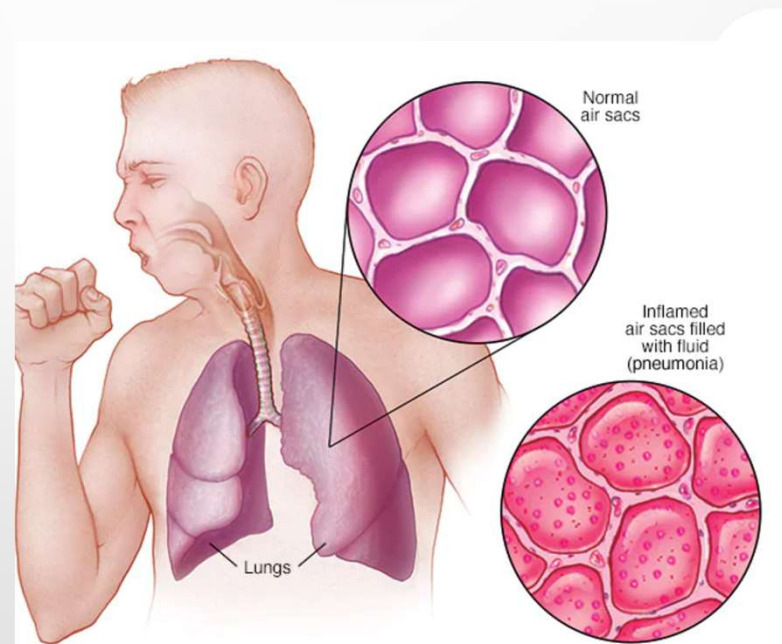# Pneumonia Detection

TENSORFLOW & KERAS

By Leticia Drasler
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What is Pneumonia?

Pneumonia is a common lung infection caused by bacteria, a virus, or fungi. It is often spread via coughing, sneezing, touching or even breathing, and those who don't exhibit symptoms can also spread the illness. It may resemble common cold and flu symptoms.

- The symptoms may include:

- Fever;

- Difficulty breathing;

- Chest pain;

- Cough.

Summary

In this project we will use Keras inside TensorFlow to build an algorithm that will help us to make predictions whether or not a person has pneumonia based on x-ray images.
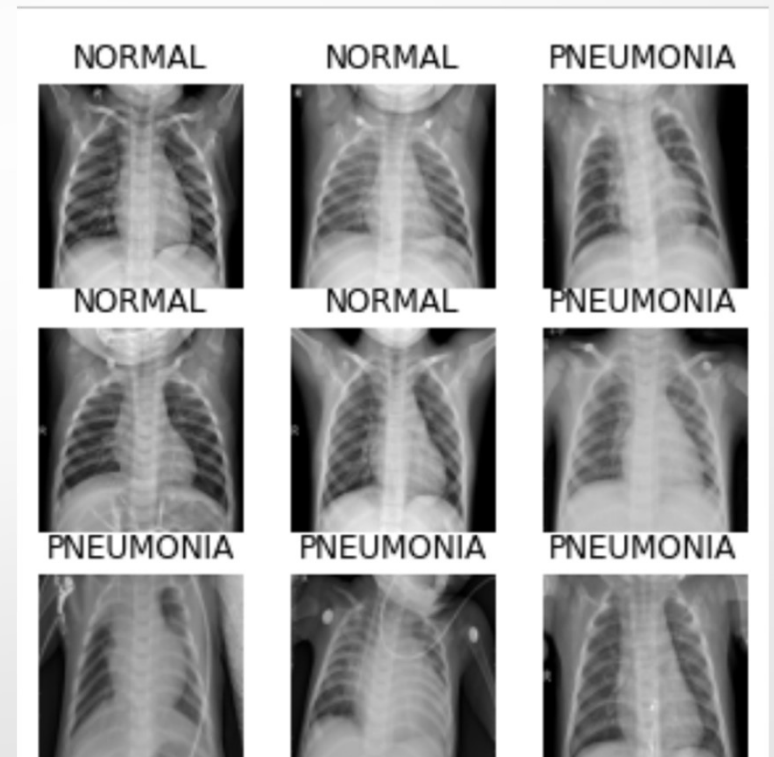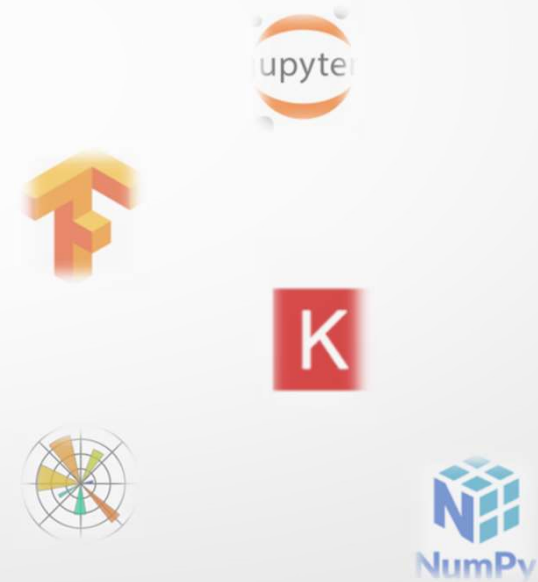
DATA

