Building a Surgical Analysis and Support Platform

Semantic-understanding AI for endoscopic surgery

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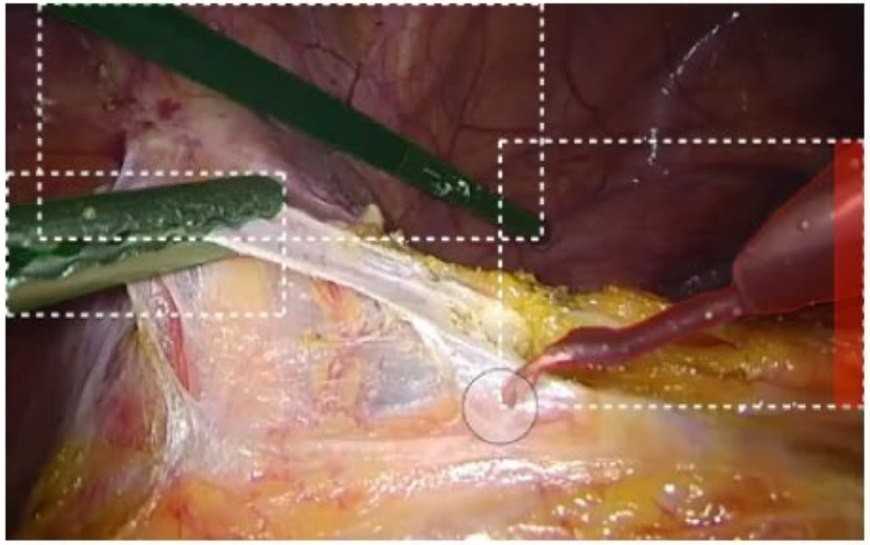
Educations

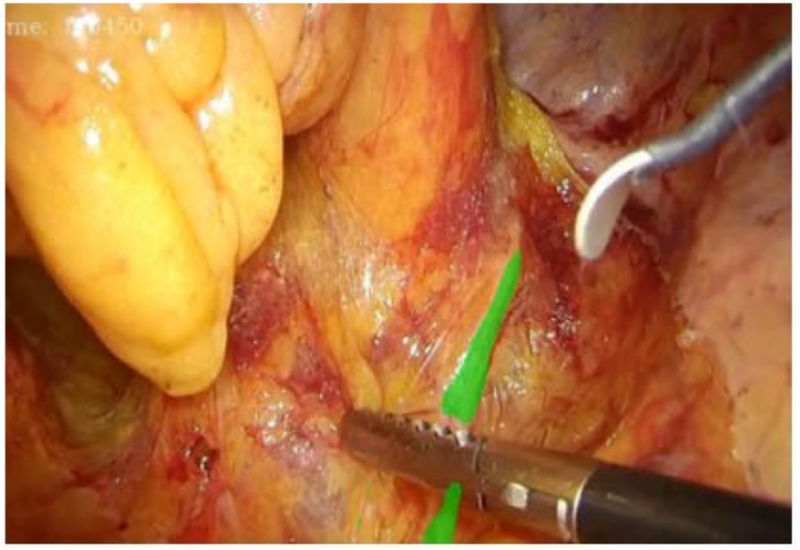
- 2006-2012　筑波大学 医学専門学群 医学類 (MD)
- 2019-2023　筑波大学大学院 人間総合科学研究科 疾患制御医学専攻 (PhD)

