| ISM 2022w |
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| **Group Number : 07** | | |
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**Contributions - Phase 1**

* **Literature Review (Author: Everyone):**

Everyone reviewed different papers in literature to understand what kind of feature extractors have been successfully used to solve classification of lung diseases including COVID, as well as other similar problems. Furthermore, it was agreed to spend time on papers that were similar to our project and that could be implemented easily. To name a few, Ahmad studied “IKONOS: an intelligent tool to support diagnosis of COVID-19 by texture analysis of X-ray images” and Joel studied “COVID-19 detection using X-ray images and statistical measurements”.

Also, some of the members did not have much experience with python and had to brush up their skills.

* **Pipeline:**

Ahmad set up a scalable pipeline in Python which allowed the easy integration of new preprocessing methods, feature extractors, classifiers, evaluation metrics and plots by following a template. It also allowed the application of different classifiers at the same time. Moreover, It also saved all the important information for future use such as model, training and validation results, complete pipeline associated with the run and the plots. Furthermore, the code also allowed us to generate predictions (.txt file) with one function call. This pipeline allowed us to train and test different models very quickly.

* **Pre-processing and Feature Extractors:**

Ahmad worked on the splitting of data (that mainly included simple and simple stratified split) along with batch processing of the images and Joel worked on label encoding.

Depending upon which feature extractor we were testing, different kinds of preprocessing had to be done. Furthermore, different combinations of features were tested while playing with the hyperparameters.

Joel along with associated preprocessing (such as resizing, normalizing), worked on the basic extractors such as Contrast, Histogram, Skewness and Kurtosis. In addition, he also worked on an algorithm lung segmentation for better pre-processing. Due to the noise and different shapes of the images it was not successful.

Ahmad worked on data preprocessing methods such as Edge Detection and Gaussian blur (denoising) and on feature extractors such as Haralick and Zernike features.

* **Classifiers:**

We mainly worked on two classifiers: Ahmad worked on SVM and Joel worked on Random Forest Tree. We also played with the values of hyperparameters to study their effect on the results. Furthermore, we also worked on the boosting in an attempt to improve the results.

* **Evaluation metrics:**

Joel worked on the evaluation metrics which included accuracy, and balanced accuracy while Ahmad worked on the plotting of confusion matrix.