

Problem & Objectives

Surgical drain output is critical for detecting postoperative complications, but bedside assessment is often subjective and inconsistent. This project aims to develop a retrieval-augmented vision system that can automatically classify drain type, fluid characteristics, and estimated volume from standardized clinical images.

Dataset & Image Acquisition

Standardized bedside photos of surgical drains were prospectively collected using a crosshair background to ensure consistent orientation and scale. Images were de-identified and labeled for drain type, fluid characteristics, and estimated volume based on clinical documentation.

Feature Extraction

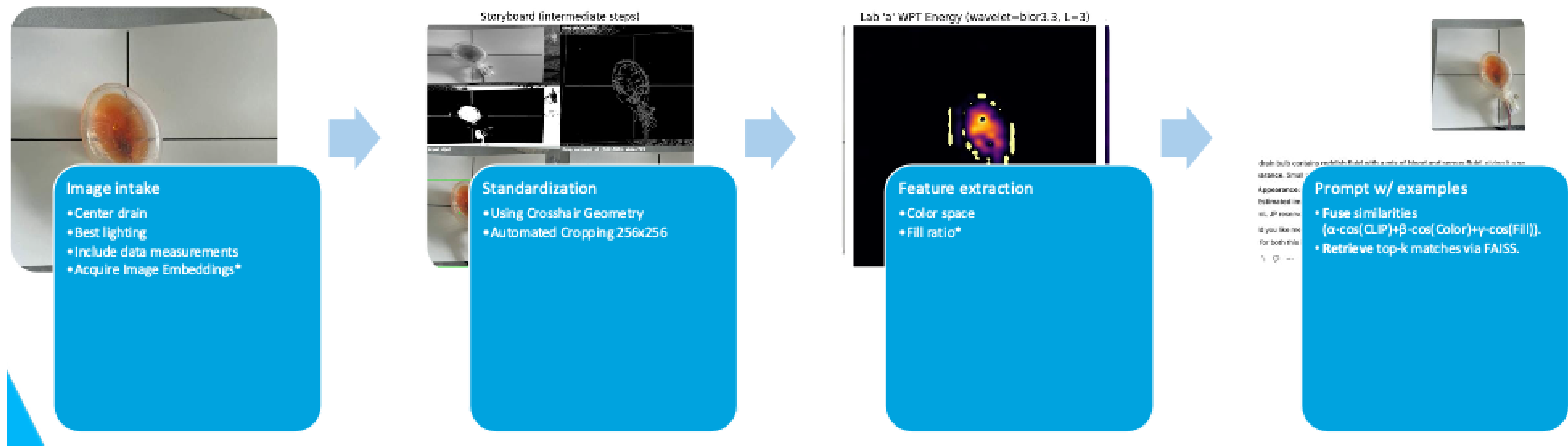
Project drAI: Retrieval-Augmented Vision Pipeline for Automated Surgical Drain Interpretation

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Preliminary Findings

Dataset expansion is ongoing to support robust performance evaluation. Early testing shows reliable drain recognition, fluid characterization, and volume estimation, with final validation planned in a larger cohort of ~500–1000 images