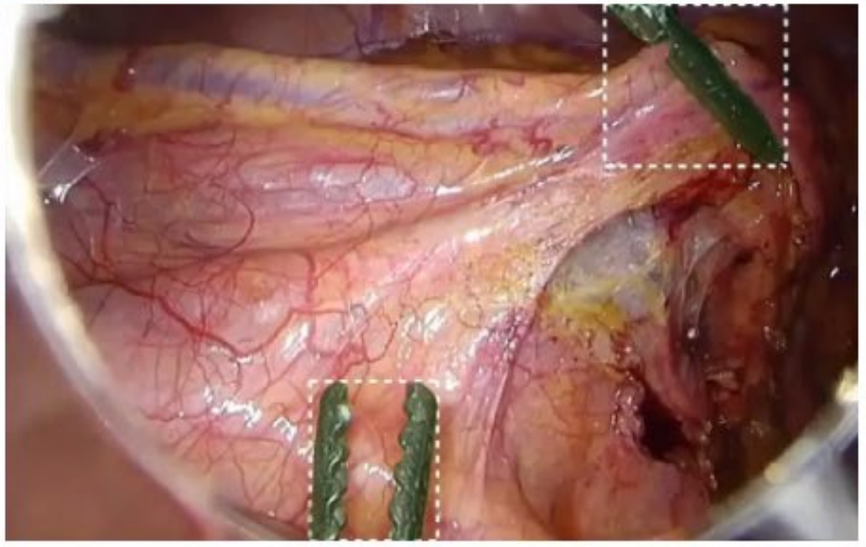
Experiences

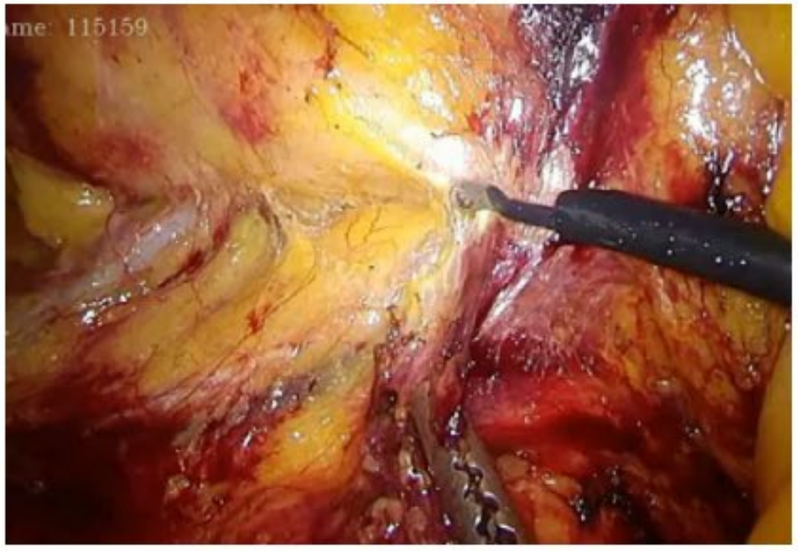
- 2012-2017　筑波大学附属病院 消化器外科
- 2017-2025　国立がん研究センター東病院 大腸外科
- 2025-2026　Research Fellow, IRCAD France
- 2026-　筑波大学 医学医療系 消化器外科

Surgical Data Science









Deployment in Surgical Setting

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October 2023

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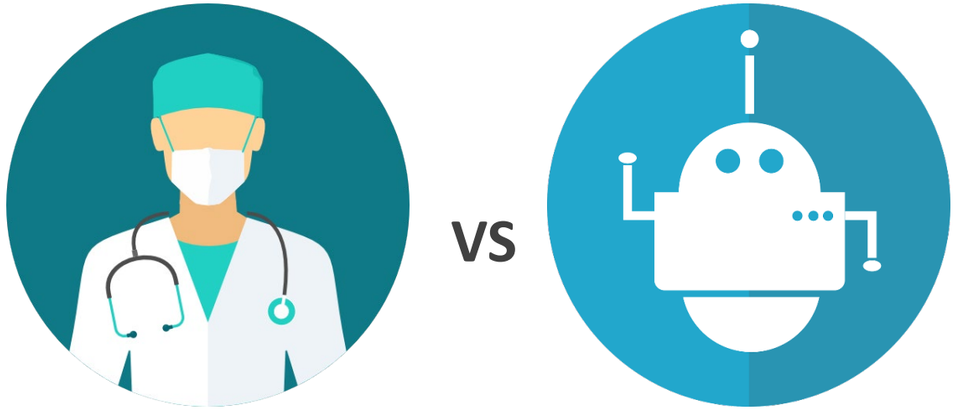
BJS, Volume 110, Issue 10, October 2023, Pages 1355–1358,
https://doi.org/10.1093/bjs/znad249



Surgeon AI

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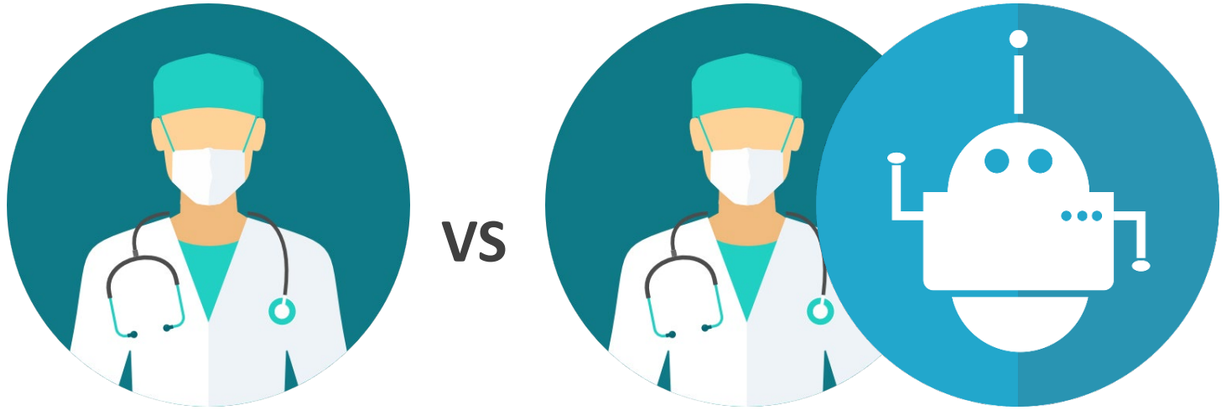


Surgeon Alone Surgeon x AI Collaboration

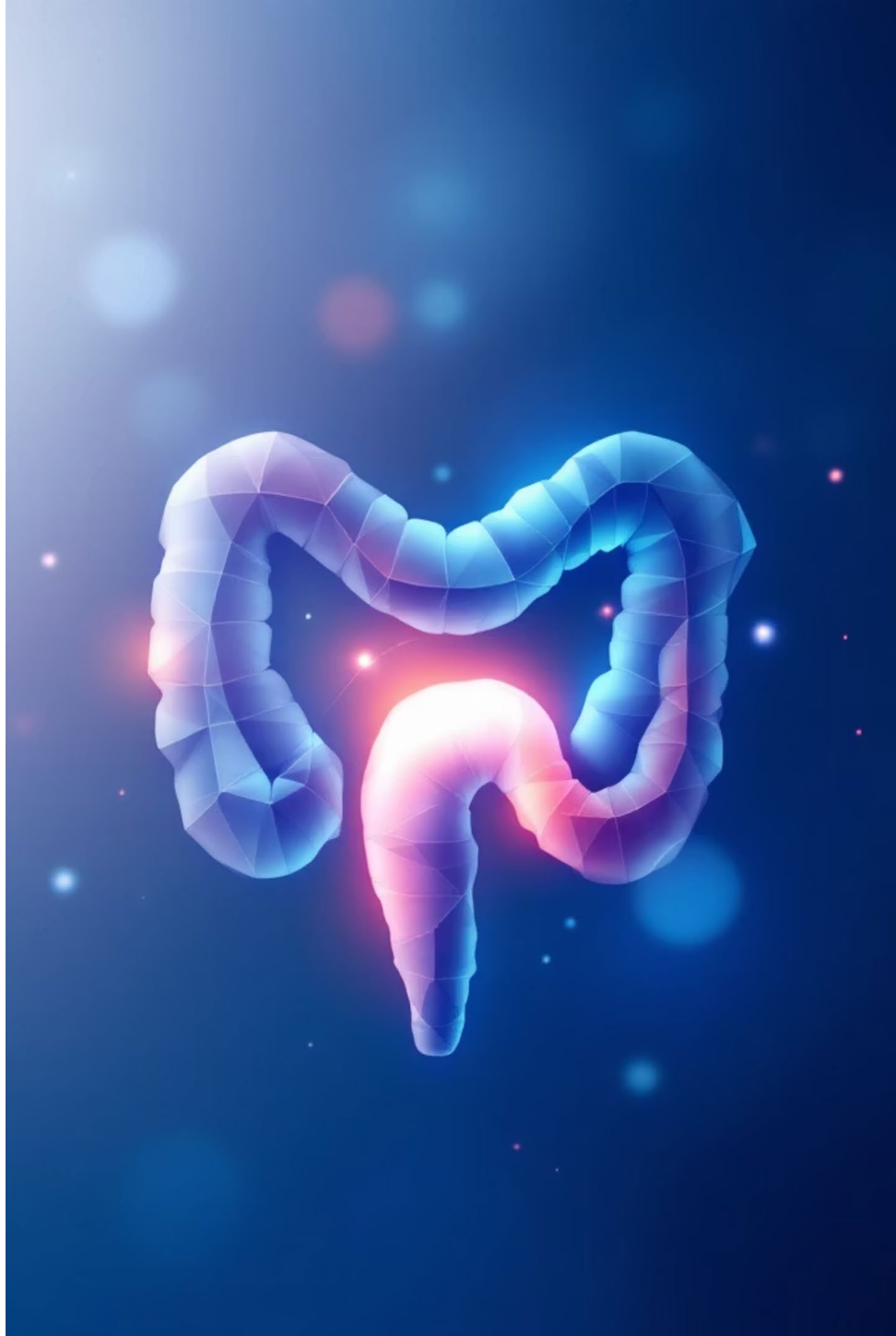
Clinical Focus:
Colorectal Cancer Surgery

