Explainable-AI SAR-COVID CT SCAN

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Degree of

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IN
Electrical and Electronics Engineering

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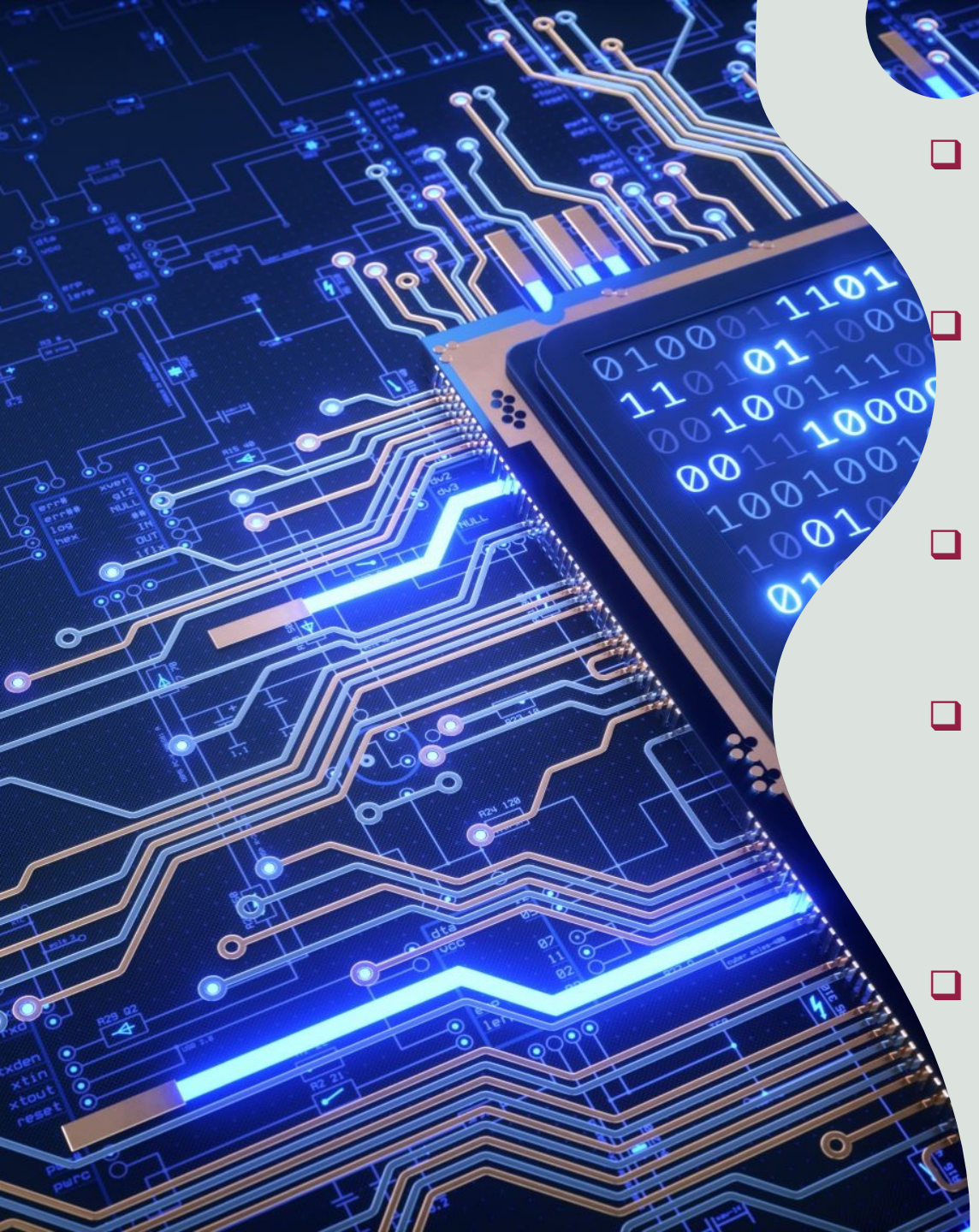
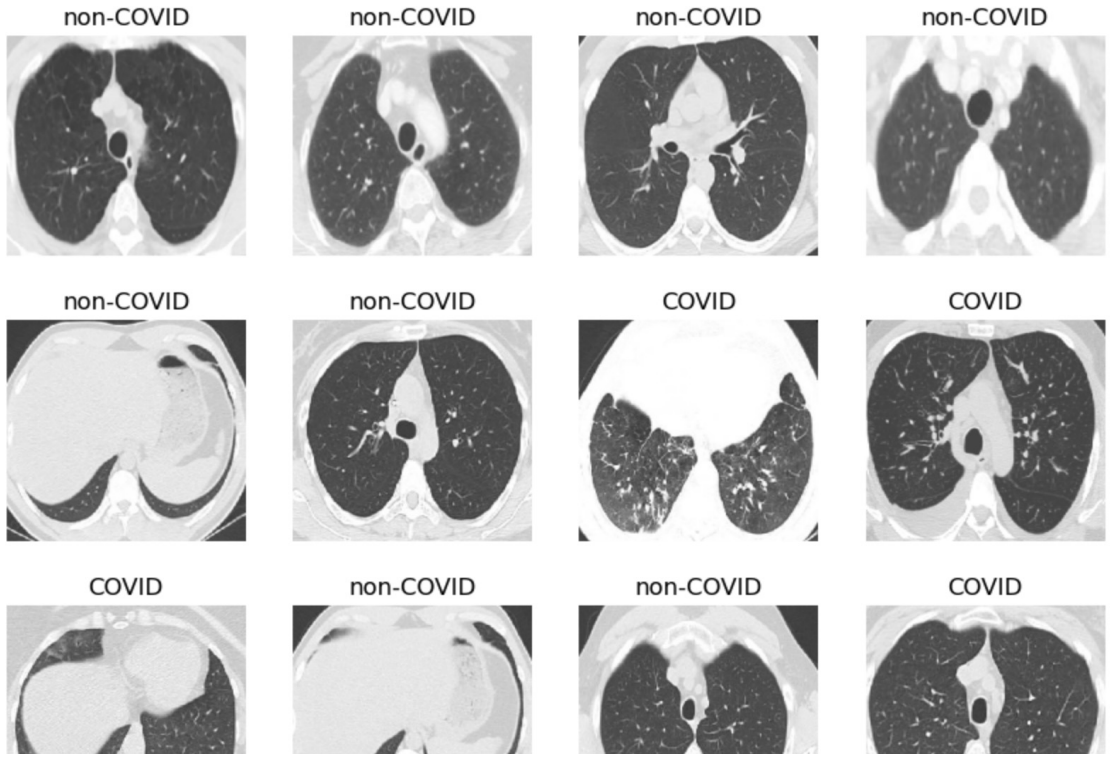