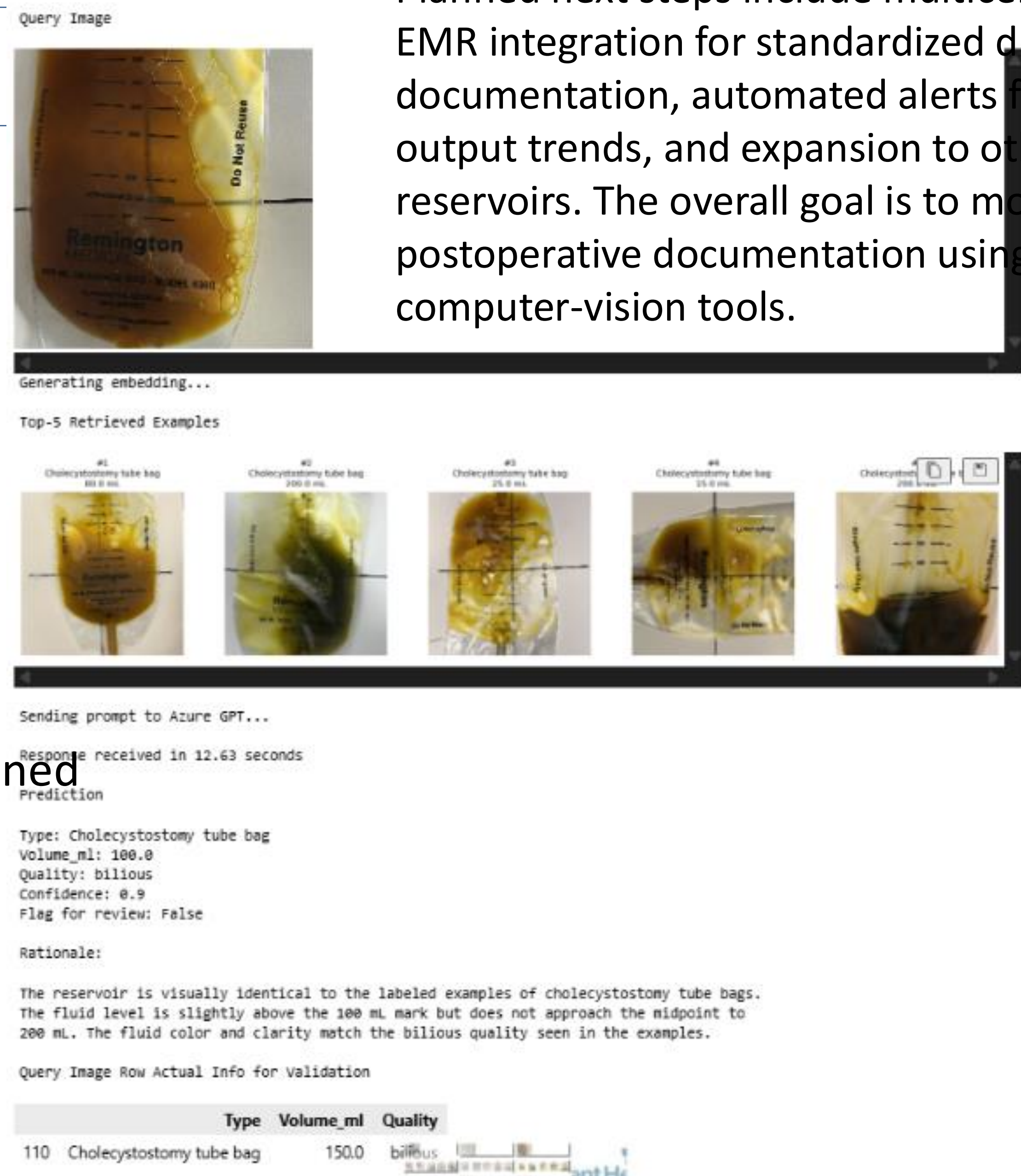
Future Directions & Clinical Impact

Prospective Dataset Characteristics

A prospective dataset of 208 bedside drain images was collected, representing multiple drain types and a wide range of fluid appearances under real clinical conditions. Use of a standardized crosshair background enabled consistent centering and scale normalization for automated analysis.

Model Performance

- Correct drain type classification demonstrated in real clinical images
- Fluid appearance characterization and fill-ratio estimation aligned with charted output
- Structured prediction generated including volume estimate, confidence score, and visual rationale
- Real-time inference feasible at bedside (~10–15 seconds per query)



Planned next steps include multicenter validation, EMR integration for standardized drain documentation, automated alerts for abnormal output trends, and expansion to other surgical reservoirs. The overall goal is to modernize postoperative documentation using scalable computer-vision tools.

