Neural Networks and Colon Polyp Detection

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Each year about 50,000 patients die from colon cancer – it is the second leading cause of cancer death in the United States. Colon cancer usually develops from polyps, which are growths on the interior of the colon. Colon cancer is preventable if detected early and colonoscopy has been effective in reducing incidences of colon cancer. However, colonoscopy is an operator-dependent procedure. In tandem colonoscopy, average miss rates of 22% were found. Computer aided detection (CAD) may help to reduce miss rates. The objectives of this study were to use machine learning techniques to segment polyp stills taken from colonoscopy for the purpose of accelerating detection and treatment. The project included assembling the datasets, setting up a workstation, and applying different convolutional neural networks. Image data and labels were taken from the polyp database CVC-ColonDB. 380 images from 15 different colonoscopies were available. My project used convolutional neural networks (CNN) in a colon polyp binary segmentation task. I programmed my neural networks in Python using Caffe and NVIDIA DIGITS. In this study, the learning rates of the Alexnet network were changed. The accuracy and loss metrics were encouraging, however the dice metric showed that the high accuracy and low loss values were a result of overfitting.

Awards Won: