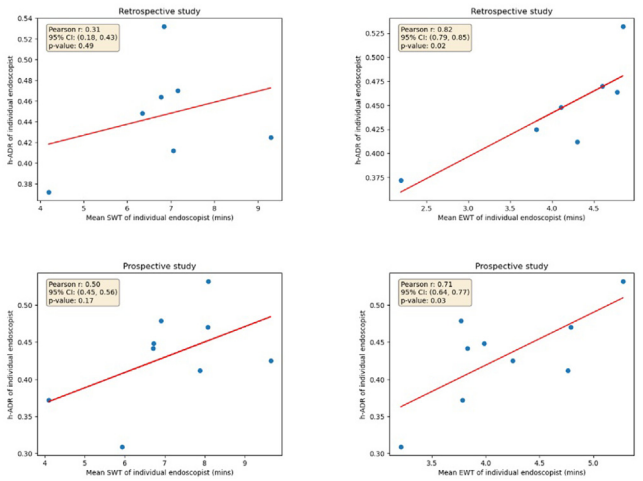

Figure 1: Scatter plot and correlation line of h-ADR vs mean EWT and SWT of individual endoscopist in both retrospective and prospective studies.

Sa1972

Artificial Intelligence Endoscopy

ENHANCED MONOCULAR DEPTH ESTIMATION FROM MOTION IN COLONOSCOPY

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Background: Colorectal cancer (CRC) is the third most common malignancy worldwide and the second leading cause of cancer-related death. Early detection through colonoscopy is crucial, yet up to 25% of lesions are missed. A leading reason is the incomplete visualization of the colonic mucosa stemming from the complex colon topography and limited endoscopic maneuverability. A robust three dimensional (3D) reconstruction of the colon would provide a visual reference to the endoscopist, opening the possibility to estimate both the percentage and location of unseen colon mucosa with potential to reduce risk of missed lesions. Our team has developed a novel method for extracting depth information for 3D reconstruction from two dimensional (2D) endoscopic images. Methods: We developed a learning-based depth estimation artificial intelligence (AI) framework by exploiting motion in 2D endoscopic images taken during colonoscopy. Using an artificial neural network, we analyzed consecutive frame pairs to determine optical flow, indicating 2D displacement for each pixel. 2D optical flow was then combined with change in scale measures as objects approaching the camera appear larger. Displacement along the z-direction, the depth variation, was then computed and used to create a 3D depth map of the second frame of the input pair. Given the absence of real intraoperative depth data, we used the public synthetic dataset "C3VD" and evaluated our approach using root mean square error (RMSE) against conventional monocular depth estimation techniques: Monodepth2, MiDaS, and LeReS. Results: Our novel depth estimation achieved a RMSE of 5.27 mm (IQR: 1.5 mm). This was significantly lower than conventional estimation techniques ($p<0.05$): Monodepth2 (15.7 mm, IQR: 2.35 mm), MiDaS (15.6 mm, IQR: 3.16 mm), and LeReS (14.4 mm, IQR: 4.67 mm). Monodepth2 was noted to be particularly sensitive to specular reflections and camera deformations, while MiDaS and LeReS, despite better generalization, were less consistent under varying scene conditions. Figure 1 shows an example of the predicted depth maps obtained from both the novel and conventional approaches. Qualitative 3D reconstructions using predicted depth maps and actual camera poses (Figure 2) was used to demonstrate the potential of using this depth information to reconstruct the colon mucosa morphology. Conclusion: The novel AI method of analyzing 2D endoscopic images to extract depth information for 3D reconstruction of the colon was successful and robust. When compared conventional techniques, the novel method showed improved accuracy and precision, as well as superior consistency across varying scene conditions. These results highlight the suitability of our method to enable 3D colon surface reconstruction for creation of a map that notes percentage of mucosa visualized for a colon visualization index.

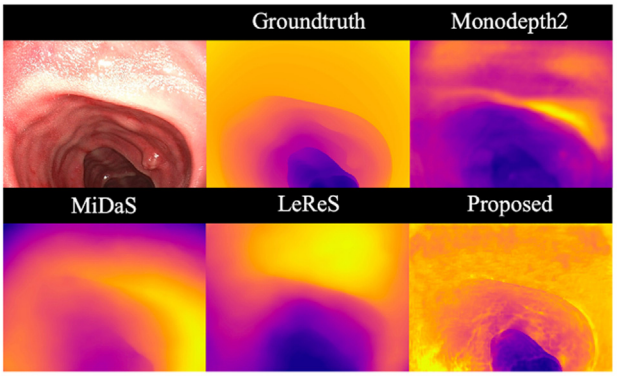

Figure 1: Example of predicted depth estimation maps for the novel proposed motion approach (proposed) and the conventional approaches (Monodepth2, MiDaS, LeReS)

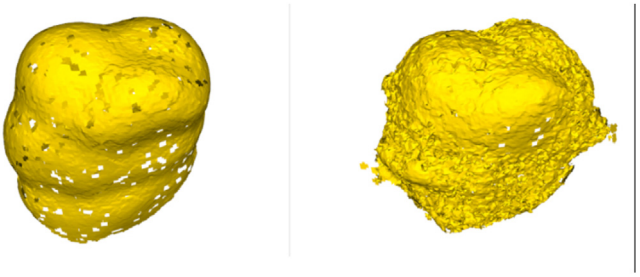

Figure 2: Qualitative 3D colon reconstruction (Ground truth shape (left image); Novel motion based approach shape based on depth map (right image)).

Sa1968

Artificial Intelligence Endoscopy

EVALUATION OF CMS OPEN PAYMENTS FOR GASTROENTEROLOGISTS PUBLISHING ON THE USE OF ARTIFICIAL INTELLIGENCE IN ENDOSCOPY

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Institutions: The University of Texas at Austin Dell Medical School, USA. Disclosure compliance: I understand. Participant disclosure: Faraz Jafri: NO financial relationship with a commercial interest; Charles Hyman: NO financial relationship with a commercial interest; Deepak Agrawal: NO financial relationship with a commercial interest.

Introduction: In recent years, the integration of artificial intelligence (AI) into the field of gastroenterology has led to a surge in research publications on the application of AI in endoscopy. These studies often highlight the potential benefits of AI-guided endoscopic procedures, ranging from improved diagnostic accuracy to enhanced patient outcomes. However, concerns have been raised regarding potential conflicts of interest, particularly financial relationships between the Authors of these publications and leading medical device companies. This study explores the correlation between financial disclosures in the Open Payments CMS data and the Authors of papers published on AI in endoscopy. Methods: We identified papers focused on AI-guided endoscopy using the query "artificial intelligence gastrointestinal endoscopy" on PubMed. Articles relating to gastrointestinal endoscopy and those published within the last 10 years in the top 50 gastroenterology journals based on impact factor were included. Article types included review articles, randomized control trials, observational studies, and meta-analyses. Articles with Authors not in the CMS database were excluded. A listing of all the Authors along with their total number of publications last five years was made. The top 30 Authors were cross-referenced with the Open Payments CMS database from years 2019 – 2022, to determine whether they had received payments or other forms of compensation from companies that market AI products. Results: Our initial query yielded 323