**Deep Learning Project – Summer School DSA Fort Portal**

**Background**

Chest opacities are a major health problem worldwide; failure of early detection and treatment may lead to significant morbidity and mortality. In addition, chest diseases are a great burden to the individual suffering, their attendants and the society at large. Chest diseases are among the ten leading causes of death, ranking the second in Africa.  Chest X-ray is the first line procedure to assess chest conditions but interpretation of radiologic sign such as vascular opacity redistribution and interstitial edema are often questionable and subjective. Moreover X-ray is 2 dimensional hence one may not accurately tell the nature of these opacities and localization of the same is not definitive; even with established guidelines for interpretation, chest X-ray has demonstrated to be an insensitive method with relatively low accuracy. This delays establishment of the cause of chest opacity hence mismanagement of the patient leading to more costs for hospitalization and even death. CT scan has been determined as the gold standard to characterize, localize and identify the nature of opacities. However, it is expensive, not always available, uses ionizing radiation and transferring critically ill patients to the CT room is complicated.

In this project we use deep learning to train a model, based on Ultrasound images, that helps in the diagnosis and management of chest opacities while overcoming the limitations of X-ray and CT scan-based methods. The method has potential to accurately localize opacities, differentiate between opacities and suggest appropriate further investigations.  Ultrasound is easily available, uses no ionizing radiation, is relatively cheaper and portable. This is an on-going project and data was collected and pre-processed. You are required to use knowledge gained in this course to train a Deep Learning model capable of diagnosing an ultrasound image scan as normal or as having a chest opacity. Specifically, you are required to:

* Train, validate and test a Python based Deep Learning model of your choice using the “**known\_images**” dataset under **dataset1** that you have downloaded from the link to be shared . Details about the dataset are under the “readme.txt” file in the same folder.
* **Commit** both the model and source code to your GitHub repository.
* Use your trained model to diagnose/classify all the images located in the “**unknown\_images**” directory under **dataset1** as either normal (0) or sick (1). Create a **csv file** and indicate the label/class your model has given to each of the images.
* **Commit** this file to your repository as well.
* Test the performance of your model on dataset2 and commit the test results (such as Accuracy, Precision etc) to your repository in a text file. Note that images in Dataset2 were captured under different conditions from those in Dataset1 and using a different machine; our intention is to determine how well the model will generalise on images captured under different condition.