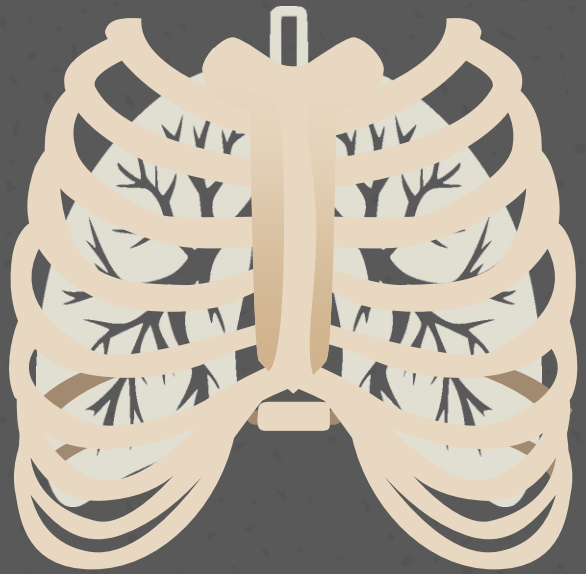
## Deep Learning CNN

# Chest Disease X-Ray Image

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# Outline

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# Introduction

**Pneumonia** is an inflammatory condition of the lung affecting primarily the small air sacs known as alveoli. Symptoms typically include some combination of productive or dry cough, chest pain, fever and difficulty breathing. The severity of the condition is variable.

**Pneumonia** is usually caused by infection with viruses or bacteria and less commonly by other microorganisms, certain medications or conditions such as autoimmune diseases.

Risk factors include cystic fibrosis, chronic obstructive pulmonary disease (COPD), asthma, diabetes, heart failure, a history of smoking, a poor ability to cough such as a stroke and a weak immune system.

# About Project

- The dataset is organized into 3 folders (train, test, val) and contains subfolders for each image category (Pneumonia/Normal).
- There are 5,863 X-Ray images (JPEG) and 2 categories (Pneumonia/Normal).
- Data from Kaggle.

# Challenges

1. **Excution time problems such:**

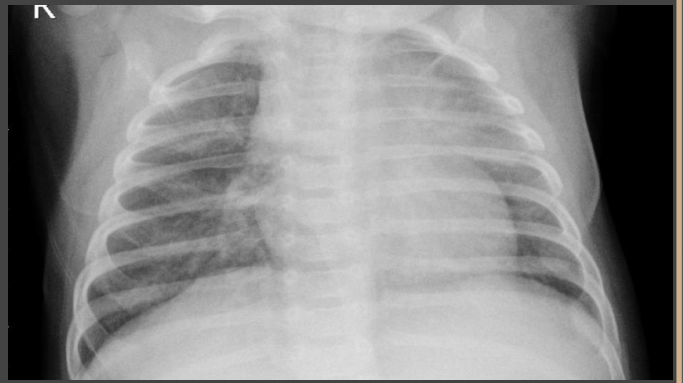
- Epoch 12 – 20 - 50.
- Improve accuracy after Epoch.
- Cannot execute all models at the same time unless using multiple files for each model.

2. **Define number of hidden layers.**

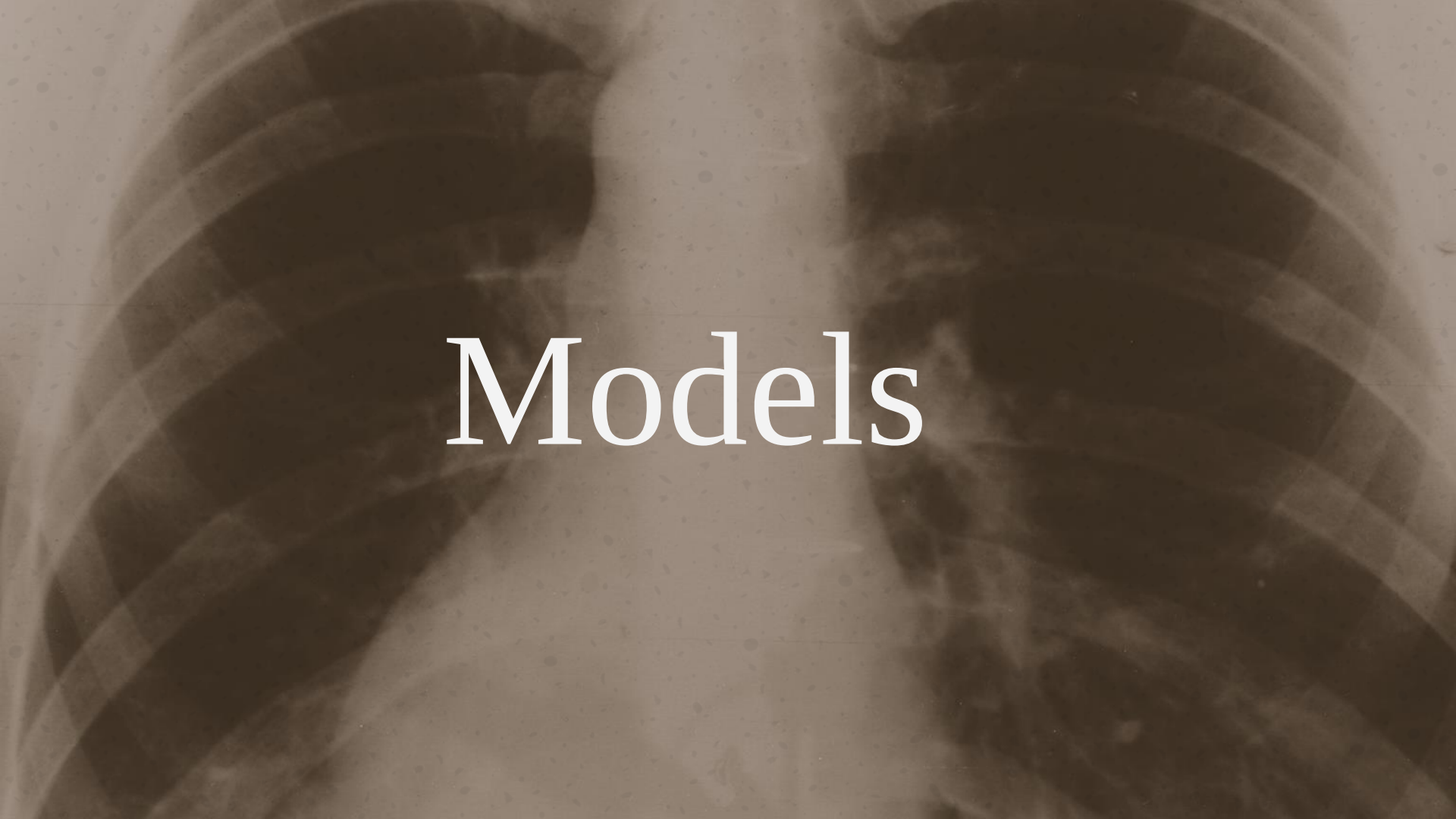
3. **Hard to define and find best parameters for each model.**

# An Example of Normal and Infected by Pneumonia Lugs

Normal Lungs



Lungs infected by Pneumonia



# Models

# Preprocess

Reshapping
224 x 224

Normalization
1./255

Batch Size
10

# 1. Sequential

| Optimizer | Early Stopping | Without Early Stopping |
|---|---|---|
| rmsprop | Epoch 20<br>Stopped at 3/20 | Epoch 12 |
| Accuracy | 96 % | 95 % |

# 2. VGG16

| Optimizer | Early Stopping | Without Early Stopping |
|---|---|---|
| Adam | Epoch 20<br>Stopped at 3/20 | Epoch 20 |
| Accuracy | 96 % | 98 % |

