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Summary

SUBJECT ELIGIBILITY AND TREATMENT RESPONSE: PERFORMANCE OF A MACHINE LEARNING ALGORITHM FOR INTERPRETATION OF COLONOSCOPY VIDEOS IN ULCERATIVE COLITIS CLINICAL TRIALS

Kenneth Gaither

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A machine learning pipeline for automated Mayo Endoscopic Score assessment in ulcerative colitis colonoscopy videos achieved accuracy comparable to human-human agreement across 732 videos from two hospitals.

KEY POINTS

- The model was trained on nearly 3 million frames from 732 ulcerative colitis videos (505 Ukrainian, 227 Israeli), with annotations by 12 trained reviewers supervised by an expert gastroenterologist with over 10 years central reading experience.
- The end-to-end pipeline uses convolutional neural networks and LSTM models to filter non-informative frames, score individual frames for Mayo Endoscopic Score, and aggregate results for full video scoring.
- Model-human agreement on full videos achieved a quadratic weighted kappa of 0.763 compared to human-human agreement of 0.814, with dichotomous classification accuracies of 0.902 for MES 0 versus 1-3 and 0.874 for MES 0-1 versus 2-3.
- On individual clear frames, the model achieved higher agreement with human reviewers (kappa 0.822) than inter-human agreement (kappa 0.770).
- Future work will expand training with new data sources, test agreement with additional expert readers, and explore integration with human readers in clinical trial central reading contexts.

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