Image Segmentation of Gastrointestinal Polyps in the Human Gastrointestinal Tract Using Machine Learning

Lee, Leo (School: Regis High School)

Currently, colorectal cancer is one of the most common cancers in the world, with it contributing to over 10% of all cancers. With colorectal cancer being a significant contributor to the worldwide mortality rate, it is imperative to find effective methods for treatment and detection. Early disease detection has a huge impact on survival from colorectal cancer, and polyp detection is therefore important. Although colonoscopies have seemingly been perceived to search and find a large amount of potentially cancerous polyps, there are still many issues with thorough detection. Several studies have shown that many polyps are often overlooked during colonoscopies, with 38.69% of patients having at least one polyp missed during colonoscopy, along with a general polyp miss rate of 17.24%. Increasing the detection of polyps has been shown to decrease the risk of colorectal cancer. Thus, automatic detection of more polyps at an early stage can play a crucial role in improving both prevention of and survival from colorectal cancer. This convolutional neural network model, trained on an annotated medical dataset(KVAIR-SEG), is able to accurately detect gastrointestinal polyps with a state-of-the-art accuracy of 96.8%. This machine learning model built using the fast.ai library will immensely improve the polyp detection accuracy of colonoscopies in the future.

Awards Won: