

Chest X-Ray-Image Classification



Team Members: Lahari Kuchibhotla, Sanjana Ramankandath, Stuti Sanghavi, Tanmayi Varanasi

Agenda

01

Problem Statement

02

Dataset Overview

03

Model Description

04

Model Results

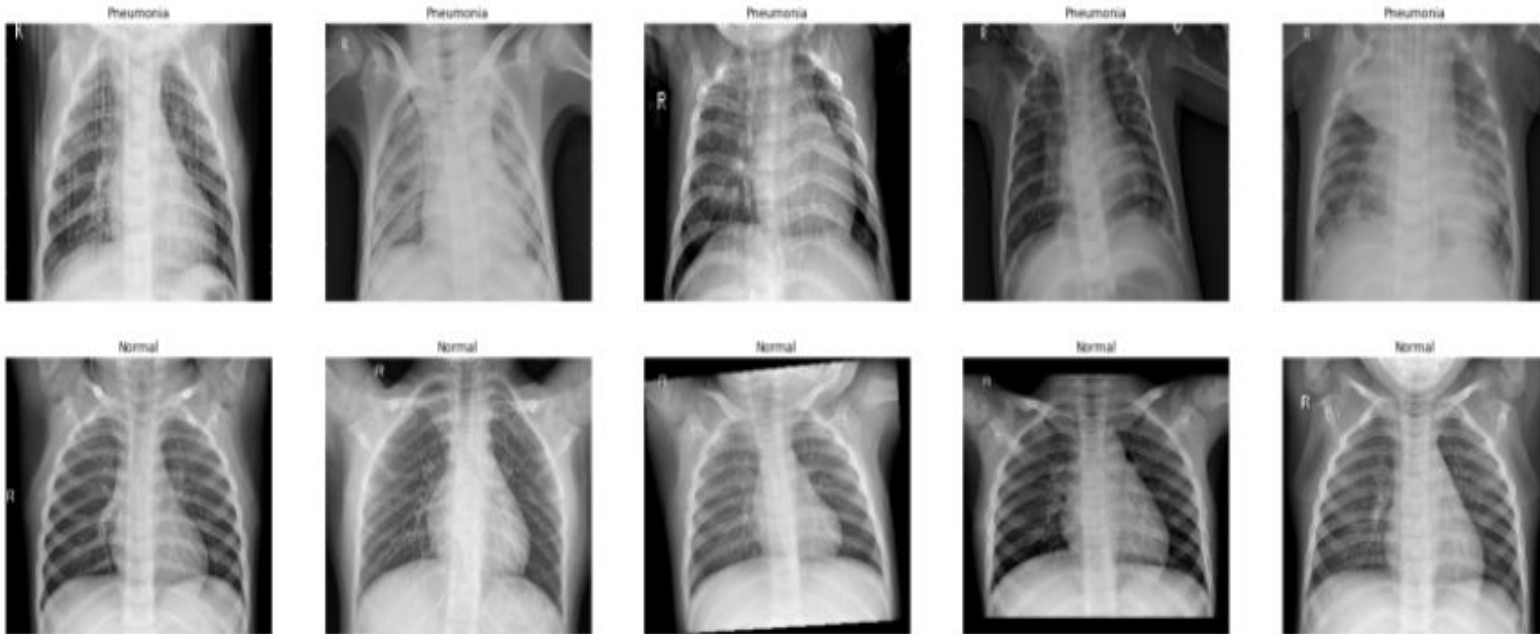
05

Learnings

06

Next Steps

Problem Statement

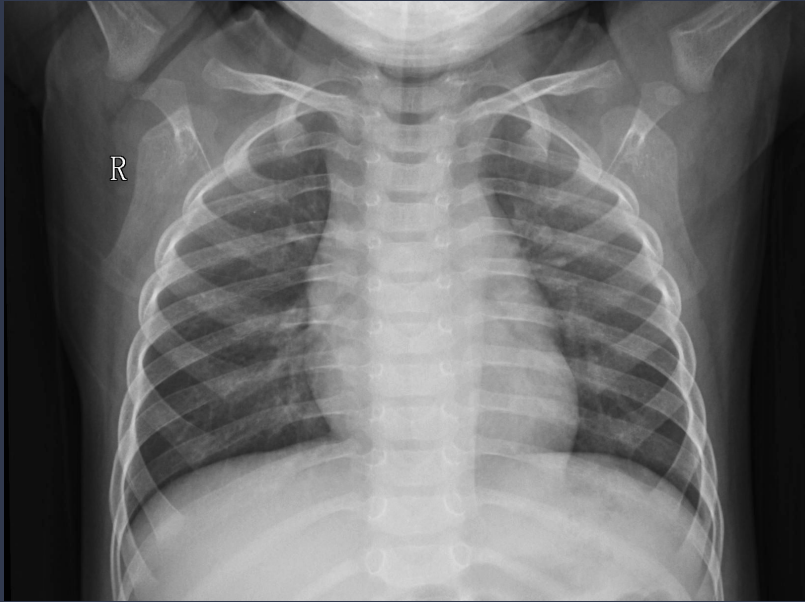