Dataset provided by Kaggle.

It is free and you can have access to it, here:

https://www.kaggle.com/paultimothymooney/chest-xray-pneumonia

- These data include 3 file folders belonging to 2 classes.

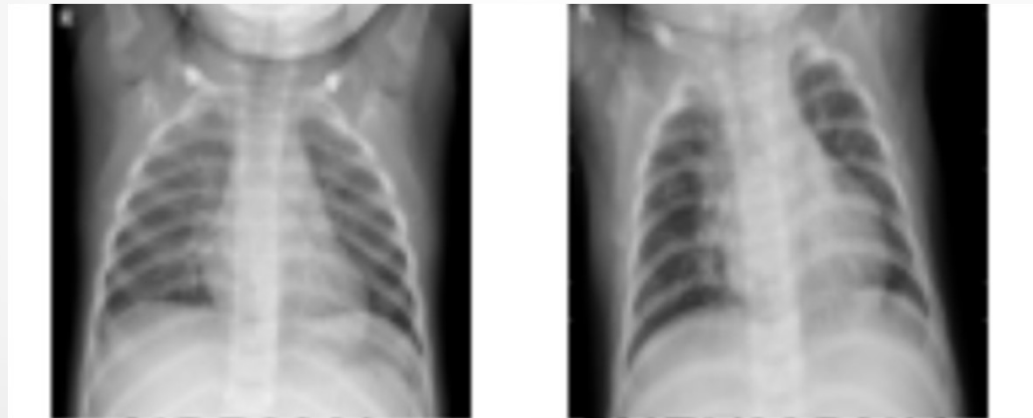 2 types of x-ray images defined as "NORMAL" AND "PNEUMONIA".

Environment and tools

- Jupyter Notebook;
- TensorFlow;
- Keras;
- Numpy;
- Matplotlib;
- Lime.

