Detecting Pneumonia via X-Rays

Image Classification with Deep Learning

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01

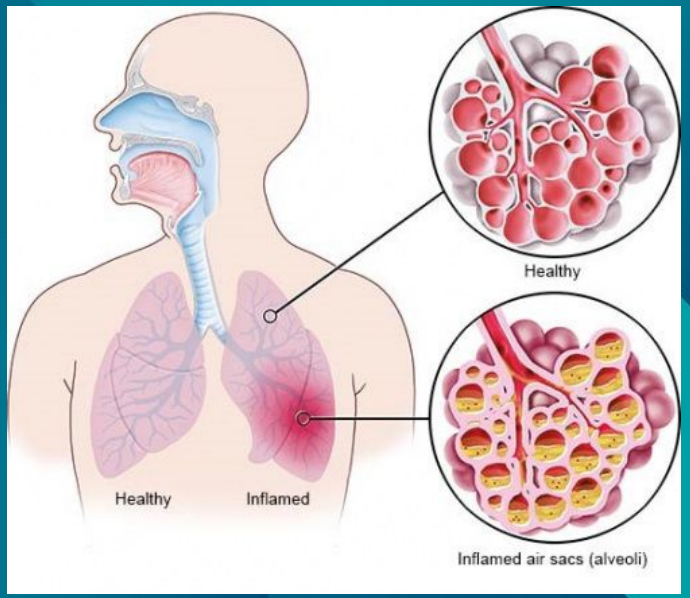
THE PROBLEM

Pneumonia - Overview

Pneumonia is the single largest cause of death in children worldwide.[1]

Every year, it kills an estimated 1.4 million children under the age of five years, accounting for 18% of all deaths of children under five years old worldwide.[1]

Almost all of these deaths are preventable, and early detection can save lives.



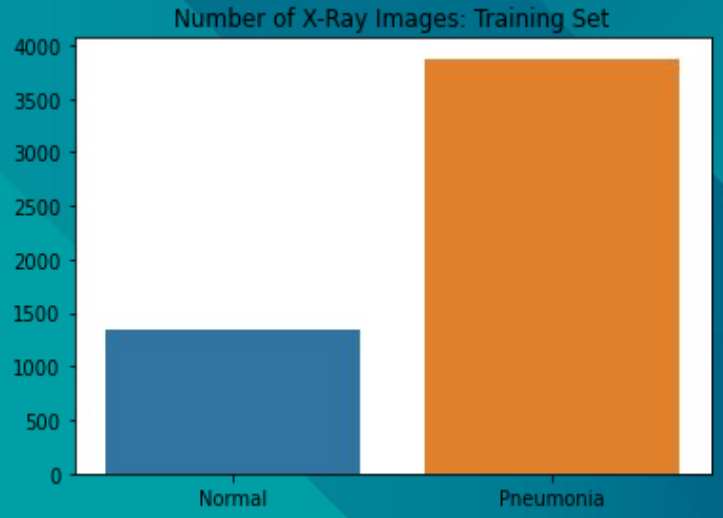
[1]https://www.who.int/maternal_child_adolescent/news_events/news/2011/pneumonia/en/

02

DATA OVERVIEW

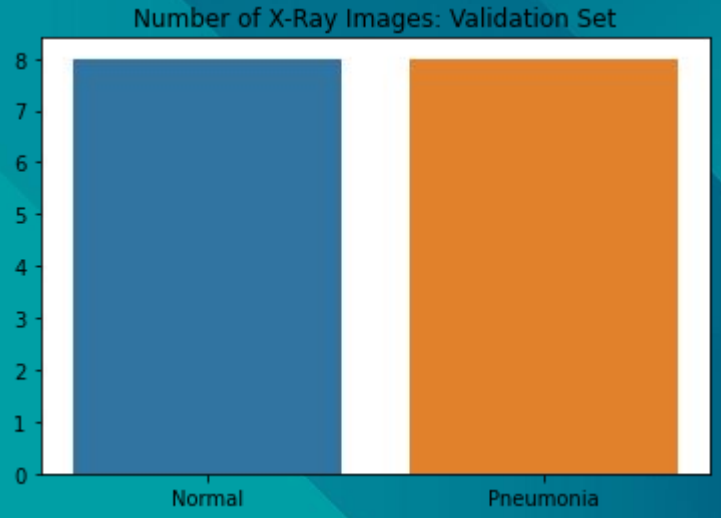
Data - Overview

X-ray images from pediatric patients from 1 - 5 years old from China. X-rays were graded by two expert physicians, and checked by a third expert.



