# RECOGNIZING COVID-19 FROM LUNG CT SCAN IMAGES BY VARIOUS BASE MODELS


Team: Profound Studying

Members:

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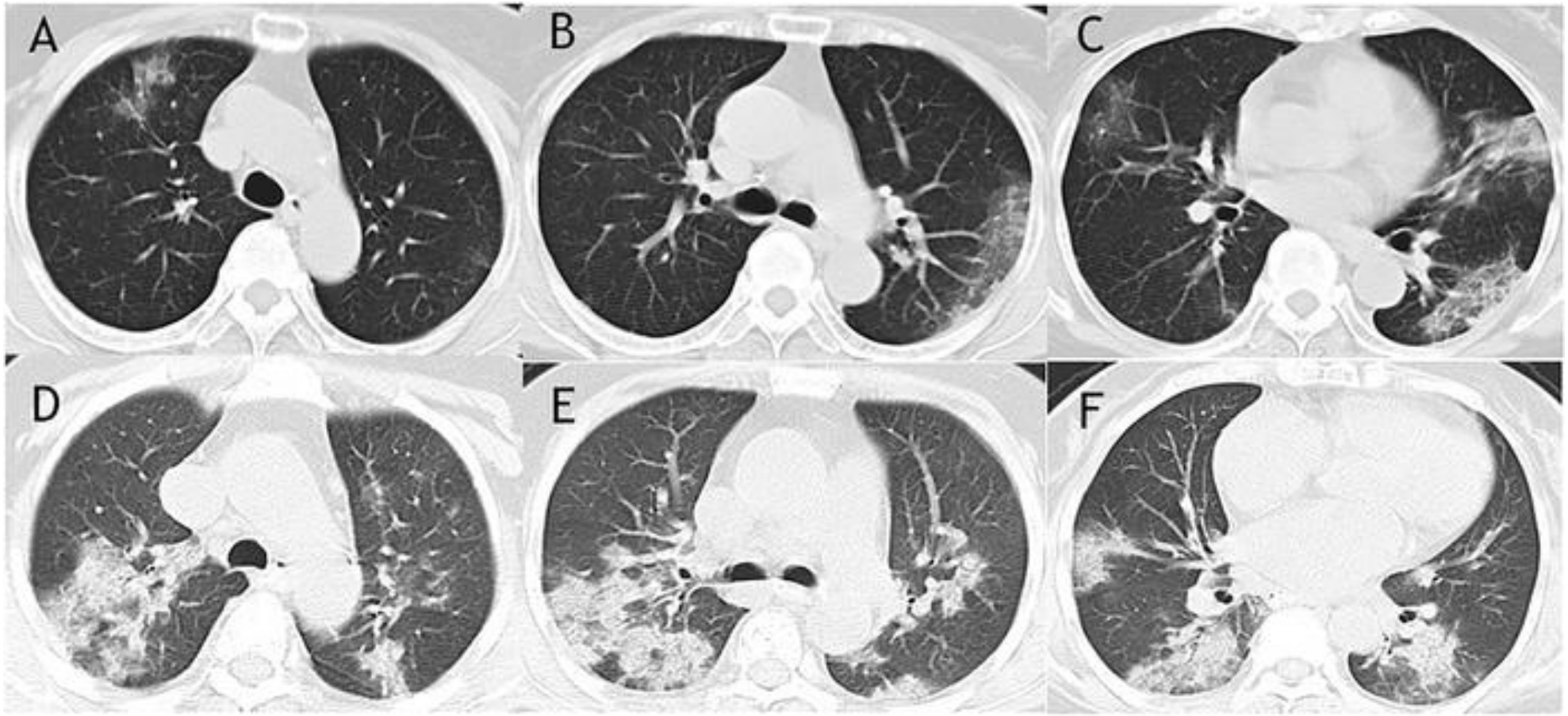
# HOW DOES COVID-19 LOOKS LIKE ON LUNG CT

