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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.