Project 12

Evaluation of CT Registration for Image-Based Sinus Reconstruction

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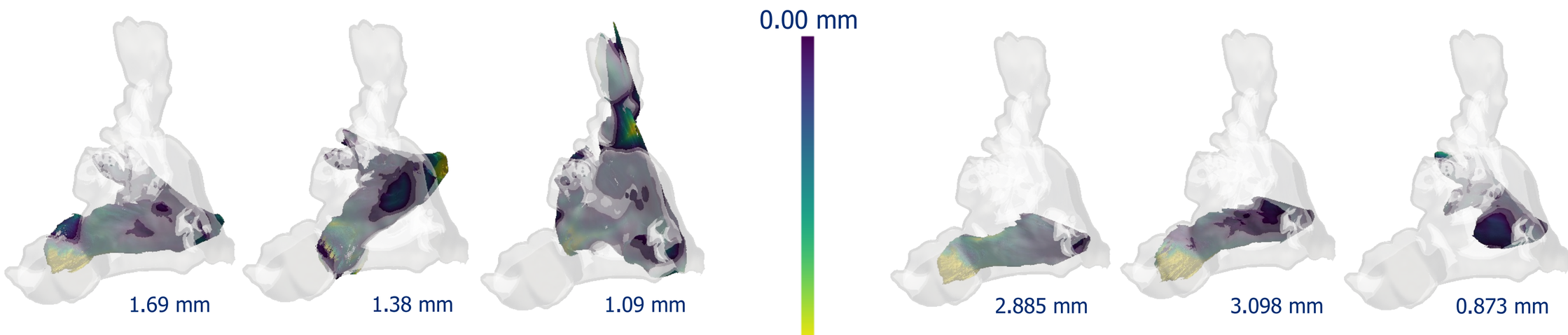
Endoscopic navigation guides surgeons through intricate anatomies to improve patient outcomes during surgical intervention.

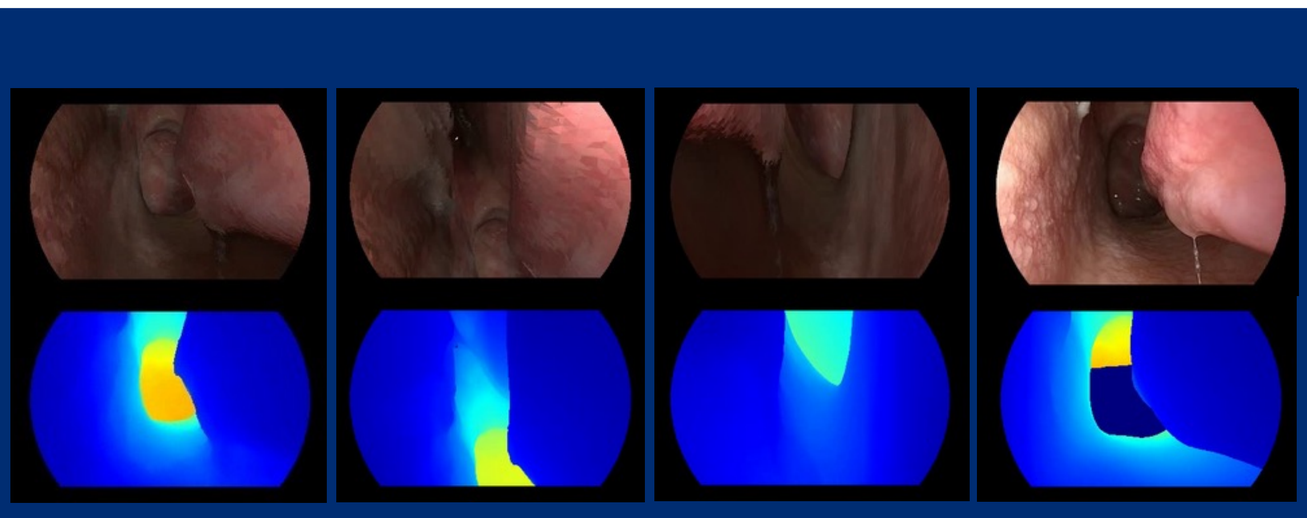
Standard approaches like optical and electromagnetic tracking require additional resources that may **negatively impact clinical workflow**.

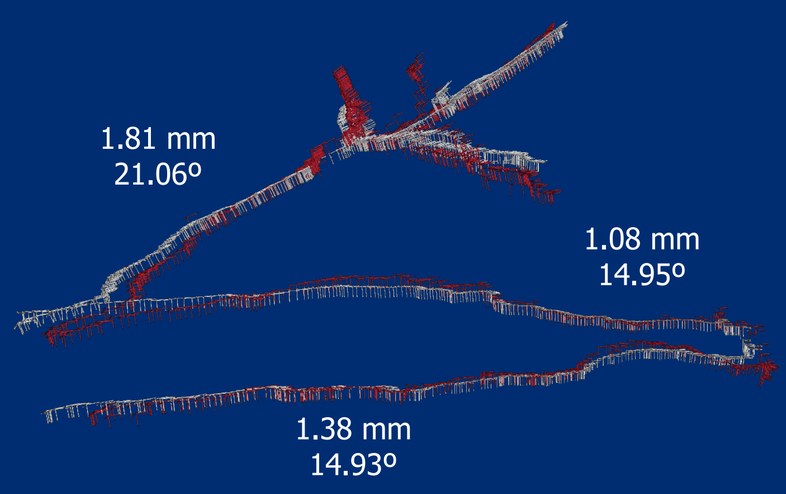
Vision-based solutions provide **advanced visualization** and **improved spatial understanding** at **no additional hardware cost**.

Investigating **multiple registration options** to align dense reconstruction and CT

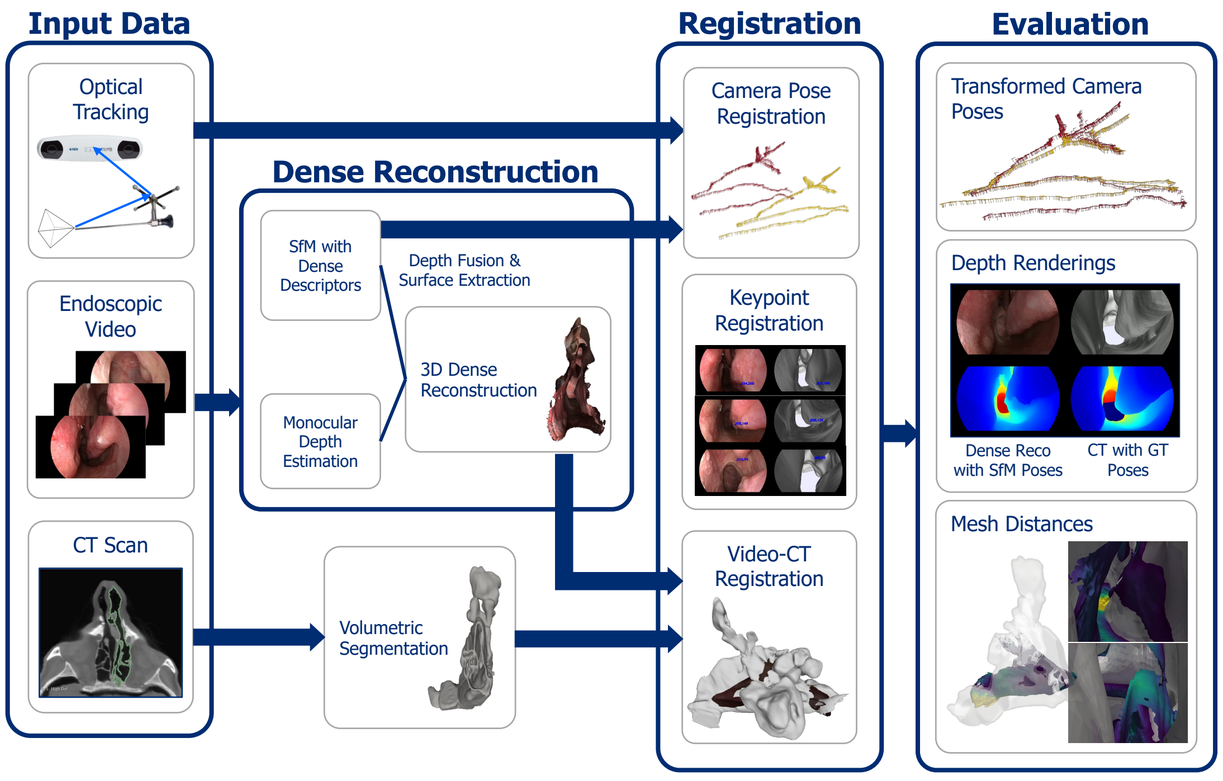
Evaluating **local reconstructions** with **camera pose registration**



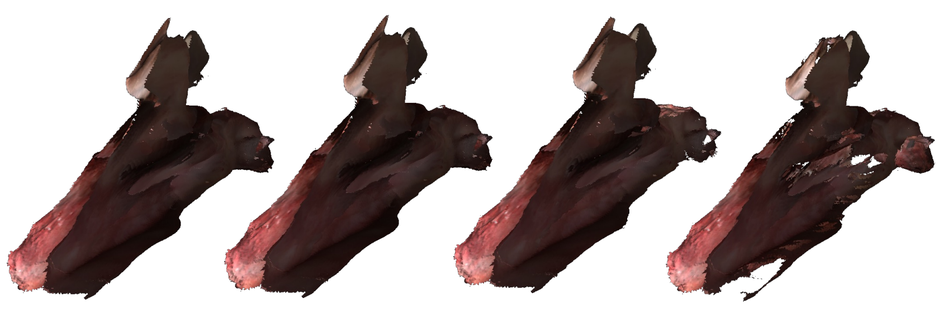




Registration Framework



Adjusting **the depth fusion step** in attempt to rescale the dense reconstruction



Sequence Indexes	Fusion Adjustment	Scale Invariant Depth Error	Mesh Distance (mm)
0 - 1059	Original	0.490	1.691
	Weighted	0.491	1.674
	Large Depths Removed	0.493	1.786
	Outliers Removed	0.514	1.710

References

[1] Xingtong Liu et al. "Reconstructing Sinus Anatomy from Endoscopic Video – Towards a Radiation-Free Approach for Quantitative Longitudinal Assessment". In: Medical Image Computing and Computer Assisted Intervention – MICCAI 2020. Ed. by Anne L. Martel et al. Cham: Springer International Publishing, 2020, pp. 3–13. isbn: 978-3-030-59716-0.

[2] Andriy Myronenko and Xubo Song. "Point set registration: Coherent point drift". In: IEEE transactions on pattern analysis and machine intelligence 32.12 (2010), pp. 2262–2275.

[3] Brian Curless and Marc Levoy. "A volumetric method for building complex models from range images". In: Proceedings of the 23rd annual conference on Computer graphics and interactive techniques. 1996, pp. 303– 312

Next Steps

- Evaluate different patient anatomies using this registration framework
- Explore other potential sources of error (depth estimator, SfM point cloud, etc.)

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