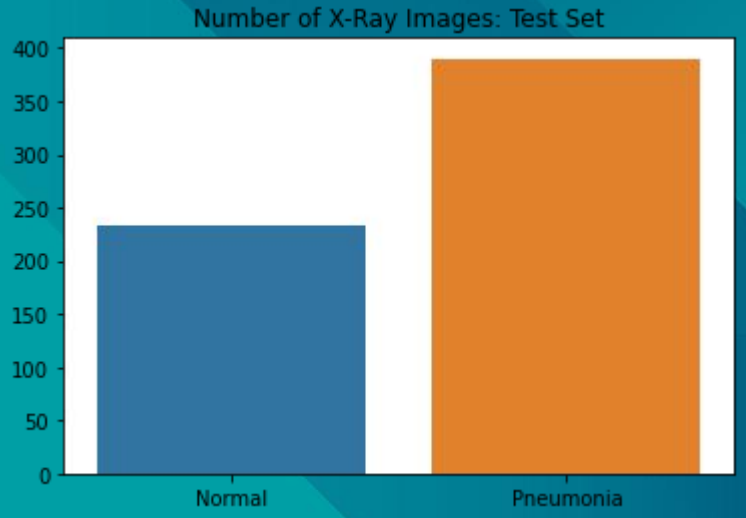
1,341 normal training images
3,875 pneumonia training images

Data - Overview



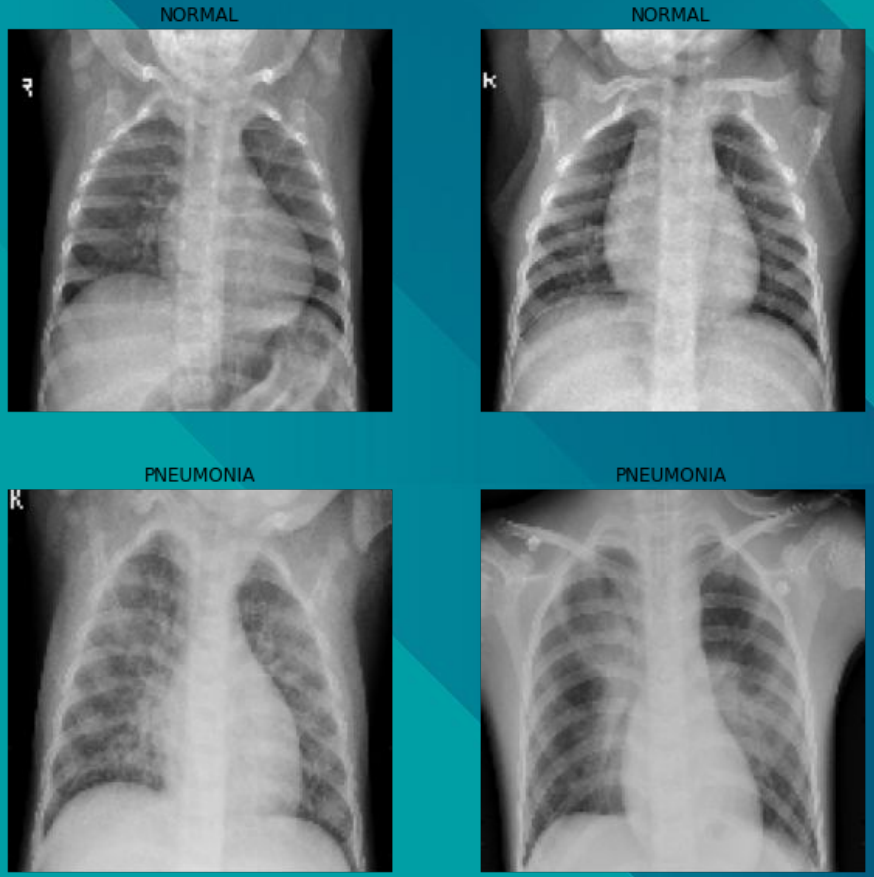
8 normal validation images
8 pneumonia validation images

