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## A Deep-learning Based Cataract Workflow Analysis

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### Abstract

With over 10 million interventions per year, cataract surgery is the most frequently performed procedure worldwide and the number of patients at risk is expected to increase sharply. With such a large demand, the ability to train surgeons to competently perform cataract surgeries and optimize the workflow is a public health necessity. In this context, automatically recognizing the surgeon's action can provide real-time support and post-operative analysis of the intervention to potentially prevent complications and customize the training process. To this end, we propose a method for cataract surgeries that recognizes the current surgical action jointly with the surgical tool in use. Our method uses recent deep-learning architectures to extract spatial and temporal information from the microscope video stream which is recorded as a standard procedure in cataract surgeries. We make explicit use of the correlation between the tool in use and the current surgical action to improve the predictions on both in a multi-task setting. Our proposed method outperforms all competitors by more than 8% on average in the CATARACTs workflow challenge, a sub-challenge of the MICCAI 2020 EndoVis challenge.