Abstract

- Artificial Intelligence (AI) is an enabling technology that when integrated into healthcare applications and smart wearable devices such as Fitbits etc.
- World Health Organization has defined COVID-19 as a contagious, communicable and fast spreading disease engendered by the Corona virus, SARS-CoV-2, is a respirational microorganism.
- Computerized Tomography (CT) scan images of the chest helps in detecting COVID 19 infection in a fast way with much reliability.
- In this CT scan images of COVID and Non-COVID categories are considered to train the supervised classifier, Iterative convolution Neural Network. The training process is done with six different training data size. The trained models are iterated for the fixed size of testing data images.
- The same set of training and testing processes are done with two different Iterative Convolutional Neural Network architectures, one with two hidden layers (CNN1) and another with three hidden layers (CNN2)

Introduction

- ✓ The new coronavirus is the main cause of the current epidemic, which began in early December 2019. The coronavirus identified in December 2019 gave rise to the name **"COVID-19"** (corona virus 2019), commonly known as **"COVID-19".**
- ✓ All enterprises have been put on lockdown as a result of the coronavirus epidemic. Since about July 9, 2020, the **World Health Organization** (WHO) forecasts that over **12 million individuals are infected, with 552,050 causalities.**
- ✓ We have taken Found **1984 images** belonging to 2 classes. **Found 497 images** belonging to 2 classes.