It is very difficult to classify those images correctly on the basis of their features and properties.

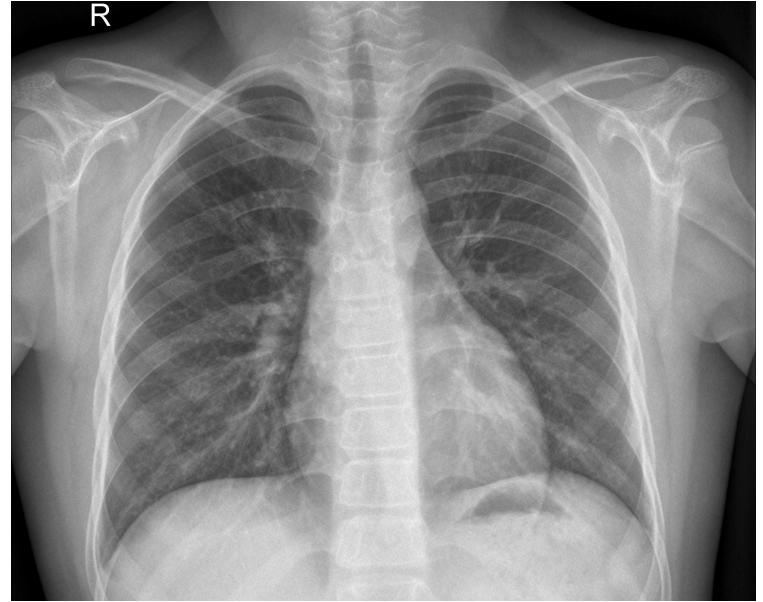
Dataset

- Contains X-ray images of patients from a medical center
- Each X-ray image could be with or without pneumonia
- The dataset is split into 3 categories:
 - Training
 - Test
 - Validation
- Overall, there are 5,863 X-ray images which are categorized

