LUNG CANCER DETECTION

In the United States, lung cancer strikes 225,000 people every year, and accounts for $12 billion in health care costs. Early detection is critical to give patients the best chance at recovery and survival. The image assessments in use today are identifying lung lesions as potentially cancerous that later turn out to not to be cancer leading to unnecessary patient anxiety, additional follow-up imaging and interventional treatments. Using a data set of thousands of high-resolution lung scans provided by the National Cancer Institute, we developed algorithms that accurately determine when lesions in the lungs are cancerous. This will dramatically reduce the false positive rate that plagues the current detection technology, get patients earlier access to life-saving interventions, and give radiologists more time to spend with their patients.

The dataset(~200GB) consists of over a thousand low-dose CT images from high-risk patients in DICOM format. Each image contains a series with multiple axial slices of the chest cavity. Each image has a variable number of 2D slices, which can vary based on the machine taking the scan and patient. The DICOM files have a header that contains the necessary information about the patient id, as well as scan parameters such as the slice thickness. Mango (Multi-image Analysis GUI) was used initially to understand the lung system and to identify area of interest (cancer region) of each patient. Later code was developed in python to preprocess the whole data and to the generate the 3D images of area of interest for all the patients.

ARGO cluster at GMU was used for 3D image generation since it required huge computation power. Later these images were pushed into GPU enabled machine learning(ML) algorithms developed in tensor flow (on ARGO Cluster) and theano (on UVa's (University of Virginia) Cross Campus Grid-XCG) for building the model. At the end both models were compared in assessing the probability of a new lung CT scan being cancerous.

-Anirudh Myakala (Team Leader)
-Vamshidar Reddy Chaulapally
-Pragnakar Pedapenki
-Chaitanya Krishna Sai kosaraju