INNOVATION PARTNERSHIPS
UNIVERSITY OF MICHIGAN

AI-Powered Surgical Video Analysis

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Software
Life Sciences
Engineering & Physical Sciences

Inventor
Shahzad Mian
Bradford Tannen
Nambi Nallasamy

Further information
Drew Bennett
andbenne@umich.edu

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OVERVIEW

AI tools for automated analysis of cataract surgery competency and quality

- Enhances precision, speed, and objectivity of surgical analysis
- Useful for training, quality assessment, surgical performance improvement

BACKGROUND

Cataract surgery is one of the most common and crucial eye surgeries globally, aimed at restoring vision by removing the cloudy lens and replacing it with an artificial one. Historically, assessing surgical competency and quality has been a manual process, relying heavily on the subjective judgment of experienced surgeons. This approach is time-consuming, inconsistent, and prone to biases, leading to variability in surgical outcomes. Given the high demand for cataract surgeries and the prerequisite for uniform high standards, a need exists for an efficient and objective method to evaluate surgical performance and improve patient outcomes.

INNOVATION

Researchers have developed a comprehensive suite of AI and deep learning tools designed for the automated analysis of cataract surgery competency and quality. Key advancements include the creation of BigCat, the largest deeply annotated cataract surgery video database, and state-of-the-art performance tools for identifying and localizing surgical instruments. Additionally,

these tools can segment surgical videos into their component steps, compress videos by removing inactive phases, and semantically segment anterior capsulotomies with objective performance metrics. The ability to employ transfer learning allows these models to be adapted for varying surgical procedures using different instrumentation sets. Real-world applications of this technology include improved training for surgical residents, objective quality assessments of cataract surgeries, and continuous improvement of surgical techniques through data-driven insights.

ADDITIONAL INFORMATION

REFERENCES:

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