Challenge

As you can see, it is hard to distinguish the condition by looking at it.
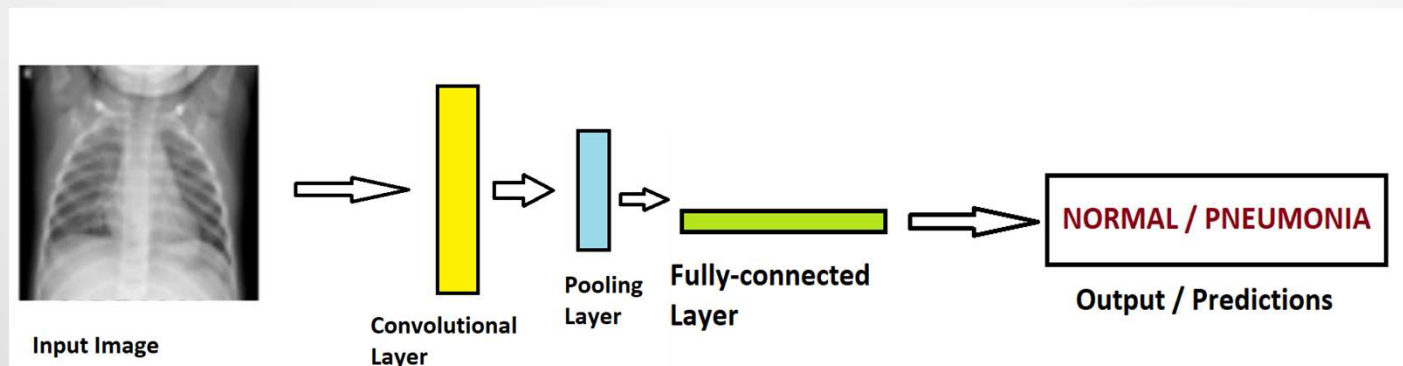

Which one of these images should be classified as "Normal" and which one as "Pneumonia"?

Image Classification Model

Applying Convolutional Neural Network (CNN)

- Convolutional Layers
- Pooling Layer
- Fully Connected
- Output

Image Classification Model

- Our model will find features starting with simple and moving to more complex features in deeper layers of the model.
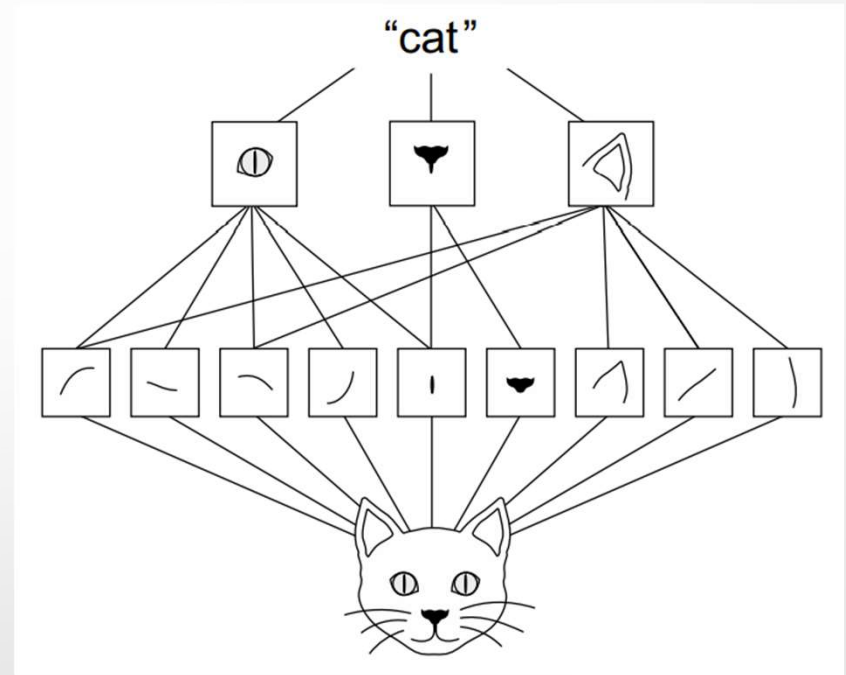

Figure 1. Book: Deep Learning with Python Francois Chollet; 2017.