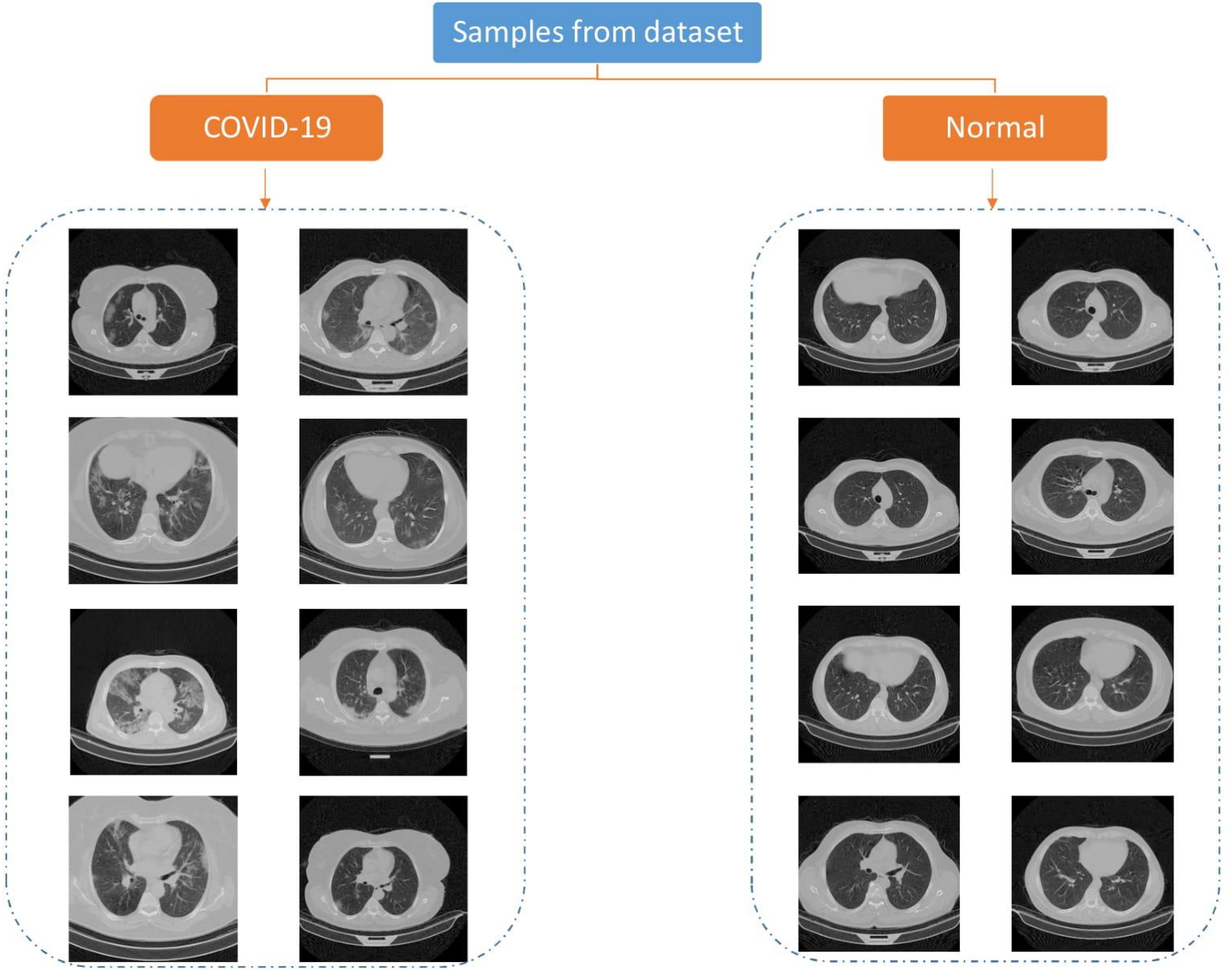


# THE MOTIVATION

# THE IMAGES OF THE DATASET

12058 16-bit uint grayscale images with  resolution of 512*512

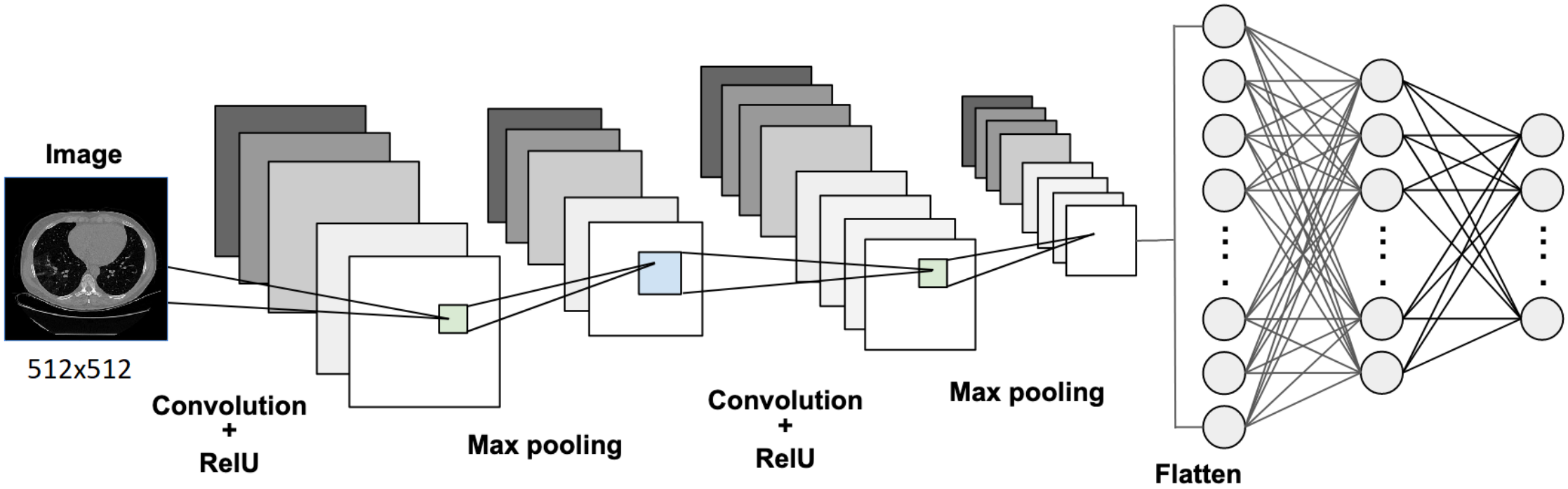
- 9776 Healthy (from 282 people)
- 2282 Covid-19 infected (from 95 people)



## RATES OF THE SEPARATED IMAGES

| | Train | Validation | Test |
|---|---|---|---|
| Covid | 1500 (~65%) | 391 (~17,5%) | 391 (~17.5%) |
| Normal | 1500 (~15%) | 391 (~4%) | 7875 (~80.6%) |

# OUR FIRST TRY 🙃



## TRANSFER LEARNING

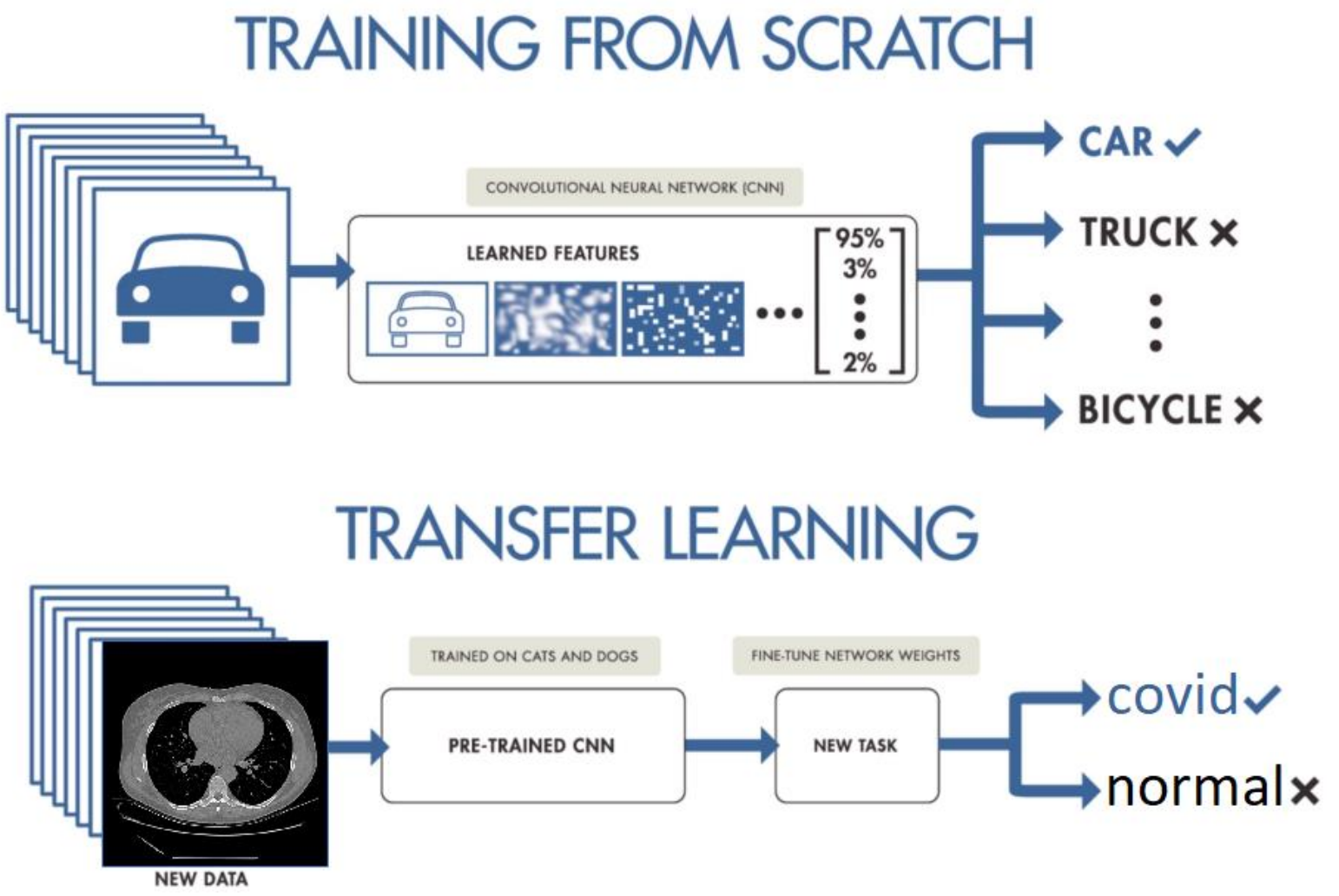
Using a pretrained model, that has learned a lot of features from various pictures of the imagenet.

