A Review: Computational Analysis of Radiographic Images of chest of COVID-19 Patients & its predictions using AI

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*Abstract:*With the exponentially growing COVID-19 (corona virus disease 2019) pandemic, clinicians continue to seek accurate and rapid diagnosis methods in addition to virus and antibody testing modalities. Because radiographs such as X-rays and computed tomography (CT) scans are cost-effective and widely available at public health facilities, hospital emergency rooms (ERs), and even at rural clinics, they could be used for rapid detection of possible COVID-19-induced lung infections. Therefore, toward automating the COVID-19 detection, we propose a viable and efficient deep learning-based chest radiograph framework to analyze COVID-19 cases with accuracy. A unique dataset is prepared from available sources containing the chest view of CT scan/X-ray data for COVID-19 cases. Our proposed framework leverages a data augmentation of radiograph images algorithm for the COVID-19 data, by adaptively employing the MATLAB and NeuroSolution on COVID-19 infected chest images to generate a train a robust model. The training data consisting of actual and synthetic chest images are fed into our customized neural network model, which achieves COVID-19 detection with good accuracy. Furthermore, through this it is possible to efficiently automate COVID-19 detection from radiograph images to provide a fast and reliable evidence of COVID-19 infection in the lung that can complement existing COVID-19 diagnostics modalities.

Index Terms **- COVID-19, MatLab, Neuro Solution Software, Microsoft excel, Various Transform Technique**

I. INTRODUCTION

The severe acute respiratory syndrome coronavirus 2(SARS-CoV-2), first observed in Wuhan, China, turnedinto a global pandemic of COVID-19 (coronavirus disease 2019). COVID-19 has a destructive impact on the well-being of people, particularly senior citizens and patients with underlying health conditions and compromised immunity levels. By 28th May.2021, the COVID-19 pandemic already contributed to over 35.1 lac mortalities and more than 19.6 crore million cases of COVID-19 infection . A critical step in the fall of 2021, preparedness to combat such scenarios will involve increasing use of portable chest CT scan / X-ray devices due to widespread availability and reduced infection. Therefore, as depicted in Fig.,to automate the COVID-19 detection using machines, we aim to develop an artificial intelligence (AI)-based smart chest radiograph for COVID-19 cases with accuracy.
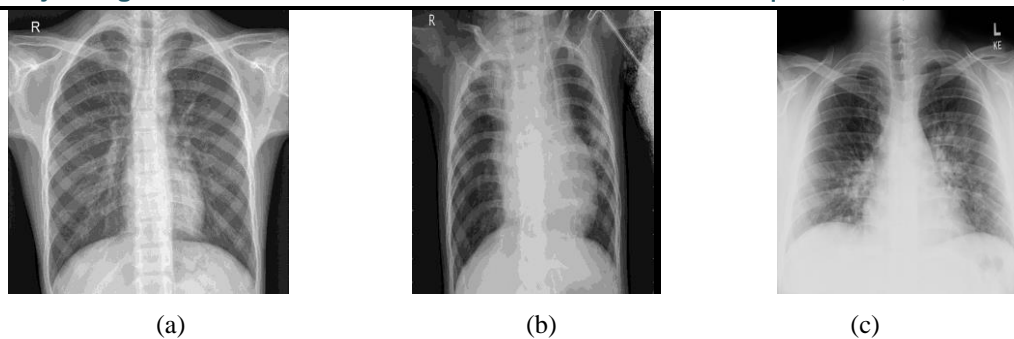
(a) (b) (c)