Image Classification Model

Single filter:
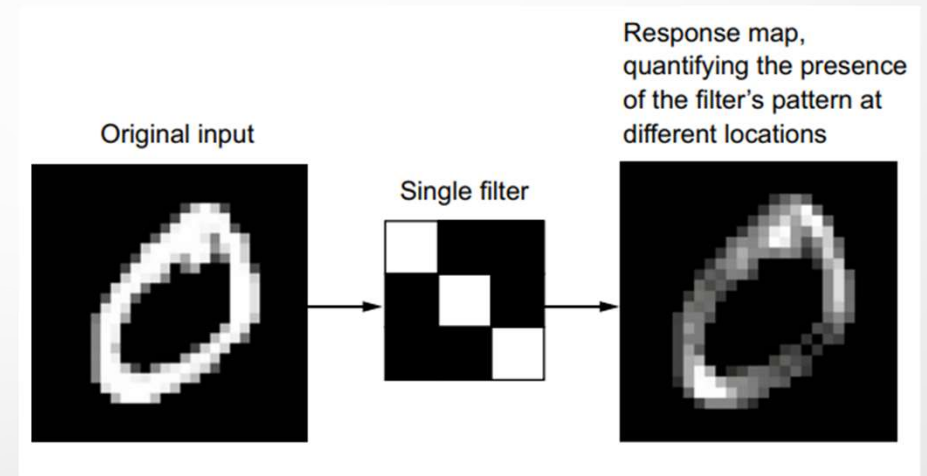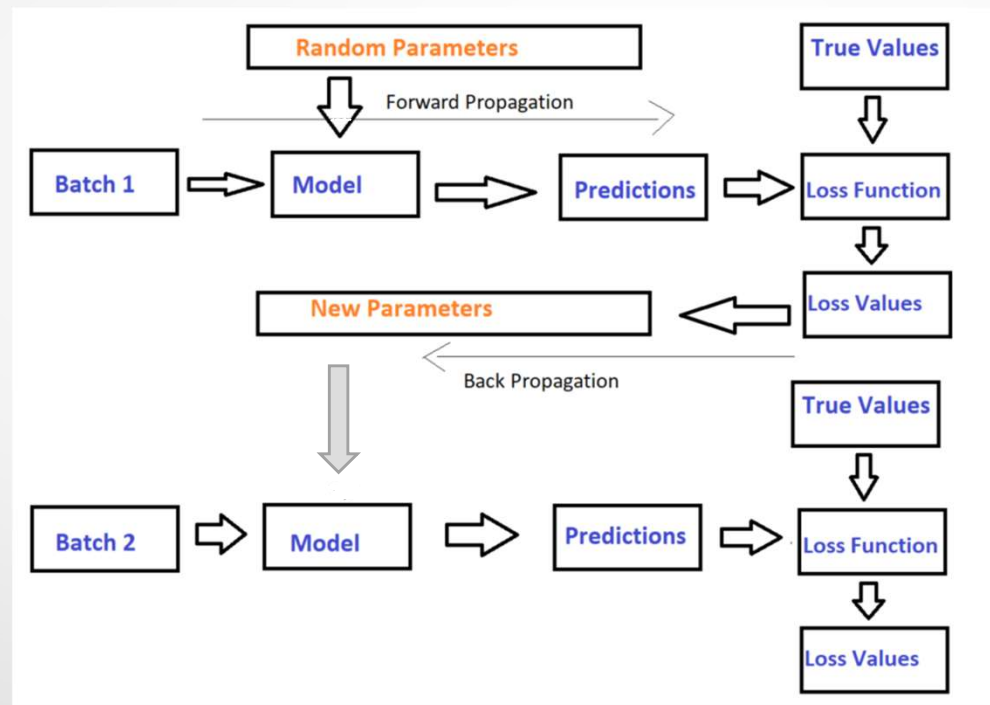Matching simple features.

