



WOLFRAM CONSULTING SERVICES

Revolutionising Cancer Diagnosis with AI and Machine Learning

Industry: Healthcare

Applications: Image processing, machine learning, interface development

ABOUT THE AID-GI PROJECT

The **AID-GI Project** (Artificial Intelligence-supported Diagnostics of Gastrointestinal diseases with video capsule endoscopy) is a collaborative research initiative funded by the UK Government. The aim is to improve the diagnoses of colon cancer and other gastrointestinal (GI) diseases with machine learning, [1] allowing for more GI screenings without sacrificing quality to help reduce growing hospital backlogs.

HIGHLIGHTS

400,000

Around **400,000** images are produced by a video capsule endoscope on its journey through the body.

56%

The amount of time specialists spend per procedure has been reduced by **56%**.

45,000

NHS England carries out around **45,000** colonoscopy procedures every year.

THE CHALLENGE

While traditional colonoscopy procedures that utilise tube-mounted cameras are still considered the gold standard of GI tract analysis, revolutionary video capsule endoscopy can offer significant advantages.

However, with the number of patients requiring screening and the resulting volume of images being taken by the capsules, conducting consistent, high-quality analysis for all the images created is unachievable with current manual methods.



These pill-sized capsules provide high-quality imaging and are much more comfortable and less invasive compared to traditional endoscopy procedures.

[1] Innovate UK, 'Results of Competition: Precision Medicine Technologies: Shaping the Future', Innovate UK, Nov. 2018.

The goal of the AID-GI project is to make innovative video capsule endoscopy a reality by removing the data processing bottleneck through the use of machine learning-based automated image analysis. Removing the requirement for specialised doctors and

consultants to be present during the procedure means the pill-sized camera can be swallowed at home or at a local medical practice, relieving the burden on acute services and endoscopy units while extending coverage to underserved areas.

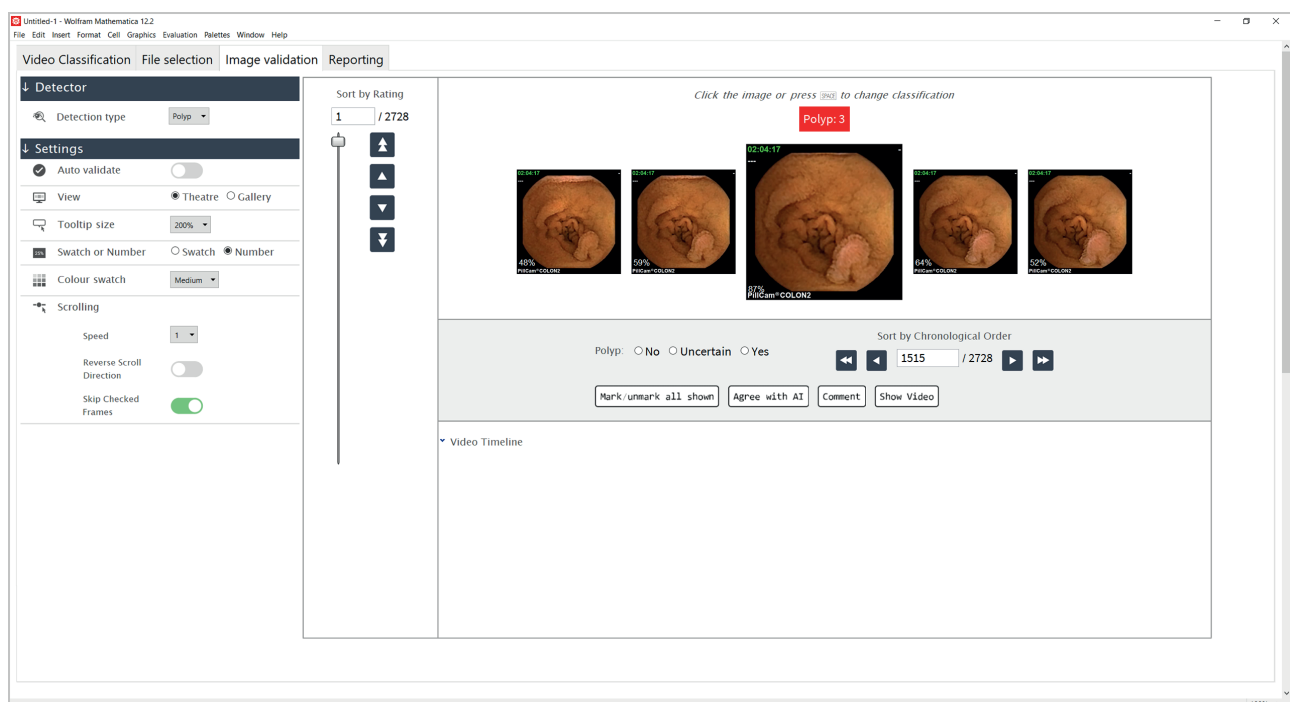
THE APPROACH

The **Wolfram Consulting Services** team built CapScan, an integrated tool that assists human operators in creating accurate training data to be used in the machine learning-based, automated image analysis. Importing, converting and analysing videos from the capsule can now be achieved easily and accurately at scale through a simple interface.

The Wolfram Consulting Services team's strong project management expertise made them an ideal hub in this collaborative research project where communication about goals, scope, progress and much more was vital.

Additionally, the **Wolfram Language** was the perfect platform for a project that required robust importing, processing and presentation of information from a variety of sources and in many different formats.

With a potential global rollout planned, scalability and security was paramount. Wolfram's multidisciplinary team could handle the medical, data science, interface development and infrastructure elements of the project, while providing an outside perspective and innovative ideas.



The CapScan allows clinicians to import thousands of images and automatically identify any abnormalities. Operators can manually verify the classifications to provide a diagnosis and improve CapScan's machine learning algorithms.

ACHIEVEMENTS



Enabling Health Tech Innovations

The Wolfram Consulting Team developed the CapScan tool, removing the bottlenecks holding back innovations in GI screening technology. Operators no longer need to browse through thousands of individual images per patient; they are now able to select a single image and have matching AI-suggested images returned.



Reducing NHS Backlogs and Improving Healthcare Equality

Now GI tract analysis can be performed quickly and accurately without the need for specialised doctors and consultants. This allows not only for a greater number of screenings in acute care but also in community health care centres, improving access to care in underserved areas and reducing the burden on hospitals.



Strong Foundations for Continuous Improvement

Images with verified anomalies are added back into the training set for CapScan's machine learning algorithm, improving its performance the more it is used. Furthermore, the Wolfram Consulting Team have created a strong foundation on which we and other collaborators can build to further integrate machine learning and automated image analysis into gastrointestinal diagnostics.

MADE POSSIBLE BY WOLFRAM

“Using the Wolfram Language allowed us to easily join up the image processing, machine learning and data visualisation required to present clinicians with the information they needed, together with the tools to create and deploy an easy-to-use interface. Because all of these tools are built into the Wolfram Engine and designed to work together, the code required is quite small and very high-level, making it easy for us to maintain and further develop the tool with future generations of the core AI.”

—Jon McLoone

Director of Technical Communication and Strategy
Wolfram Research Europe

LET'S TAKE YOUR PROJECT TO THE NEXT LEVEL

Find out how the Wolfram Technical Services team can jump-start your project with in-depth troubleshooting, code optimisation, custom training or production deployment.