Research Methodology

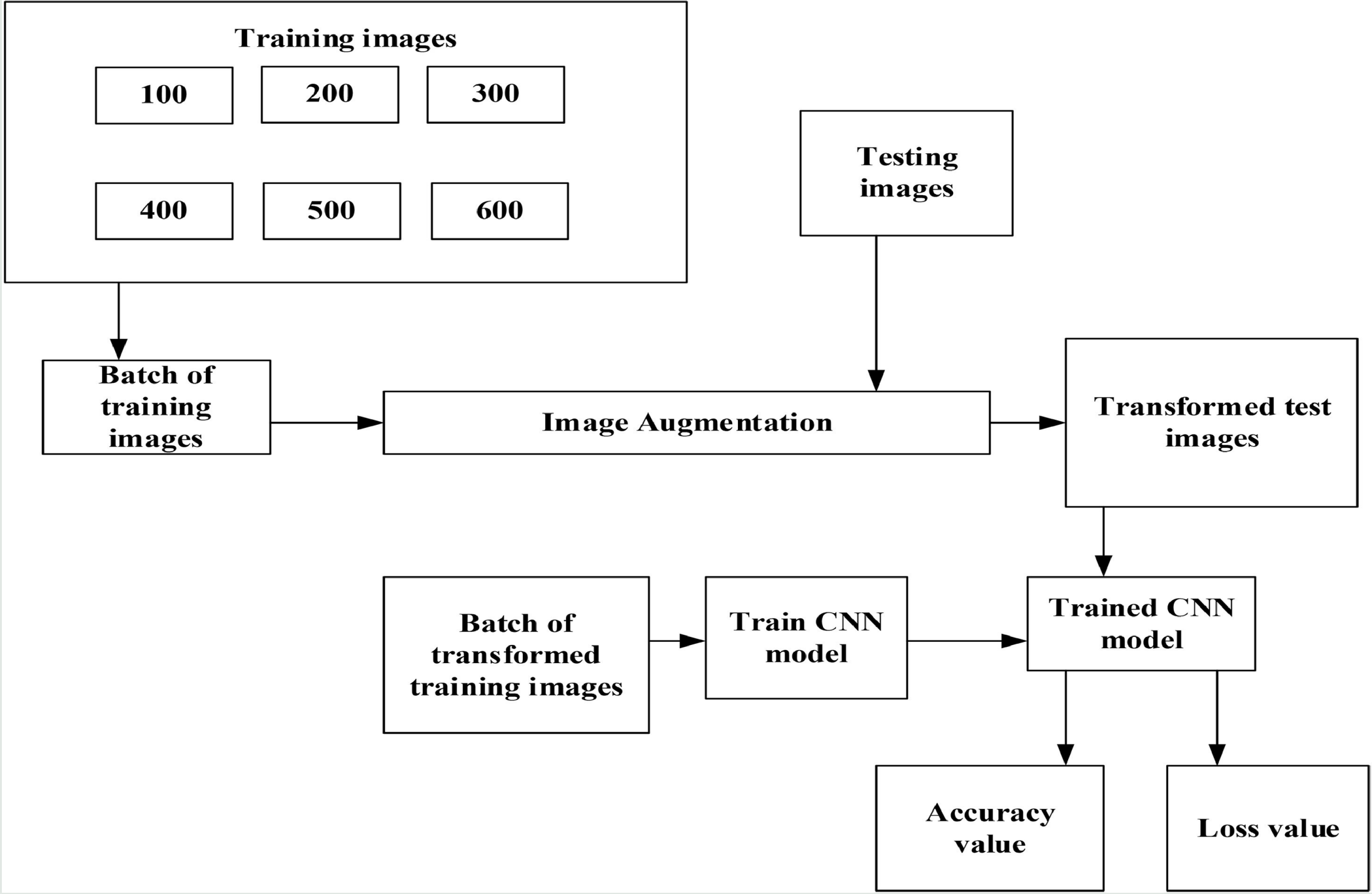
- The SARS-CoV-2 CT-scan dataset[43] is considered one of the largest CT scan datasets currently available for research that follows a patient-wise structure. The CT scans have been collected in public hospitals in Sao Paulo, Brazil, with a total of 4173 CT scans for 210 different subjects. The CT scans are distributed into three classes, namely COVID-19, Healthy, and Others.

Convolutional Neural Network (CNN)

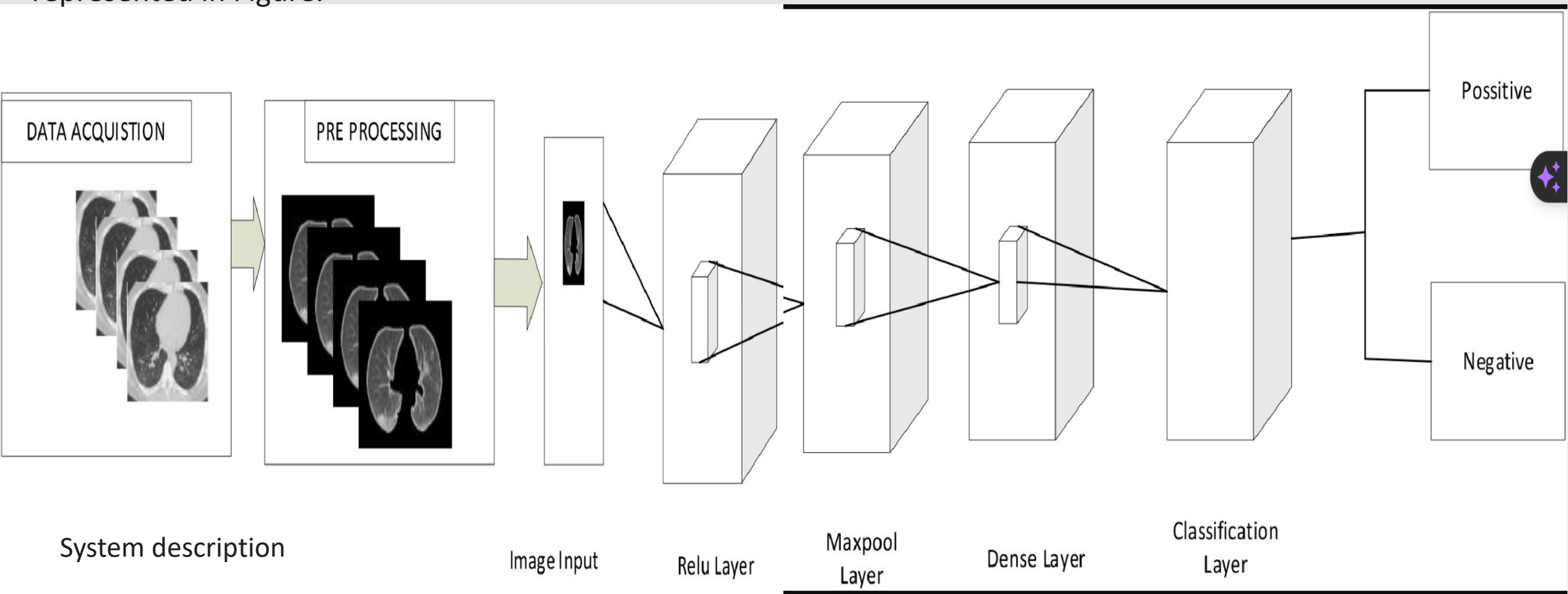
- it's basically a multilayer perceptron and a multilayer neural network, and there's a visible sequence between these layers, that consists of an input layer, a hidden layer, and an output layer.

- Convolutional neural networks are a special variety of neural network used for image classification.

Architectural representation of the CNN Model.



