
Detection of Covid-19 in patients using lung X-ray Images

Dhruvil Shah[dshah4]. Hitarth Shah[hshah4]. Prerona Dutta[pdutta3]. Sreemoyee Ray[sray9].

1 Data

We will make use of the Covid-19 Radiography database available at <https://www.kaggle.com/tawsifurrahman/covid19-radiography-database>. The dataset comprises of 219 Covid-19 positive images, 1341 normal images and 1345 viral pneumonia images.

2 Project Idea

In the ongoing COVID-19 pandemic, radiological imaging can play an important role in the early diagnosis of the disease. Chest radiography can detect a few characteristic findings in the lung associated with COVID-19. Our proposed model aims to primarily implement Convolutional neural networks, introducing different filters on each layer to provide diagnostics for binary classification - COVID vs. No Findings.

The model will make this decision on the basis of the detection of GGOs, consolidation areas, and nodular opacities, which are the characteristic findings of patients with COVID-19 on X-ray radiography. We intend to make our model more robust and accurate by applying several pre-processing techniques like Flip, Invert and Mirroring.

3 Software Needed For the Project

Programming and Implementation: Python, pytorch, tensorflow, keras, numpy, matplotlib

Miscellaneous: Jupyter Notebook, pycharm

4 Teammates and Work Division

Pre-processing: Prerona Dutta and Sreemoyee Ray

Model Implementation : Dhruvil Shah and Hitarth Shah

Evaluation: Prerona Dutta and Sreemoyee Ray

5 Midterm Milestone

We will have completed the Pre-processing task and have at-least one of the models for the classification task ready by Midterm.

References

Based on preliminary research, we believe The following papers will form the basis of the project due to their analysis based on CNN on X-Ray images as well as the detailed comparison with other approaches

[1] Zhang, Jianpeng, et al. "Viral pneumonia screening on chest X-ray images using confidence-aware anomaly detection." arXiv: 2003.12338 (2020).

[2] Yoo, Seung Hoon, et al. "Deep Learning-Based Decision-Tree Classifier for COVID-19 Diagnosis From Chest X-ray Imaging." Frontiers in Medicine 7 (2020): 427.

[3] Bharati, Subrato, Prajoy Podder, and M. Rubaiyat Hossain Mondal. "Hybrid deep learning for detecting lung diseases from X-ray images." Informatics in Medicine Unlocked 20 (2020): 100391.