Figure 2. Book: Deep Learning with Python
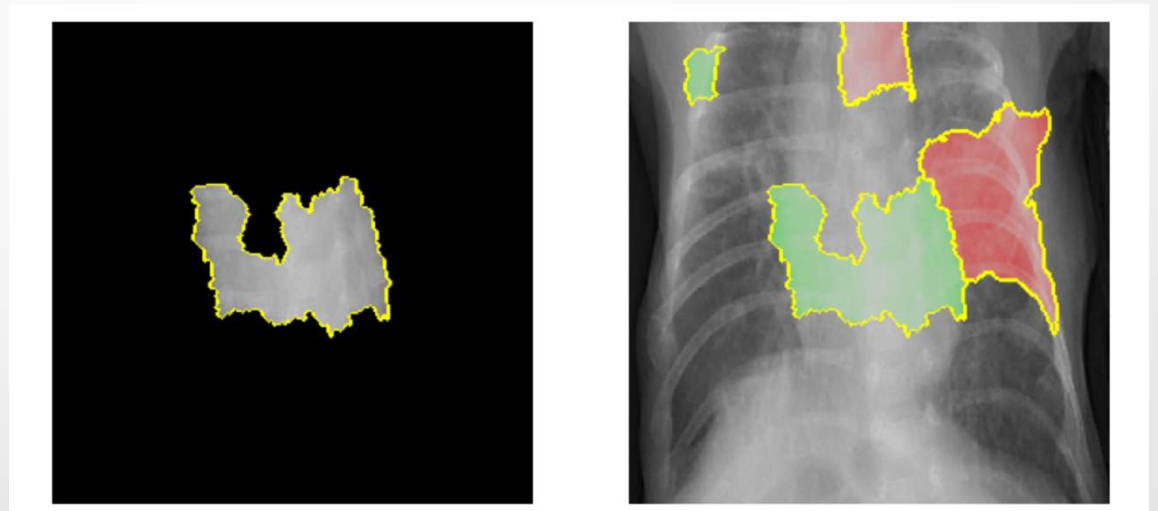
Francois Chollet; 2017.

Deep Learning Algorithm

Lime Package

local interpretable model-agnostic explanations

- I used the Lime package to have a better understand how the model is determining the class based on the image regions.

Lime

- The green region is indicating a vote for pneumonia
- The red region indicates evidence for normal condition.
- The model will measure both parts and it will predict the condition based on the relative weight of the classes.
- The example below pointed to PNEUMONIA.
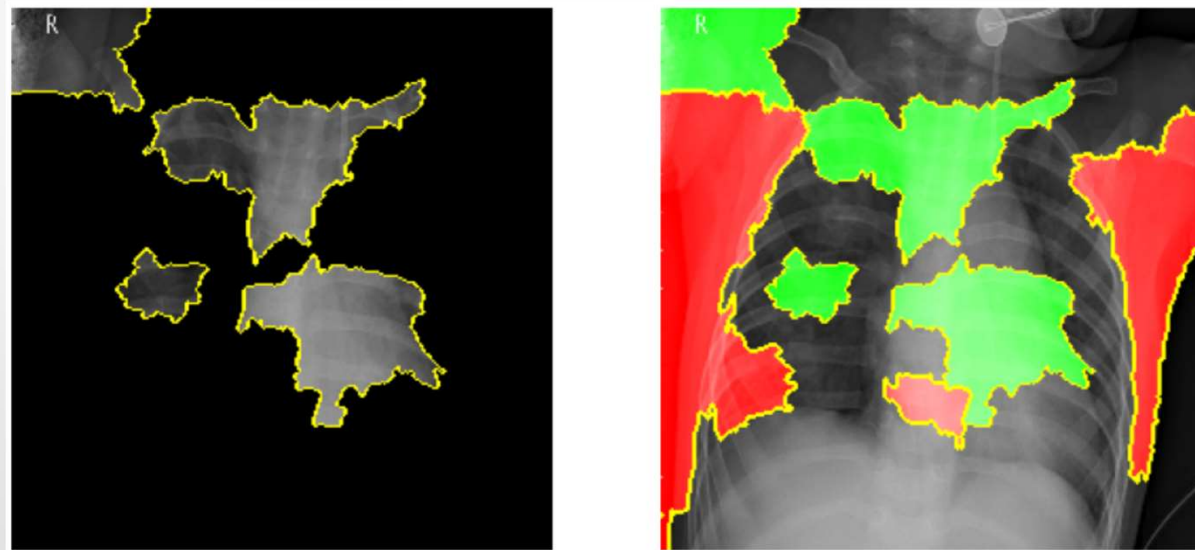
FINAL RESULTS

Convolutional Neural Network

We achieved a model accuracy of 90% using our test images. This an optimistic finding for the prediction of pneumonia using a convolutional neural network.

Thank you!!!!

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