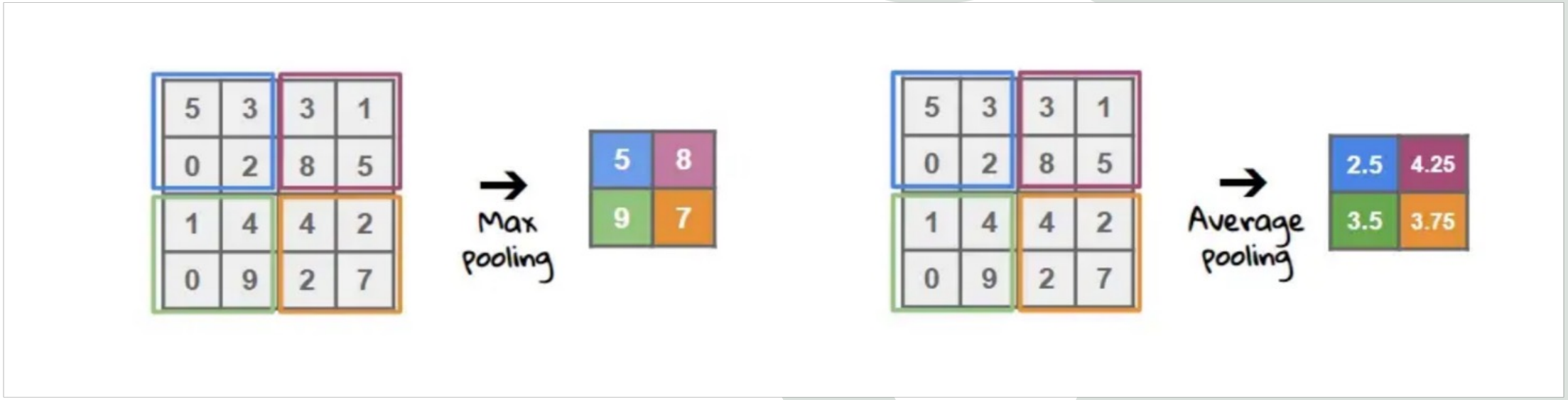
COVID-19 covid (positive)and non-covid(negative) cases are classified from CT scan images constructing two different architectures of CNN. These models are considered as an Iterative Convolutional Neural Network. The first CNN model is represented as CNN1 with two hidden layers and the second CNN model is constructed with three hidden layers which is represented as CNN2. The classification of covid and non-covid cases is done with the following processing steps: image collection, data augmentation, models construction, iteratively training the models, testing the models and evaluate the model performance. General architectural diagram for the system is represented in Figure.