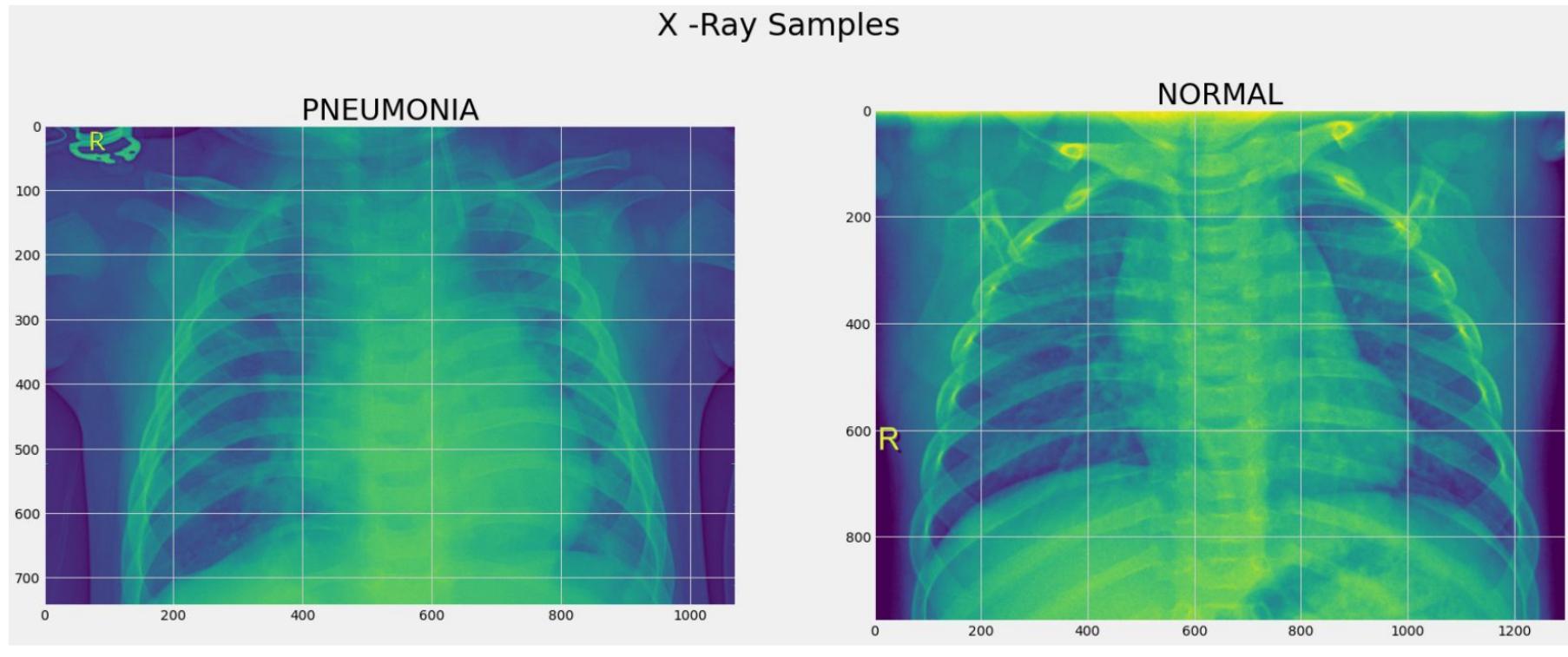
Normal



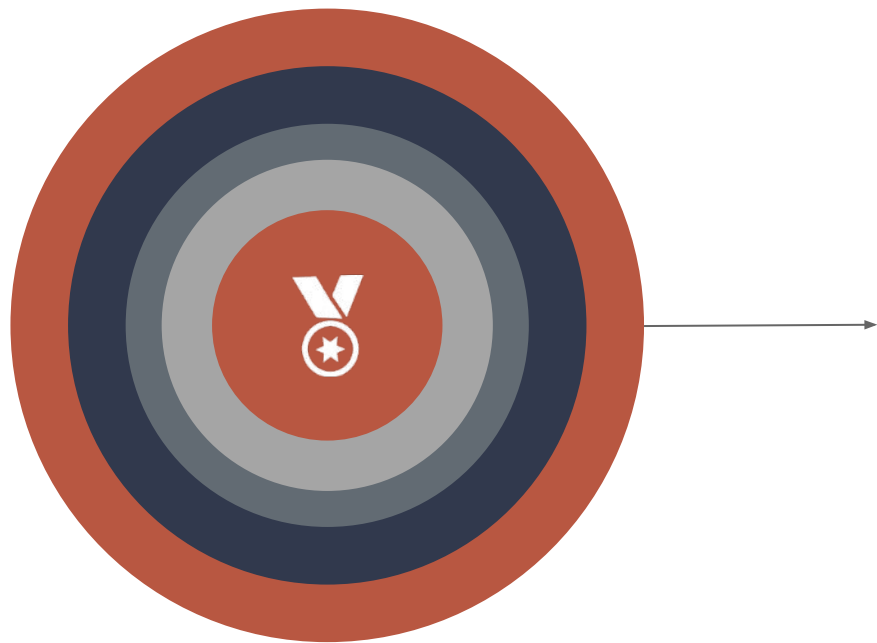
Pneumonia



Sample X-ray images



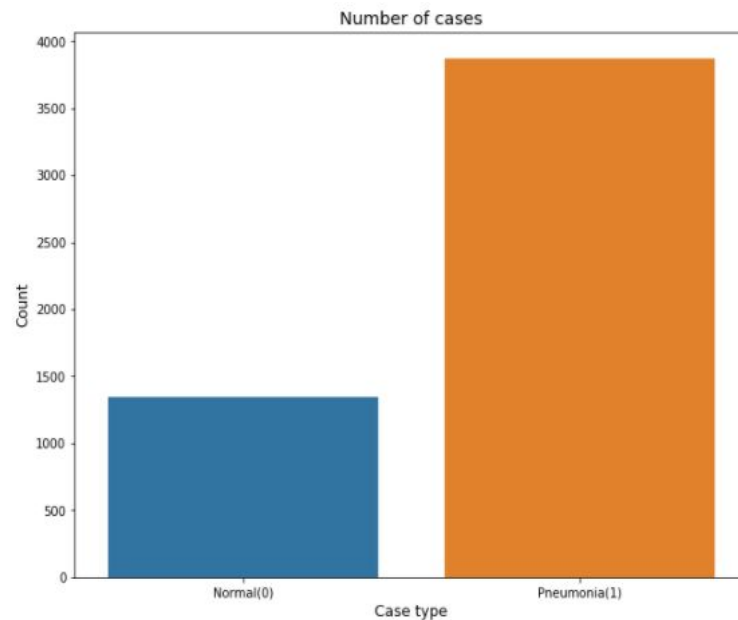
Goal for the project



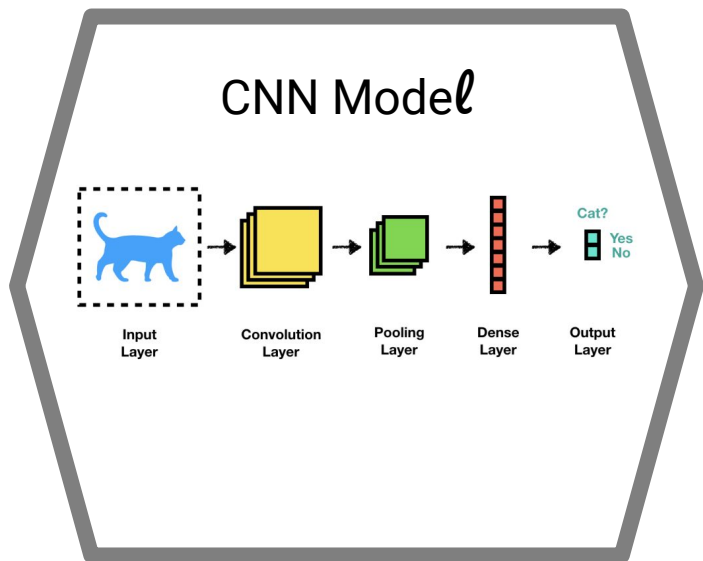
The aim of this project is to feed properly labeled X-ray images into a neural network and see if the model will be able to catch pneumonia with a minimum precision and recall of 90% or higher.

Dataset Overview

Category	Training set	Test set
Normal (Healthy)	1341	234
Pneumonia (Viral + Bacterial)	3875	390
Total	5216	624
Percentage	89.31%	10.68%



