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| Sl. No | Citation | Methodology | Dataset | Result | Merits and Demerits |
| 1. | COVID-19 Detection Through Transfer Learning Using Multimodal Imaging Data  **MICHAEL J. HORRY, SUBRATA CHAKRABORTY, MANORANJAN PAUL , ANWAAR ULHAQ , BISWAJEET PRADHAN , MANAS SAHA ,**  AND **NAGESH SHUKLA** | In their study, they performed transfer learning by testing the off the shelf deep learning models namely **VGG16/VGG19, Resnet50, Inception V3, Xception, InceptionResNet, DenseNet,** and **NASNetLarge**. And selected VGG19 model as optimum model.  There were total of 5 experiments conducted to classify   * + 1. **Normal vs (Covid-19 and Pneumonia)**     2. **Covid-19 vs Pneumonia**     3. **Covid-19 vs non-Covid-19**   With X-ray, Ultrasound and CT images.  **Steps:**   1. **Data sampling**: the images are curated and aimed to remove synthetic data and removing imbalances using **N-CLAHE method** 2. **Pre-processing:** pre-processing pipeline is implemented to reduce unwanted signal noise such as non-lung area visible in X-Rays. 3. Images are augmented to increase the number and variation of images provided to the classifier. 4. The images are then fed to the model to perform 5 different classifications. | **COVID-19 Image data Collection**  ([Source](https://arxiv.org/abs/2006.11988): )   * Total: 115 * Covid-19: 115   **NIH Chest X-ray**  ([Source:](https://arxiv.org/abs/1705.02315) )   * Total: 60683 * Pneumonia: 322 * NO finding: 60361   **COVID CT Dataset**  ([Source:](https://arxiv.org/abs/2003.13865) )   * Total: 746 * Covid: 349 * Non covid: 397   **POCOVID-Net Dataset**  ([Source:](https://arxiv.org/abs/2004.12084) )   * Total: 1103 * Covid-19: 654 * Pneumonia: 277 * No Finding: 172 | With the selected VGG19 Model, extensive performance tuning is performed by adjusting multiple parameters including learning rate, batch size, node size and drop rate.  **Detecting (Covid-19 and Pneumonia) from normal**  **With X-ray**   * Sensitivity: 0.83 * Positive Predicate Value: 0.85 * F1 score: 0.84   **Detecting (Covid-19 and Pneumonia) from normal**  **With Ultra Sound**   * Sensitivity: 0.97 * Positive Predicate Value: 0.99 * F1 score: 0.98   **Detecting Covid-19 from Pneumonia with X-ray**   * Sensitivity: 0.86 * Positive Predicate Value: 0.86 * F1 score: 0.86   **Detecting Covid-19 from Pneumonia with Ultrasound**   * Sensitivity: 1.00 * Positive Predicate Value: 1.00 * F1 score: 1.00   **Detecting Covid-19 from non-covid-19**   * Sensitivity: 0.83 * Positive Predicate Value: 0.79 * F1 score: 0.81 | **Merits:**   * a pre-processing pipeline aimed to remove the sampling bias and improve image quality was effective. * VGG19 outperformed other models to develop suitable deep learning-based tools with limited and challenging datasets. * Ultrasound samples outperformed all other models, its learning curve and confusion matrix were close to ideal * False negative predictions for the Ultrasound mode experiments were very low which is very significant.   **Demerits:**   * Since the dataset has highly variable image qualities the model produced erratic learning patterns. * considering significant variation in the CT image data sets overfitting was apparent after some epochs. |