Equipe MediCIS
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France

Internship Subject: Human pose estimation and evaluation by deep learning during surgical training.

Localization: Laboratoire Traitement du Signal et de l'Image (LTSI), MediCIS Team

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Keywords: Pose Estimation; RGB/RGBD; Machine Learning; Deep Learning; Surgical training; Surgical simulator.

Context

Surgical simulation has become an important part of the training curriculum of surgeons. The trainees have to practice repeatedly on simulators to improve their skills and performance. In theory, they should be supervised by experienced surgeons to ensure that the trainees acquire the correct gestures to perform the task. In reality, trainees are generally in autonomy and get feedback only on assessment metrics based on results directly measurable by the simulators: execution time, instrument collisions, overlapping workspaces, length of movements, etc. These measures only take into account the kinematic data of the tools and/or effectors, ignoring the posture of the trainees, which can have a real impact on performance.

Objective of the internship

The objective of this work is to develop an automatic posture recognition method from RGB/RGBD video data in order to provide metrics reflecting trainees' posture and to provide personal advice to improve the execution of the task. To achieve this goal, the internship will be divided into multiples steps:

- Collecting data during training sessions on a simulator. This data will include kinematic and video data of the task and RBG/RGBD data of the trainees' posture;
- Develop a deep learning-based human pose estimation method from the RGB/RGBD data;
- Evaluate and compare this method's performances;
- Study the explicability of the model implemented in order to provide guidance to learners.

Profile researched

The candidate must have knowledge in machine learning, data analysis, and computer science. Additional experience in deep learning is a plus.

Salary or allowance

Standard internship allowances