System description

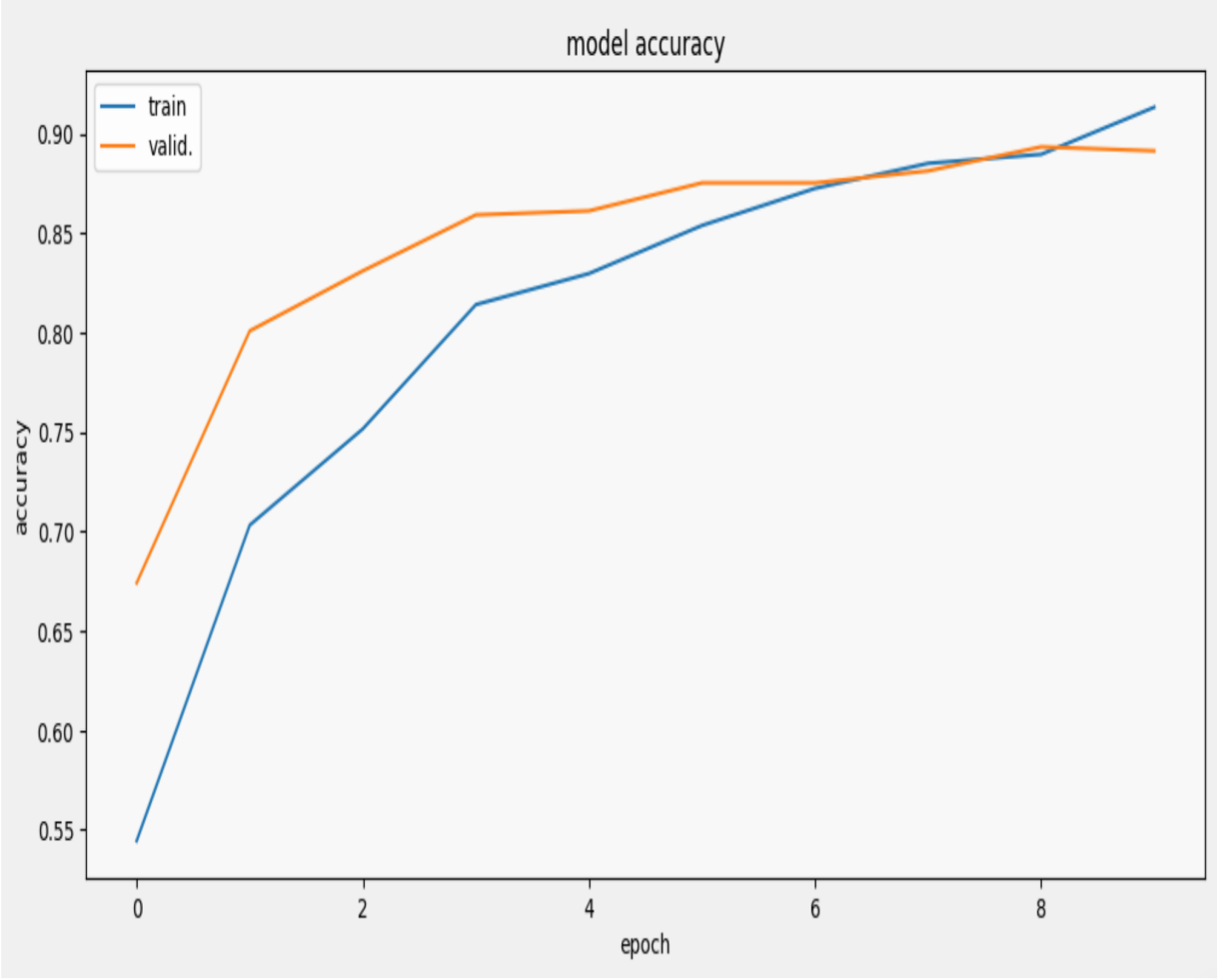
Batch of Normalisation

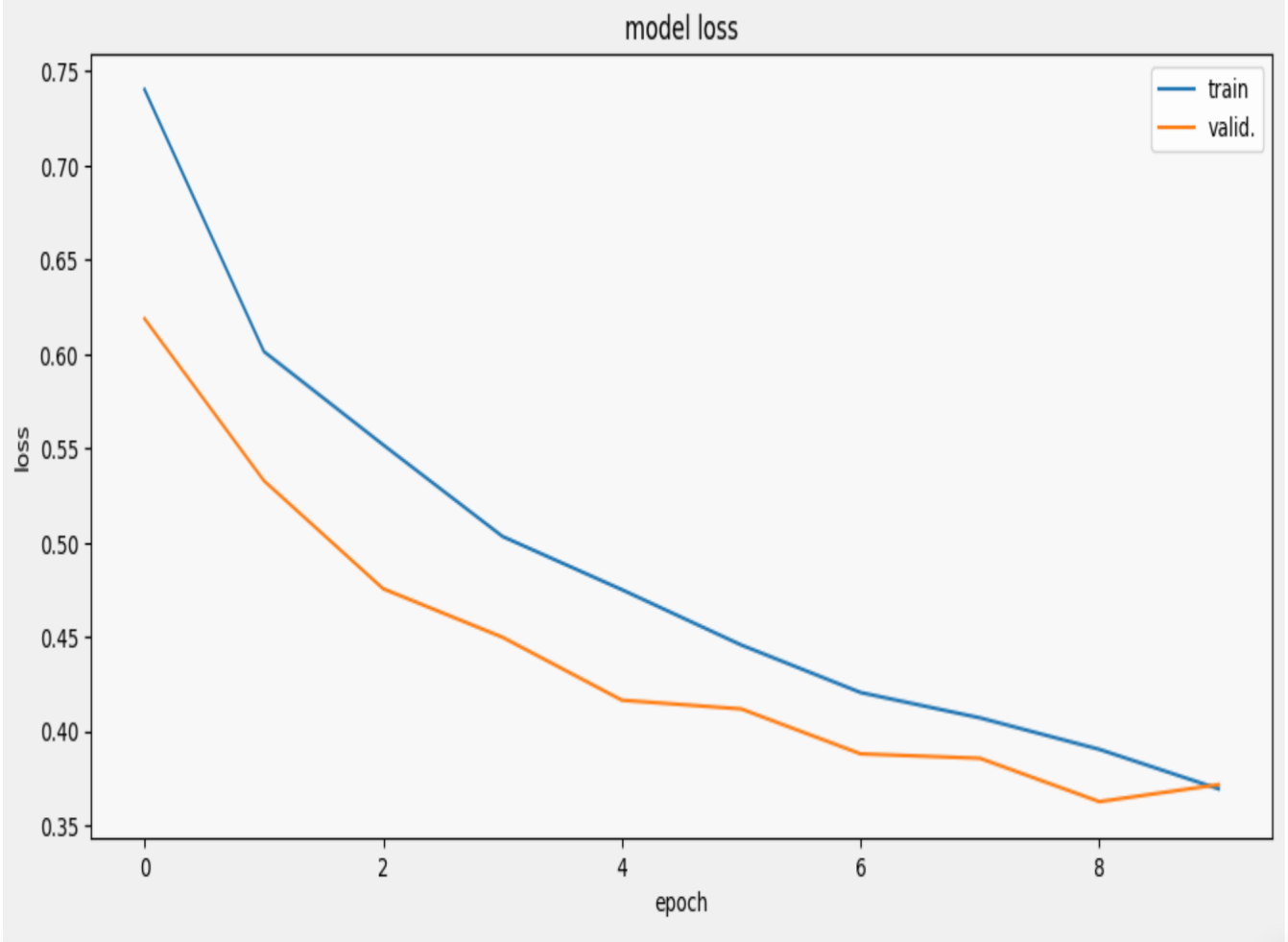
- ✓ Before stepping into Batch normalisation let's perceive the term "Normalisation". normalisation may be a data pre-processing tool wont to bring numerical data to a standard scale while not distorting its shape.
- ✓ Generally, once we input the information to a machine or deep learning algorithmic program we tend to vary the values to a balanced scale.
- ✓ The rationale we normalise is part to make sure that our model will generalise appropriately. currently coming to Batch normalisation, it's a method to form neural networks quicker and additional stable by adding additional layers in a very deep neural network.