Removed the top FC layers. And replaced them with ours.

Set the base models' layers trainability false, and trained the model.

Set the base models' layers trainability true, and fine-tuned the model.

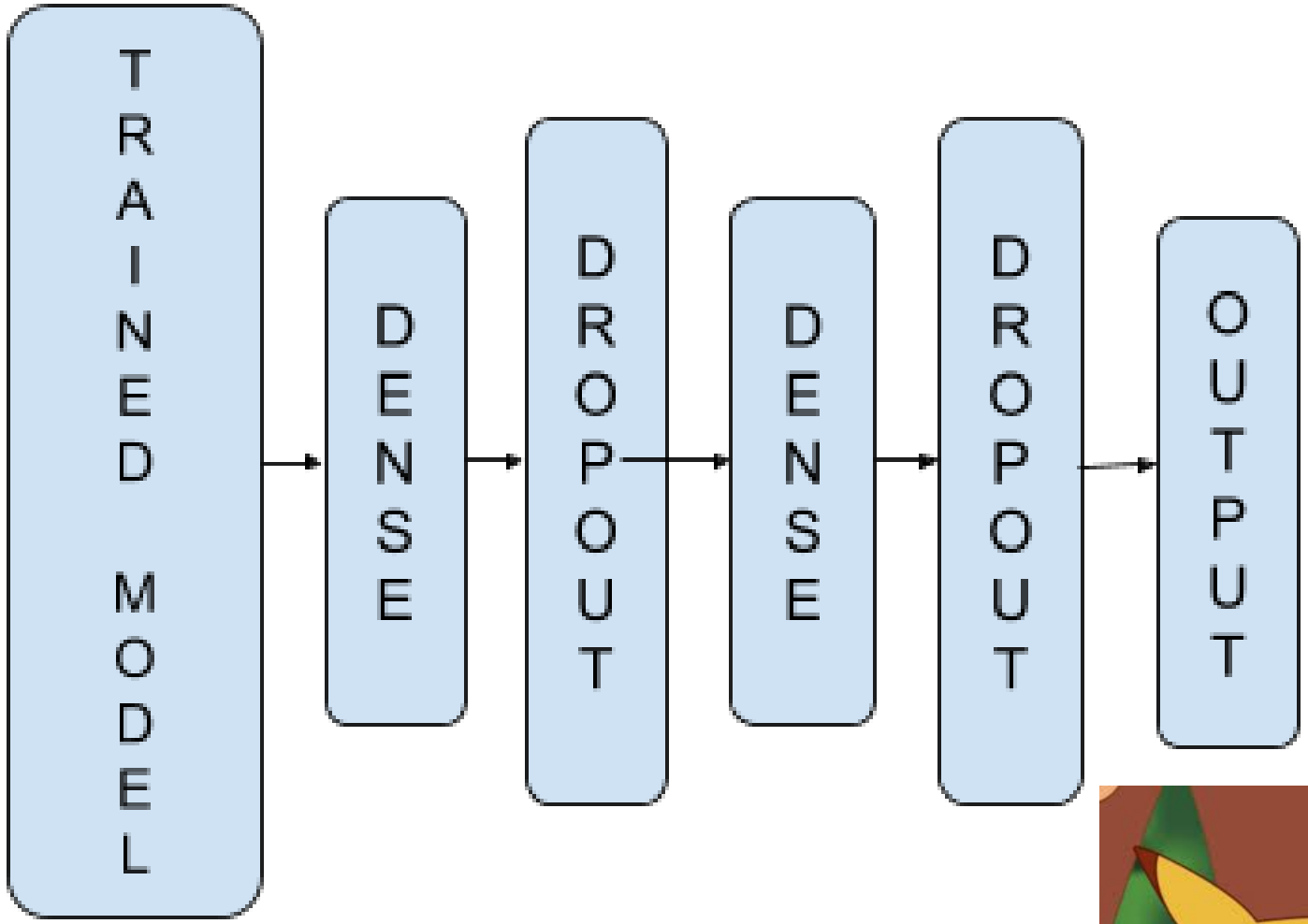
The models we used: InceptionV3, DenseNet169, VGG16, ResNet50V2