Fig.1. Three sample X-ray images, (a)Normal, (b)Pnemonia, (c)Covid

II. RELATED WORK

Nurbaity Sabri , Raseeda Hamzah , Shafaf Ibrahim & Khyrina Airin Fariza Abu Samah [1] has analyzed a total of 101 data consist of 33 COVID-19, 28 normal and 40 bacteria of chest X-Ray images are tested. The extracted features are tested using Weka software where it able to analyze the accuracy of k-NN classifier using 10-folds cross-validation. The result represents with true positive (TP) and false positive (FP) for all tested images. In their research, 3776 attributes from x-ray images have been used for classification purpose. Matrices used to measure the efficiency of the classifier precision and recall. Precision represent the percentage of x-ray images that are classified as true. Meanwhile, recall is the percentage of relevant x-ray images that labeled as "true" by the classifier Result of classification.Based.They have clearly observed that LBP able to produce a good classification accuracy with average of 0.960. 96%. The analysis also reveals that the maximum precision and recall are obtained for the LBP algorithm, with both values at 0.96. Sadman Sakib,Tahrat Tazrin,Mostafa M. Fouda,Zubair Md. Fadlullah And Mohsen Guizani [3] proposed DL-CRC framework consists of two parts: the DARI algorithm (which adaptively employs a customized generative adversarial network and generic data augmentation techniques such as zoom and rotation) and a two-dimensional convolutional neural network (CNN) model. They employed a unique dataset for multiple publicly available sources, containing radiograph images of COVID-19 and pneumonia infected lungs, along with normal lung imaging. The classification accuracy significantly increased to 94.61% by adopting our proposed DL-CRC framework. They have compared their proposal with existing deep learning models from di-verse categories such as depth-based CNN (e.g., Inception-ResNet v2), multi-path-based CNN (DenseNet), and hybrid CNN (ResNet) architectures. Extensive experimental results demonstrated that their proposed combination of DARI and custom CNN-based DL-CRC framework significantly out-performed the existing architectures. Thus, incorporating the proposed model with significantly high accuracy into the clinical-grade as well as portable X-ray equipment can allow an automated and accurate detection of COVID-19 in the scrutinized patients.
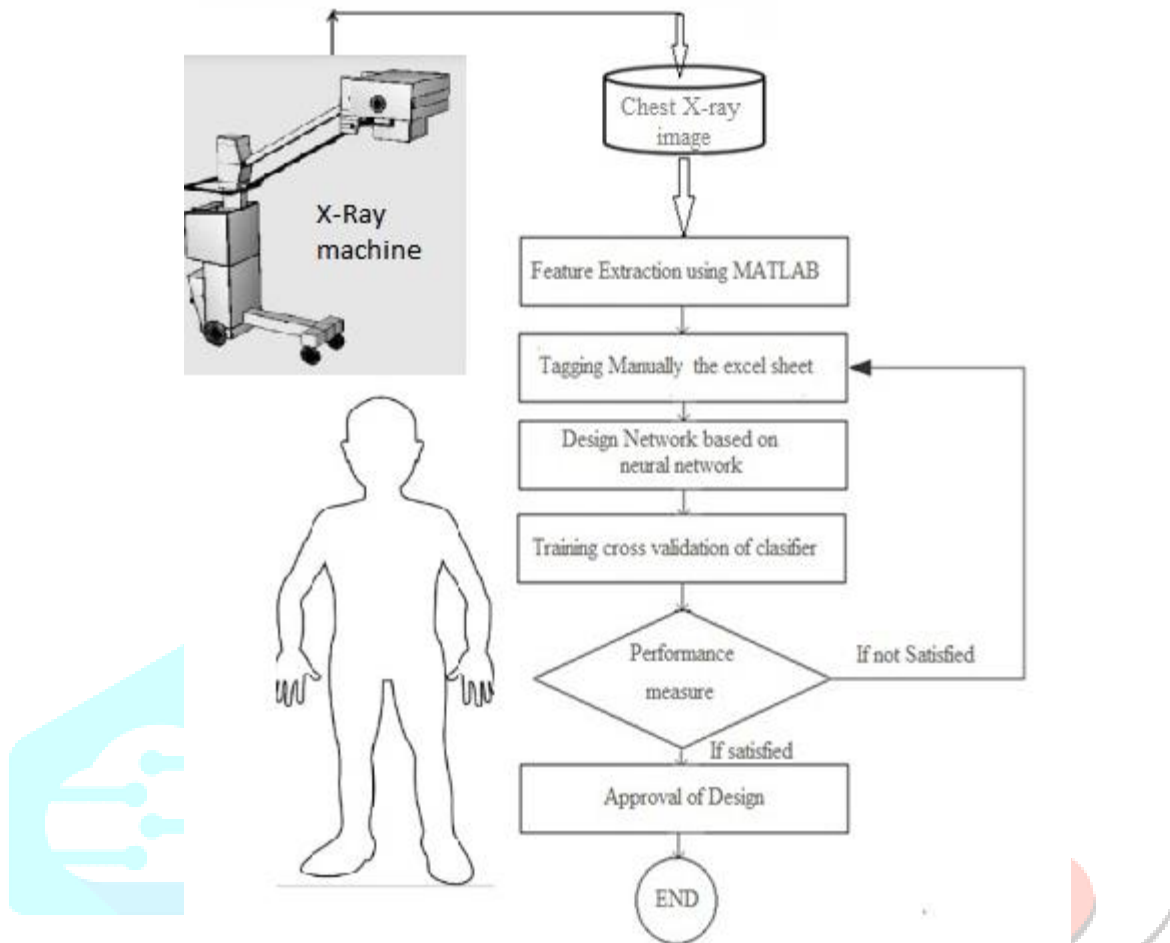
III.PROPOSED METHODOLOGY

Fig 2: Flow Chart

It is proposed to think about the grouping of three dataset images Using Neural Network Approaches.. Information securing for the proposed classifier intended for the Recognition of three type of dataset images .The most vital un corresponded includes and in addition coefficient from the images will be extricated . In order to extract features, statistical techniques, transformed domain will be used.

Computational Intelligence techniques include the following will established techniques.

i) Statistics

ii) Learning Machines such as neural network .

iii) Transformed domain techniques such as FFT, WHT, HISTOGRAM etc.

For choice of suitable classifier following configuration will be investigated.

i) Support Vector Machine.

ii) Modular Neural network.

iii) Generalized Feed Forward Neural Network

For each of the architecture, following parameters are verified until the best performance is obtained.

i) Train-CV-Test data

ii) Variable split ratios

iii) Retraining at least five times with different random initialization Iof the connection weights in every training run.

iv) Possibility different learning algorithms such as Standard Back-Propagation, Conjugate gradient algorithm , Quick propagation algorithm, Delta Bar Delta algorithm,Momentum

v) Number of hidden layers

vi) Number of processing elements of neurons in each hidden layer.

After regions training & retraining of the classifier, it is cross validated & tested on the basis of the following performance matrix.

i) Mean Square Error

ii) Normalized Mean Square Error

iii) Classification accuracy

iv) Sensitivity

v) Specificity

In order to carry out the proposed research work, Platforms/Software's such as Matlab, Neuro solutions, Microsoft Excel will be used.

IV. RESEARCH OBJECTIVE

1) To maintain the correctness with enhanced accuracy by analyzing radio images of COVID-19 patients using suggested computational Intelligence techniques.

2) A 'small try' to contribute to combat this hard situation of COVID-19 using AI.

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