# Automated Platform for Operative Video Preparation and Presentation

David P Darrow MD MPH; NIcholas Derrico; Andrew W. Grande MD
University of Minnesota

## Introduction

Neurosurgery centers are accumulating terabytes of operative videos, often not well-integrated with routine resident training. Small groups of videos been employed in a variety ways, such through standard, online surgical atlases or small clinical studies investigating video motion analysis, but no unified workflow to prepare, analyze, and present videos has been reported.1
Automatically prepared and accessible operative videos enables attending-specific preoperative preparation, resident self-evaluation, and video analysis for surgical research. Operative techniques vary with the attending surgeons, and resident development can be furthered by making videos readily available for retrospective self-assessment. Automated video segmentation allows hours of surgical video to be condensed into time-efficient resources, and network associated storage makes the large file libraries available for online streaming.2,3

## Methods

We compiled operative microscope videos from a single academic center between 2012-2015. A comprehensive video workflow was created using open-source software to automatically collect, consolidate, delete stretches of inactivity, and archive into a ready-to-stream format. The files were organized into an easily searchable database for remote viewing.

## Results

Over 600 operations at the University of Minnesota, nearly 20 terabytes of video, were consolidated and processed. Detailed instructions were created so that other institutions could implement the comprehensive platform with minimal cost. The database has been used by residents to prepare for procedures in an attending-specific manner as well as more in-depth analysis of surgical decision-making in morbidity and mortality conferences.
Furthermore, by associating the indexed library with resident's case logs, they have been able to self-evaluate their performance retrospectively.

## Conclusions

We present the first customizable operative video management platform. Unlike other surgical video resources, the comprehensiveness of our database provides unique opportunities for preparation, evaluation, and in the future inter-/intra-operator comparison. Other institutions will have the ability to organize their video archives into a useful format and prepare videos for online sharing.


## Learning Objectives

1. The steps of video preparation include consolidation, scene analysis, formatting, storage, and indexing.

2. Videos of local operations allow for attending-specific preparation and retrospective self-evaluation.

3. This infrastructure will allow for future studies of inter- and intra-operator procedure variability and outcomes in surgical research.

## References

1. McGoldrick RB, Davis CR, Paro J, Hui K, Nguyen D, Lee GK. Motion Analysis for Microsurgical Training: Objective Measures of Dexterity, Economy of Movement, and Ability. Plast Reconstr Surg. 2015;136(2):231e-240e.

2. Crawshaw BP, Steele SR, Lee EC, et al. Failing to Prepare Is Preparing to Fail: A Single-Blinded, Randomized Controlled Trial to Determine the Impact of a Preoperative Instructional Video on the Ability of Residents to Perform Laparoscopic Right Colectomy. Dis Colon Rectum. 2016;59(1):28-34.

3. Mendi E, Cecen S, Ermisoglu E, Bayrak C. Automated neurosurgical video segmentation and retrieval system. J Biomed Sci Eng. 2010;3(6):618.