# THE EXTENDED MODEL

Containing:

- The pretrainded model without the FC layers
- Dense layers with ReLU activation followed by dropouts
- Output layer with 2 neurons and softmax activation
- Optimizer: Nadam and SGD




# HYPERPARAMETER OPTIMIZING

- Keras Tuner
- HyperBand

| Hyperparameter | Range |
|---|---|
| **Number of neuron in the first dense layer** | [16, 48, 96] |
| **Dropout probability after the first dense layer** | [0.1, 0.2, 0.3, 0.4] |
| **Number of neuron in the second dense layer** | [16, 48, 96] |
| **Dropout probability after the second dense layer** | [0.1, 0.2, 0.3, 0.4] |
| **Learning rate** | [1e-5, 1e-4] |

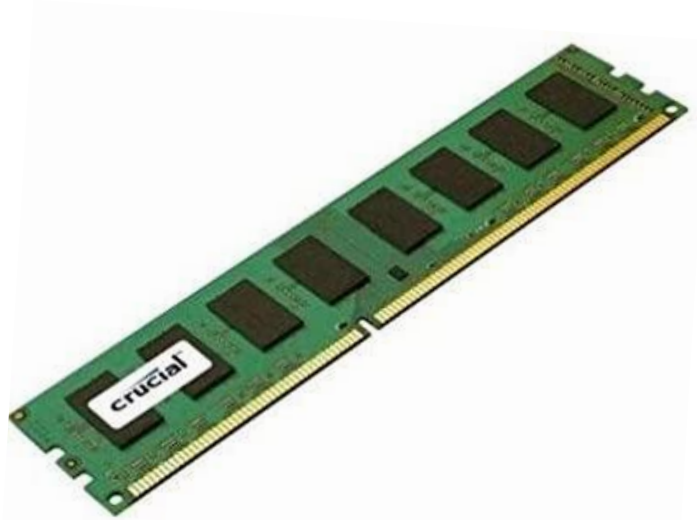
# LIMITATIONS AND SOLUTIONS

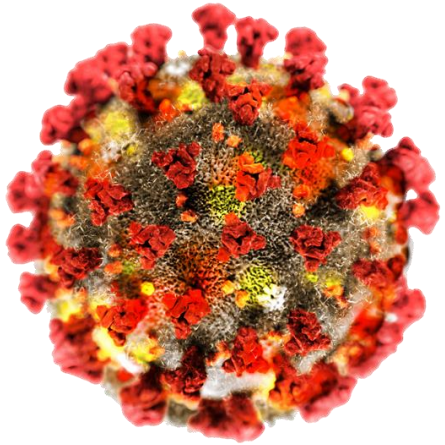
Problems:

