Objectives of the project

This project aims to leverage state-of-the-art deep learning models for pose estimation to accurately determine the rotation and position of surgical tools present in the surgical environment during \gls{rmis}. The detailed objectives of the project are as follows:

1. Dataset Analysis: The first objective is to analyze the datasets which include high-quality images captured by the Da Vinci Si endoscopic stereo camera and accurate and consistent ground truth data obtained from the Hamlyn Centre;
2. Model Development: Based on the available datasets, we will develop deep learning-based models to detect and estimate the pose of surgical instruments in \gls{rmis};
3. Robust Pose Estimation: We also need to devise novel approaches to ensure accurate and robust pose estimation in the presence of challenges such as partial tool visibility, occlusions, and other variations encountered during surgery.
4. Performance Evaluation: Finally, the project will evaluate and validate the performance of the applied models under various degrees of occlusion, ensuring their reliability in practical surgical scenarios.

Hardware/software requirements

Python / Pytorch / OpenCV