# 3. VGG19

| Optimizer | Early Stopping | Without Early Stopping |
|---|---|---|
| Adam | Epoch 50<br>Stopped at 6/50 | Epoch 12 |
| Accuracy | 97 % | 98 % |

# 4. MobileNetV2

| Optimizer | Early Stopping | Without Early Stopping |
|---|---|---|
| Adam | Epoch 50<br>Stopped at 3/50 | Epoch 12 |
| Accuracy | 96 % | 98 % |

# 5. InceptionV3

| Optimizer | Early Stopping | Without Early Stopping |
|---|---|---|
| Adam | Epoch 50<br>Stopped at 3/50 | Epoch 12 |
| Accuracy | 94 % | 97 % |

# Models

| Model | Accuracy | |
|---|---|---|
| | Train - Validation | Test |
| Sequnetial | 96% | 82% |
| VGG16 | 98% | 91.50% |
| VGG19 | 95% | 91.82% |
| MobileNetV2 | 95% | 91.82% |
| InceptionV3 | 95% | 87% |

# Conclusion

The test results showed that VGG19 and MobileNetV2 outperforms other models by accuracy of 91.82%.

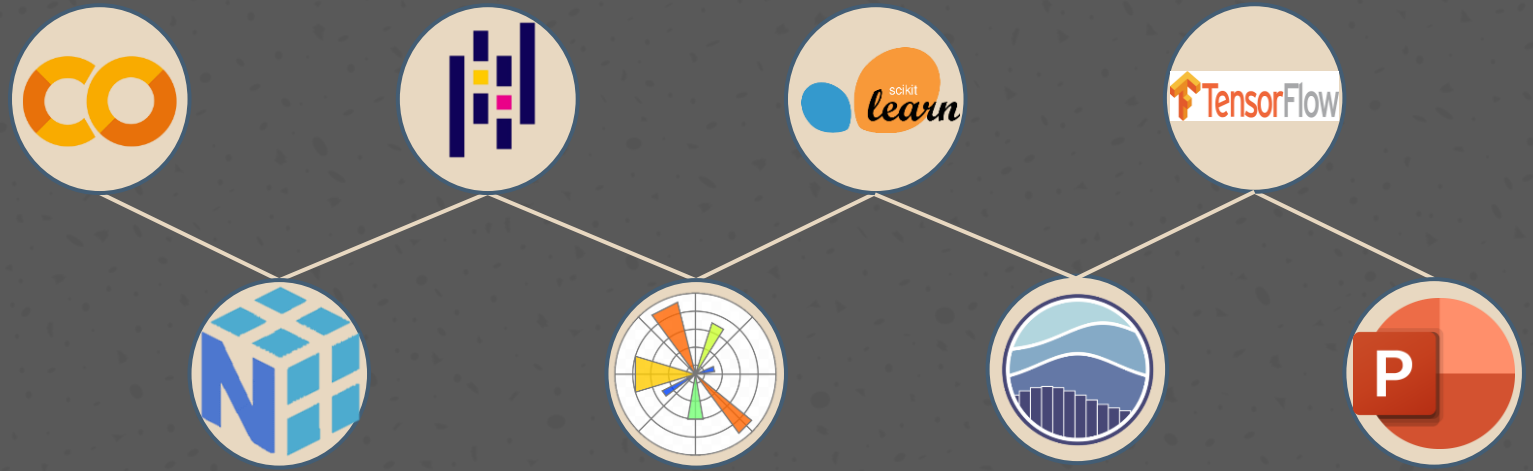
Whereas Sequential model outperformed by accuracy of 96% and VGG16 outperformed other models by accuracy of 98% that showes us in train we've had a good results but not in test.

## Future Work

- ✓ Improve the classification accuracy of all the models.
- ✓ Classify other lung diseases.
- ✓ Create an application to detect all lung diseases.

# Tools

Here are the tools we used in this project




Thank you for your attention.
Any questions?