Surgical Instrument Identification Software System

Automates precise, model level surgical instrument ID to speed tray assembly, cut errors, and streamline SPD/OR operations.

Researchers at Purdue University developed a multi-stage algorithm leveraging computer vision and machine learning for precise surgical instrument identification. This technology ensures that all surgical instruments are correctly identified for assembly in surgical procedures. Accurate surgical instrument identification is crucial for inventory management, safety, and post-operative analysis. This technology addresses problems associated with manual surgical instrument identification and inspection. These problems include human error, inefficiency, and high costs.

The innovation developed by researchers at Purdue University achieves fine-grained and specific instrument identification that provides accurate and reliable information for critical hospital processes. Additionally, this technology delivers fast and consistent assessments, enhancing operational efficiency and lowering staff training and labor expenses.

Technology Validation:

The process flow of the technology begins with object detection, followed by orientation alignment using Principal Component Analysis (PCAP). Subsequently, a Vision Transformer (ViT-Large/14 DINOv2) extracts deep features from the aligned instrument image. Identification is then performed by calculating the Euclidean distance between these features and a pre-computed reference database.

Advantages:

-Improved reliability and accuracy of data for critical hospital processes

-Scalable and generalizable for real-world clinical use

-Fast and automatic surgical instrument identification

-Improved workflow efficiency of hospital staff

Technology ID
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Category
Artificial Intelligence & Machine Learning/Computer Vision & Image Recognition
Artificial Intelligence & Machine Learning/AI-Integrated Imaging Systems & Industrial Vision and Inspection

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View online

-Cost reduction

Applications:

-Surgical instrument identification

-Surgical procedures

-Healthcare facilities

TRL: 3

Intellectual Property:

Provisional-Patent, 2025-09-08, United States

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