- The original dataset's size was 22GB
- Training time
- Lack of GPU

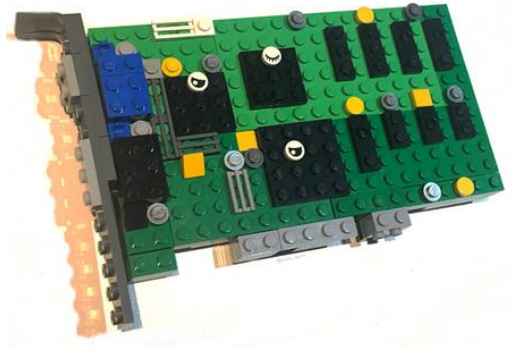
Solutions:

- Smaller dataset, Generator
- Hyperparameter range reduction
- Using Google Colab

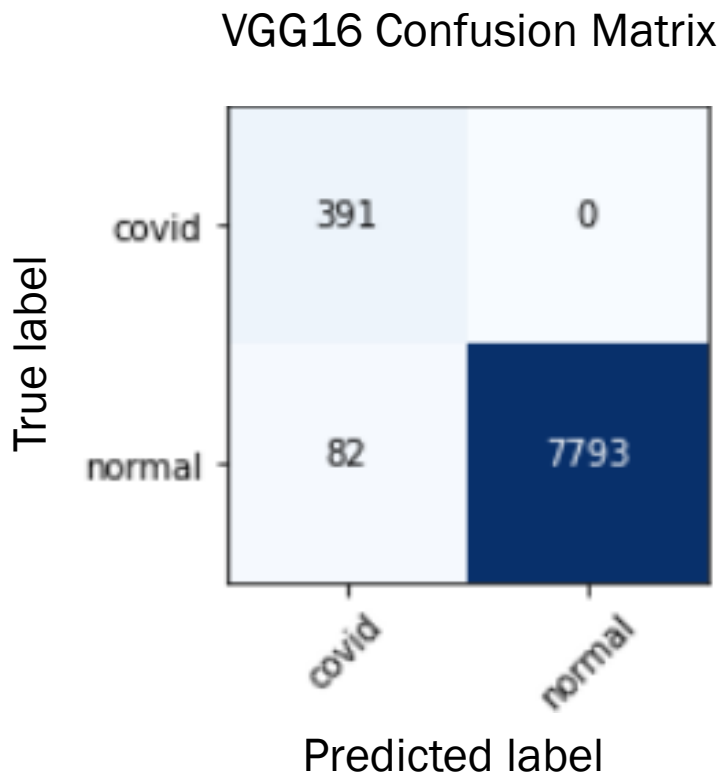