Data - Overview



234 normal test images
290 pneumonia test images

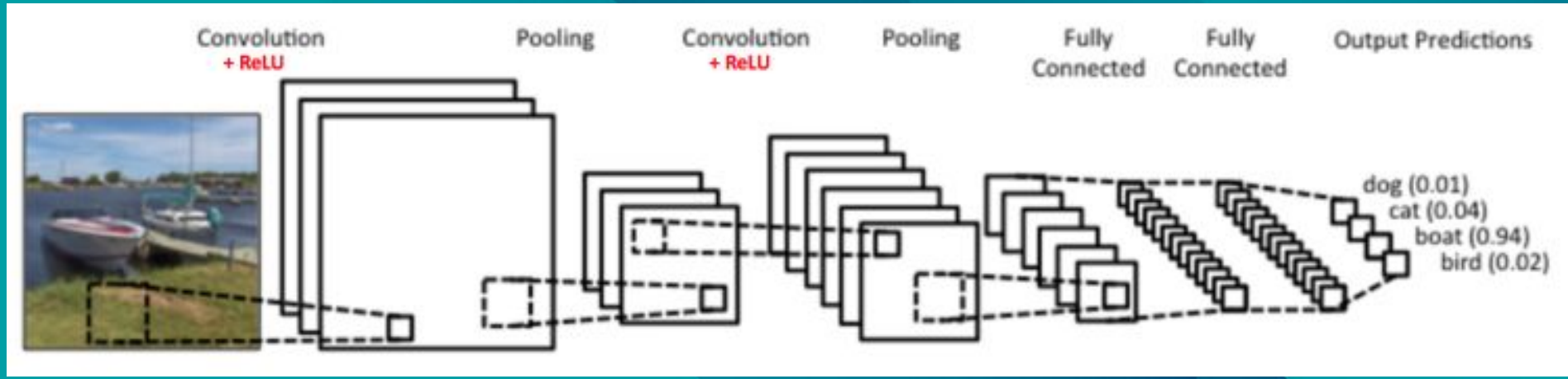
Data - Overview



03

MODELING

Modeling


Convolution
+ ReLU
Pooling
Convolution
+ ReLU
Pooling
Fully
Connected
Fully
Connected
Output Predictions
dog (0.01)
cat (0.04)
boat (0.94)
bird (0.02)

Modeling Part 2

Final Output: Pneumonia or Normal?

- Baseline Model had 62.5% accuracy
- Best performing model was LeNet-5 with 79% accuracy (with still lots of room for improvement but more time is needed to do so)

04

NEXT STEPS

Next Steps- Further Analysis

- Test out additional CNN architectures (there's at least 8 other architectures we didn't get the chance to test)
- More experiments with regularization on existing models
- Additional data (especially normal X-Rays)
- Pneumonia X-Rays for other age groups

THANKS

Do you have any questions?
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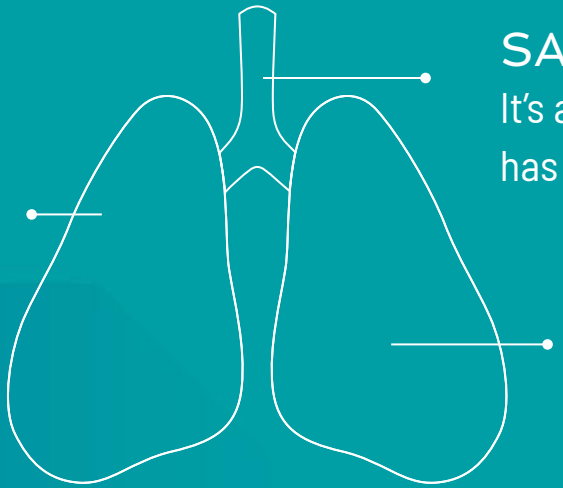
PHYSICAL EXAMINATION

MARS

Despite being red, Mars is a cold place



SATURN

It's a gas giant and has several rings

JUPITER

Jupiter is a gas giant and the biggest planet