Post-op. Outcome Prediction

Anticipating complications, functional results, recovery trajectory

Intraoperative Support

Real-time guidance during complex surgical procedures



Three Pillars of Data Integration

01

Preoperative Clinical Data

EMR extraction: sex, BMI, tumor height, comorbidities

—patient-related factors

02

Preoperative MRI Analysis

Pelvimetry focus: anatomical constraints, surgical difficulty indicators

—patient-related factors

03

Intraoperative Video Analysis

Semantic understanding of surgical actions

—surgeon-related performance factors

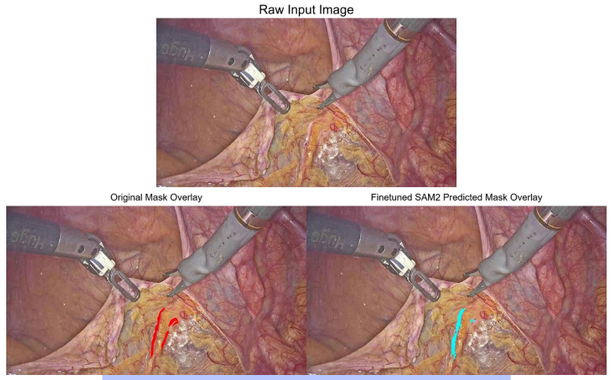
Beyond Pattern Recognition

Semantic-Understanding AI

Not just *what* is happening
—but *why* it matters

- Interpret surgical actions meaningfully
- Explain clinical significance in context
- Enable real-time, actionable insights

Enhanced Outcome Prediction



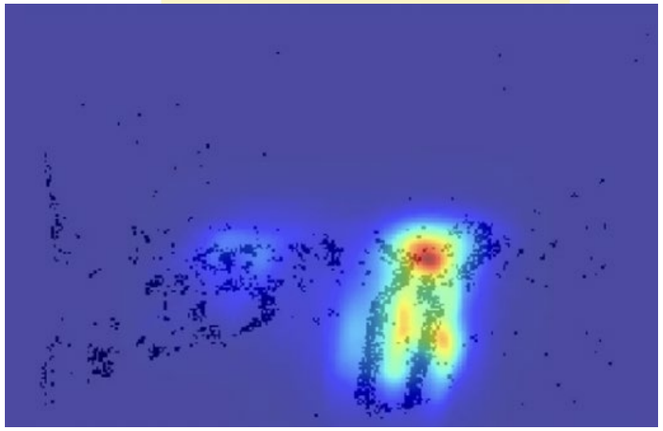
AI Prediction Engine

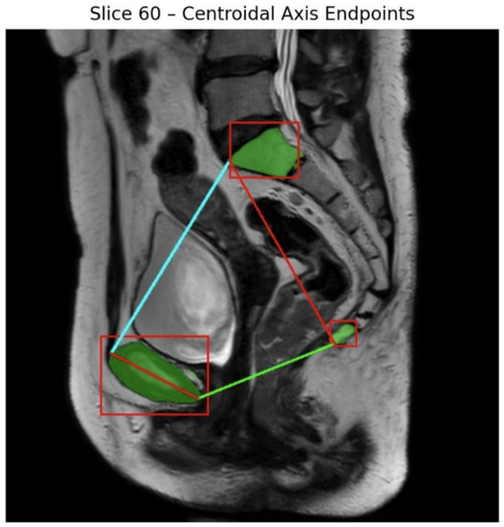
Clinical Data Collection Protocol

Patient ID: Consecutive ID in the format "[C
center 1.

Procedure details:

- **Surgery type**
  - Appendectomy
  - Cholecystectomy
  - Gastrectomy
  - Rectal resection
  - Distal pancreatectomy
- **Surgery indication:**





Unified Intelligence

Combining patient factors and surgeon factors enables unprecedented accuracy

- Short-term complications
- Functional outcomes (continence, sexual function)
- Surgery-specific risk stratification