



Visual Recognition of Surgical Actions Using a View-Invariant Descriptor

Praktikum Project

Project Description

The task of action recognition inside the operating room can help on identifying the phase of an operation. It can also support the analysis of the workflow of an operation.

Activity recognition has attracted a lot of attention during the past three decades, initially using a single camera and more recently multiple cameras [1]. In the current project, the task of surgical action recognition will be accomplished using a multi-camera system. The setup includes four CCD cameras installed on the ceiling of an operating room. The reason for the big number of cameras is the complex set-up of the operating room. It is not possible to cover the whole operating room with a single camera because of the occlusion and its dynamical environment.

The proposed framework will be based on the idea of the Self-Similarity descriptors, which have been proved to give excellent results on the task of action recognition [2]. A view-invariant descriptor will help to recognize the same action from different cameras simultaneously.

Student Tasks Description

The student will accomplish the following tasks:

- Understand the concept of the Self-Similarity descriptors.
- Implement the descriptor for trajectory based and image based similarities.
- Annotate data from operating room sequences.

- Train a classifier and evaluate the descriptors.
- Evaluate with standard sequences.

Requirements

The student should be familiar with features selection algorithms, part-based object decomposition and object classification. In addition, the student should have experience with C++ and Matlab (optionally OpenCV).

References

- [1] Moeslund, T.B. and Hilton, A. and Krüger, V., A survey of advances in vision-based human motion capture and analysis (CVIU 2006)
- [2] Junejo, I.N. and Dexter, E. and Laptev, I. and Perez, P., View-independent action recognition from temporal self-similarities (TPAMI 2011)

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