Experimental & Result

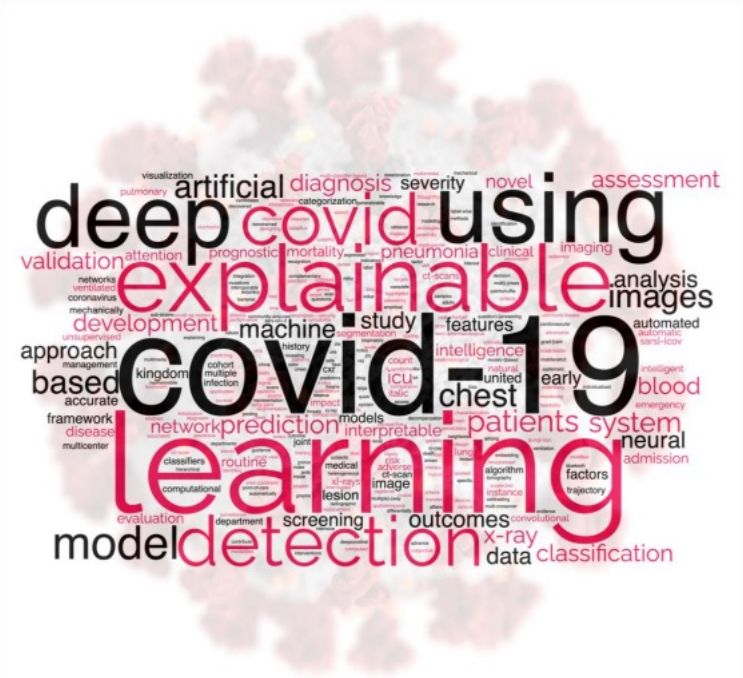
Model Loss and Model Accuracy





Conclusion & Future Scope

- The recent confluence of large-scale public healthcare datasets combined with the rapid increase of computing capacity, and the popularity of open-source code has resulted in a noteworthy increase in AI-based clinical decision support systems. This trend has increased the need for understanding the criteria which make AI solutions successful in practice. In this work.



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THANK YOU