and sports events and activities

**Remuneration**
Gratification minimum légale

---

**Instruction to apply**
Applications must be submitted online on the Inria website.
Processing of applications sent by other channels is not guaranteed.

**Defence Security**
This position is likely to be situated in a restricted area (ZRR), as defined in Decree No. 2011-1425 relating to the protection of national scientific and technical potential (PPST). Authorisation to enter an area is granted by the director of the unit, following a favourable Ministerial decision, as defined in the decree of 3 July 2012 relating to the PPST. An unfavourable Ministerial decision in respect of a position situated in a ZRR would result in the cancellation of the appointment.

**Recruitment Policy**
As part of its diversity policy, all Inria positions are accessible to people with disabilities.