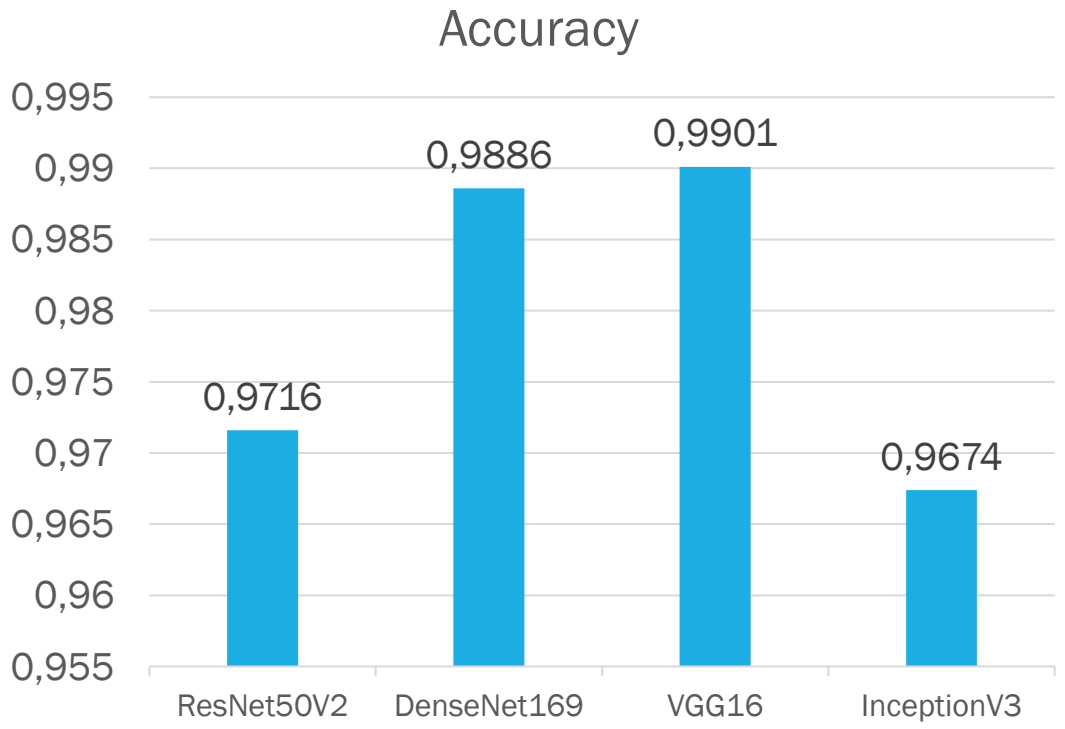



colab



# EXPERIMENTAL RESULTS



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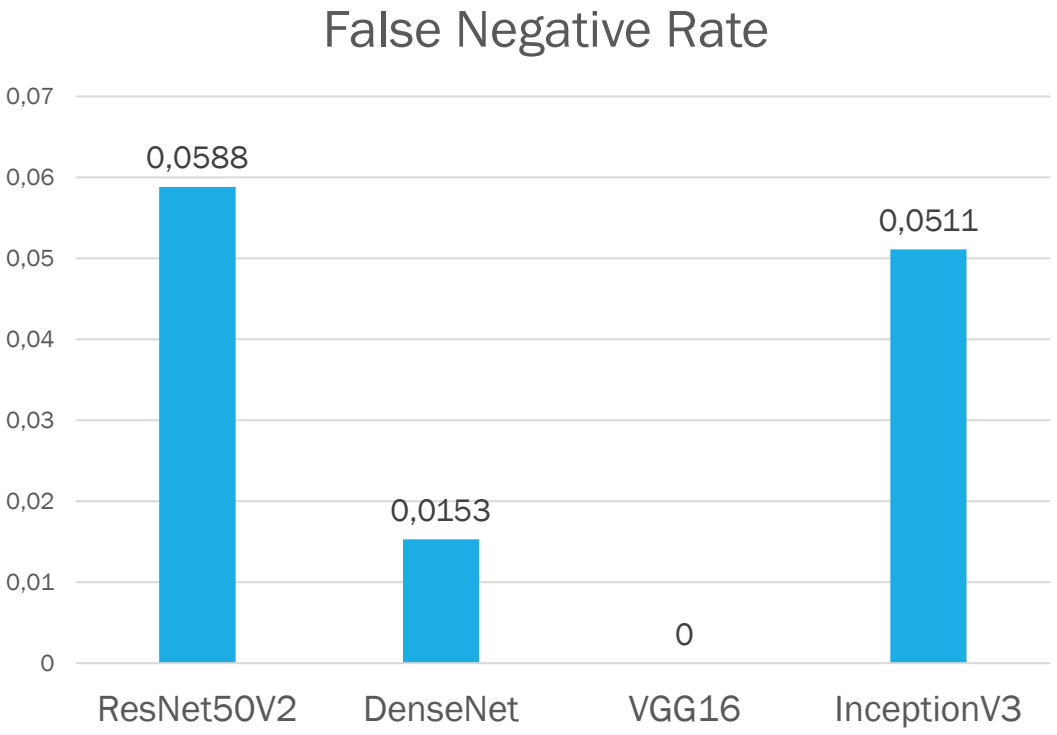
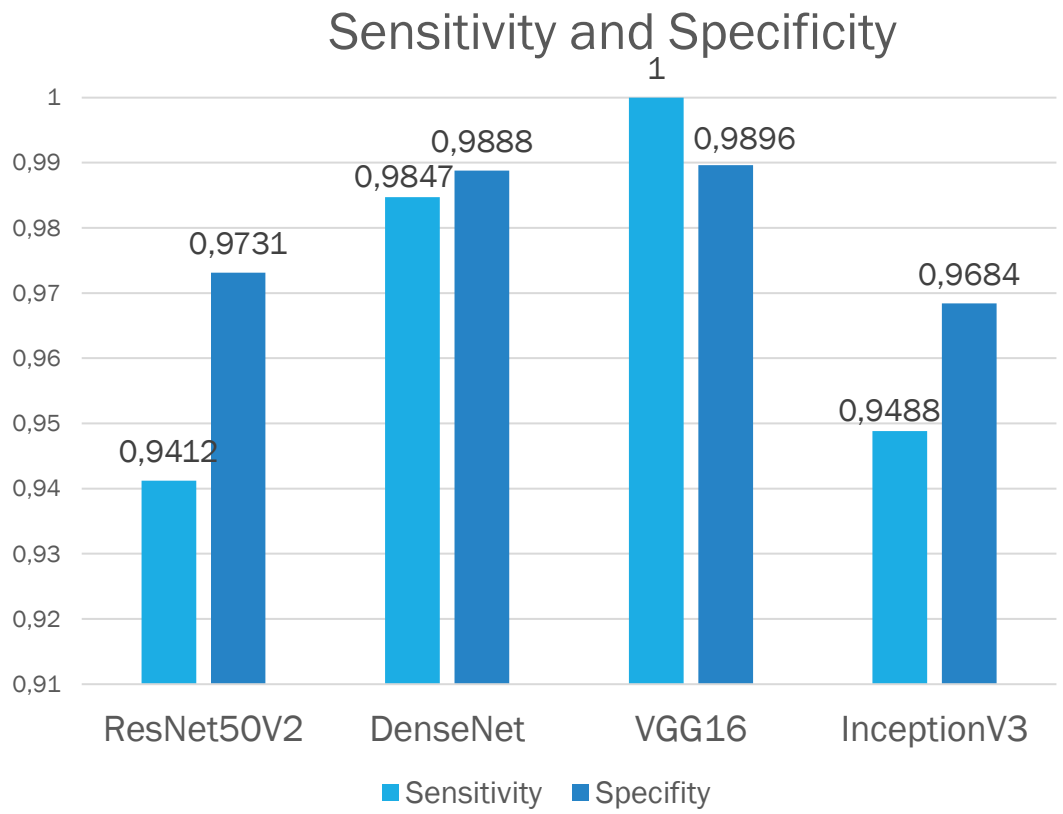