Model Description



Detect the relevant features from the image



Series of convolution and pooling operations



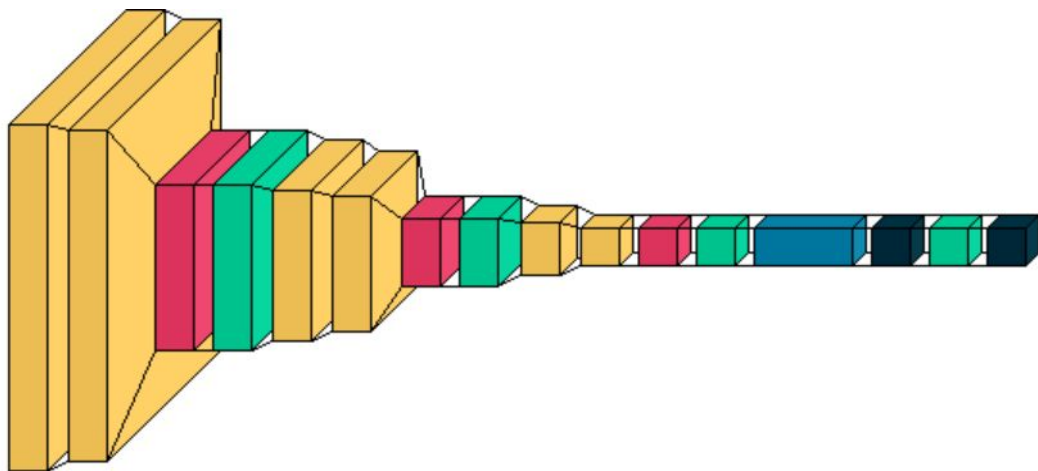
Higher accuracy



Efficient image classification

Initial Model

Techniques used in the model : Data Augmentation



Conv2D



MaxPooling2D



Dropout



Flatten

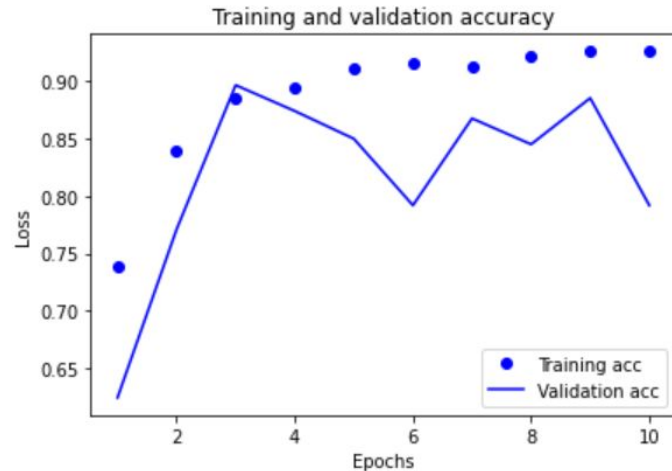


