



Case Study: Gastro-intestinal Disorder Prediction (Kvasir)

# **Gastrointestinal Disorder Prediction**



The goal of this use case was to develop a model that can predict the likelihood of Gastroinstestinal (GI) disorders such as dyed-lifted-polyps, polyps, esophagitis, normal-z-line, and normal-pylorus. The human digestive system may be affected by several diseases. As an example, three of the eight most common cancers overall are located in the gastrointestinal (GI) tract. Altogether esophageal, stomach and colorectal cancer accounts for about 2.8 million new cases and 1.8 million deaths per year [40]. Endoscopic examinations are the gold standards for investigation of the GI tract. Gastroscopy is an examination of the upper GI tract including esophagus, stomach and first part of small bowel, while colonoscopy covers the large bowel (colon) and rectum.



The use of deep learning is increasing in the field of automatic disease detection. It is an important and still unexplored field of research. Such innovations helps in improving and refining the medical practice. The human digestive system may be affected by different ailments. Studies have shown that altogether oesophagal, colorectal and stomach cancer causes about 2.8 million infections and 1.8 million deaths per year. Early detection of such ailments can control morbidity and mortality. For the analysis of GI tract endoscopy is the gold standard. Gastroscopy and colonoscopy examinations cover all the digestive system investigations resulting with high definition video frames. Kvasir is the dataset consisting images of the gastrointestinal (GI) tract. The images were captured using endoscopic equipment at Vestre Viken Health Trust in Norway. The images were annotated and verified by medical experts.



Source: https://datasets.simula.no/kvasir-seg/

The dataset consists of anatomical landmarks: Z-line, Pylorus, Cecum; Pathological Findings: Esophagitis, Polyps, Ulcerative Colitis; Polyp Removal: Dyed and Lifted Polyps, Dyed Resection Margins. The available data may help the researchers to develop a system that helps in easier detection of the GI disorders with higher accuracies and improves the health care system.



### **Model Details**

Model developer information and all details needed for governance

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### **Model Visualization**

Details of the Kvasir Models

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## **Analyzing Predictions**



This dataset has only images. The Kvasir dataset comprises 8000 gastrointestinal (GI) tract images, each class consisting of 1000 images. The model developed looks for an input as an image and determines if the has likelihood of the following dyed-lifted-polyps, dyed resection margins, esophagitis, normal cecum, normal pylorus, normal z-line, polyps and ulcerative colitis.

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wodel information				Actual 1	1.3%	(3)	11.3%	(27)	0.0%	(0)	0.0%	(0)	0.0%	(0)	0.0%	(0)	0.0%	(0)	0.0%	(0)	12.5%	(30)
Model Performance				Actual 2	0.0%	(0)	0.0%	(0)	10.0%	(24)	0.0%	(0)	0.0%	(0)	2.5%	(6)	0.0%	(0)	0.0%	(0)	12.5%	(30)
Simulation				Actual 3	0.0%	(0)	0.0%	(0)	0.0%	(0)	0.0%	(30)	12.5%	(0)	0.0%	(0)	0.0%	(0)	0.0%	(0)	12.5%	(30)
				Actual 5	0.0%	(0)	0.0%	(0)	1.7%	(4)	0.0%	(0)	0.4%	(00)	10.4%	(25)	0.0%	(0)	0.0%	(0)	12.5%	(30)
Data Distribution				Actual 6	0.0%	(0)	0.0%	(0)	0.0%	(0)	0.0%	(0)	0.0%	(0)	0.0%	(0)	12.5%	(30)	0.0%	(0)	12.5%	(30)
6				Actual 7	0.0%	(0)	0.0%	(0)	0.0%	(0)	0.0%	(0)	0.0%	(0)	0.0%	(0)	0.0%	(0)	12.5%	(30)	12.5%	(30)
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### "This what if inquiry capability enables us to ask questions or change images to inspect the likelihood of GI Disorders" Dr. Prasad

#### References

[1] Konstantin Pogorelov, Kristin Ranheim Randel, Carsten Griwodz, Sigrun Losada Eskeland, Thomas de Lange, Dag Johansen, Concetto Spampinato, Duc-Tien Dang-Nguyen, Mathias Lux, Peter Thelin Schmidt, Michael Riegler, Pål Halvorsen, Kvasir: A Multi-Class Image Dataset for Computer Aided Gastrointestinal Disease Detection, In MMSys'17 Proceedings of the 8th ACM on Multimedia Systems Conference (MMSYS), Pages 164-169 Taipei, Taiwan, June 20-23, 2017.

[2] The American Society of Society for Gastrointestinal Endoscopy <a href="https://www.asge.org/">https://www.asge.org/</a>

[3] https://datasets.simula.no/kvasir-seg/

