Early Detection of Acromegaly Using a Novel Convolutional Neural Network

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Acromegaly is a disease caused by a benign tumor which encroaches on the pituitary gland. This tumor causes the gland to release too much somatropin, leading to the release of too much Insulin-like Growth Factor 1 and life-threatening complications such as Type II diabetes and heart disease. Acromegaly is rare, and its slowly-occurring symptoms make this condition difficult to diagnose. The early detection of this disease is crucial in preventing the aforementioned complications. Using Deep Learning, I tested the hypothesis that the early detection of Acromegaly was possible by scanning for the main physical symptom of the disease: the abnormal growth of the face, hands, and feet. Using a Convolutional Neural Network (CNN) with Transfer Learning, I created a model that can keep track of small changes in a person's face. This model was trained on my dataset of patient images, and classified these images based on if they had Acromegaly or not. My model achieved a 90% training accuracy and a 76% validation accuracy. These results showed that the model was able to achieve adequate results classifying new images, but it remains limited due to the small size of the training set. Further experiments will be using a Generative Adversarial Network, which can create fake images of people who have Acromegaly for the model to train on to see how more data impacts the validation accuracy.

Awards Won:
Missouri University of Science and Technology: $575 Missouri S&amp T summer camp scholarship