Building a better surgeon: Researchers develop artificial intelligence tool for surgical training

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If you have ever faced the daunting decision of whether to undergo surgery, you likely had several questions. Among the myriad

considerations were likely questions about the skill and experience of the person holding the knife.

New research from the FAMU-FSU College of Engineering could help give surgeons better training for their crucial work. The Google endowed dean of the college, Suvranu De, led the development of an AI-powered tool that helps to train surgeons by analyzing video of their surgical technique and providing feedback. The research was recently published in *JAMA Surgery*.

"The more training and feedback surgeons-in-training receive, the more their skills will improve," De said. "We have established a cutting-edge video-based assessment network (VBA-Net) that is a major step in the direction of automating the evaluation of surgical skills effectively. This system uses state-of-the-art deep learning models for formative and summative evaluations that foster skill development."

VBA-Net is an AI model that learns to distinguish between experts and novices by watching full-length videos of real surgical tasks. It provides the learner with final scores and online feedback. It automates the task of surgical skill assessment, which is currently performed by trained proctors.

The platform merges deep neural network (DNN) technology with existing video-based surgical assessment to deliver real-time feedback for aspiring surgeons. Deep neural networks are a form of artificial intelligence that mirror the intricacies of the human brain and aid in tailoring the learning process to individual interests, enhancing the relevance of recommendations.

"This tool can offer valuable support to evaluators and has the potential to ensure greater consistency in assessments," De said. "Our objective is to streamline the evaluation process by guiding trainees in their focus on

the most critical facets of a surgical procedure."

The DNN technology incorporates Explainable Artificial Intelligence (XAI), a type of AI that enables humans to better comprehend the otherwise opaque inner workings of the network. It gives users trust in the outcomes and outputs produced by machine learning algorithms. The technology demands minimal hardware and a standard camera setup.

De's research will help meet an American Board of Surgery's initiative to incorporate video-based assessment (VBA) into training surgeons and affiliated operating personnel. The group launched an inaugural pilot program to standardize VBA in 2021. De's pioneering vision takes AI and correlates it directly to VBA.

"We hope the insights from this research can pave the way for integrating this technology in training and credentialing programs in the next five to 10 years," De said. "Our ultimate aspiration is to enhance patient outcomes, save lives and cultivate more well-trained surgeons in the future."

More information: Erim Yanik et al, Deep Learning for Video-Based Assessment in Surgery, *JAMA Surgery* (2024). [DOI: 10.1001/jamasurg.2024.1510](#)

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