Dense

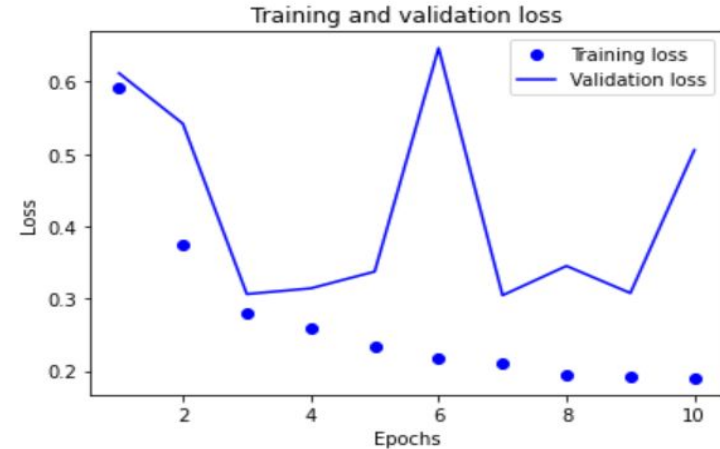
Initial Model – Result

Execution Time	~2 hours
Test Accuracy	89.6%

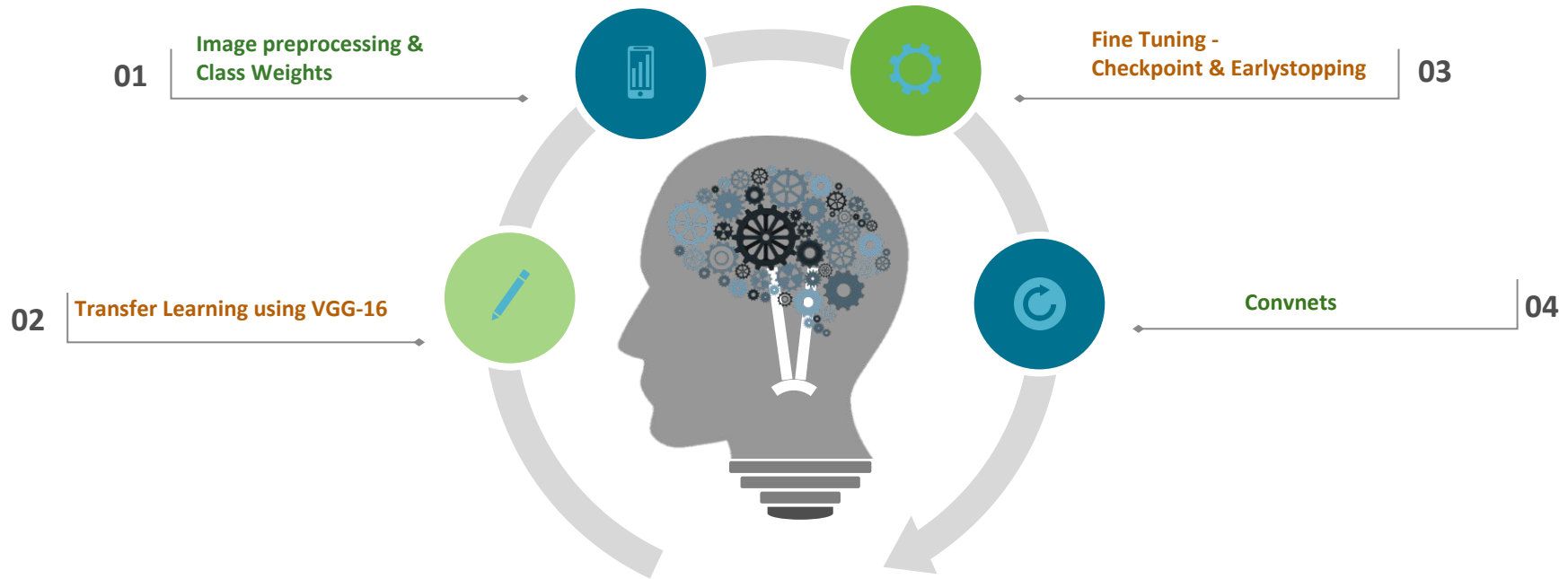
Accuracy



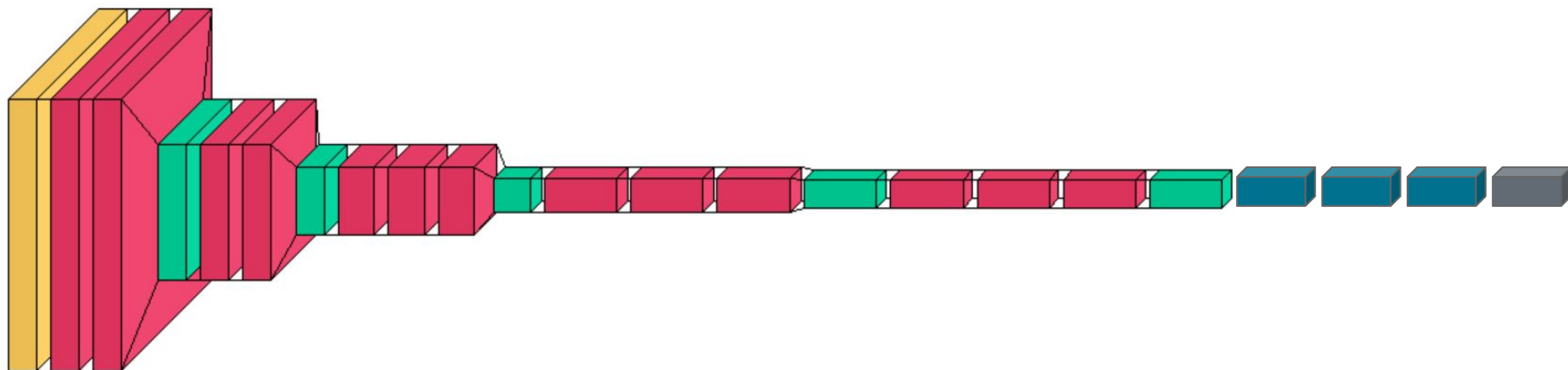
Loss



Techniques Used for Final Model



VGG - 16



InputLayer



Conv2D



MaxPooling2D

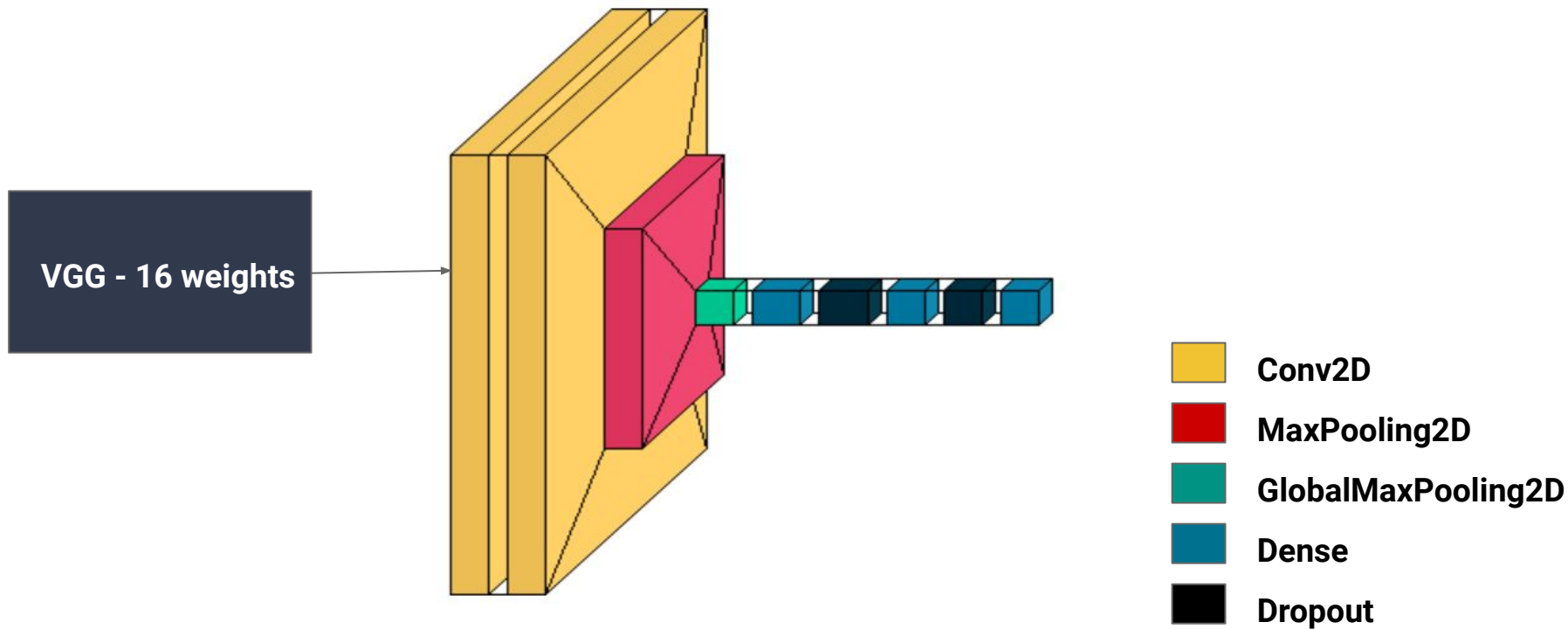