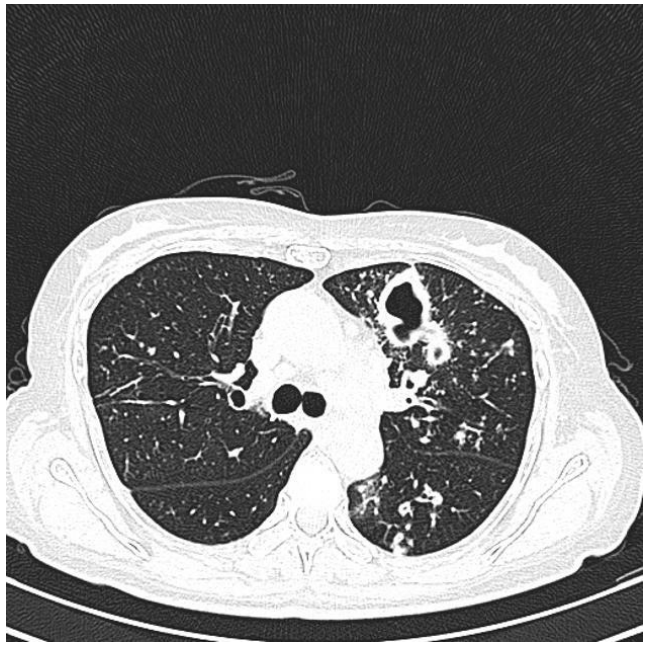
# SUMMARY

| Resnet50 | DenseNet | VGG16 | InceptionV3 |
|---|---|---|---|
| 0.7505 | 0.347 | 0.9971 | 0.9919 |

| Resnet50 | DenseNet | VGG16 | InceptionV3 |
|---|---|---|---|
| 0.5888 | 0.0655 | 0.9993 | 0.9599 |

# FUTURE PLANS

- New perspective of the lung
- More pictures with covid infection



# THANK YOU FOR YOUR ATTENTION!