Fully connected layer

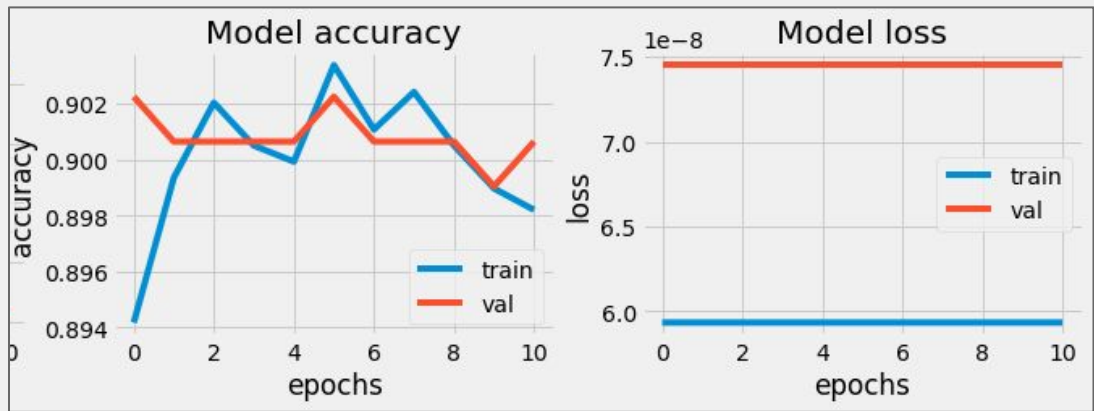
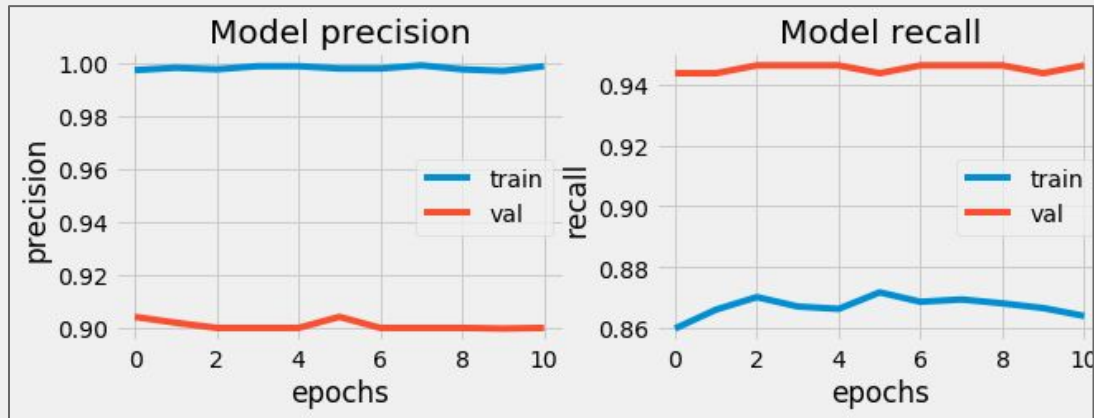


Softmax

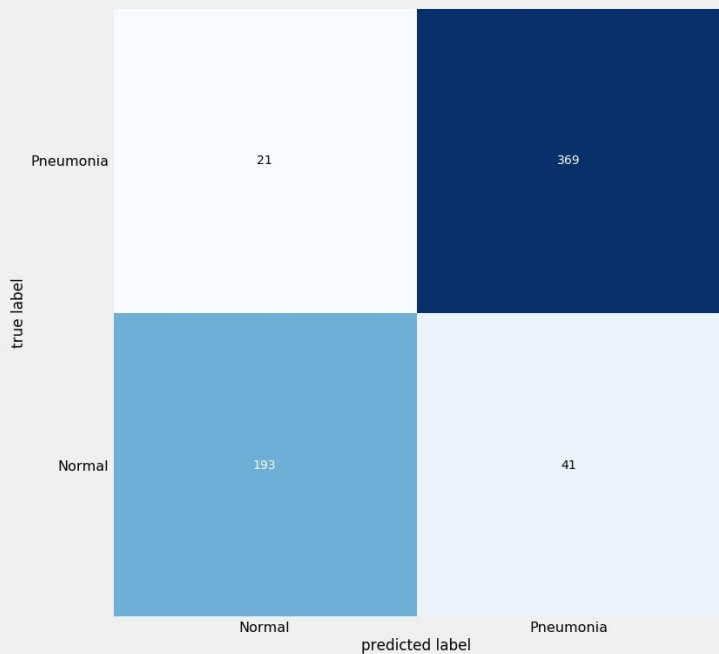
Final Model – Visualization



Model Results



Confusion Matrix



Testing Metrics

90.06%

90.00%

92.25%

94.62%

Training Metrics

Accuracy

90.03%

Precision

99.91%

F-1 Score

92.81%

Recall

86.66%

What did we learn?

- Dealing with imbalanced datasets
- How to manipulate hyperparameters for best results
- Using different models in Transfer Learning

Next Steps

01

Data Augmentation

02

Improve recall, Precision and accuracy

03

Pinpoint the areas that indicate Pneumonia

04

Try with different Pretrained Models (ResNet, Inception, etc)

Thank You !