Chest X-Ray analysis to predict presence of Lung Pathologies

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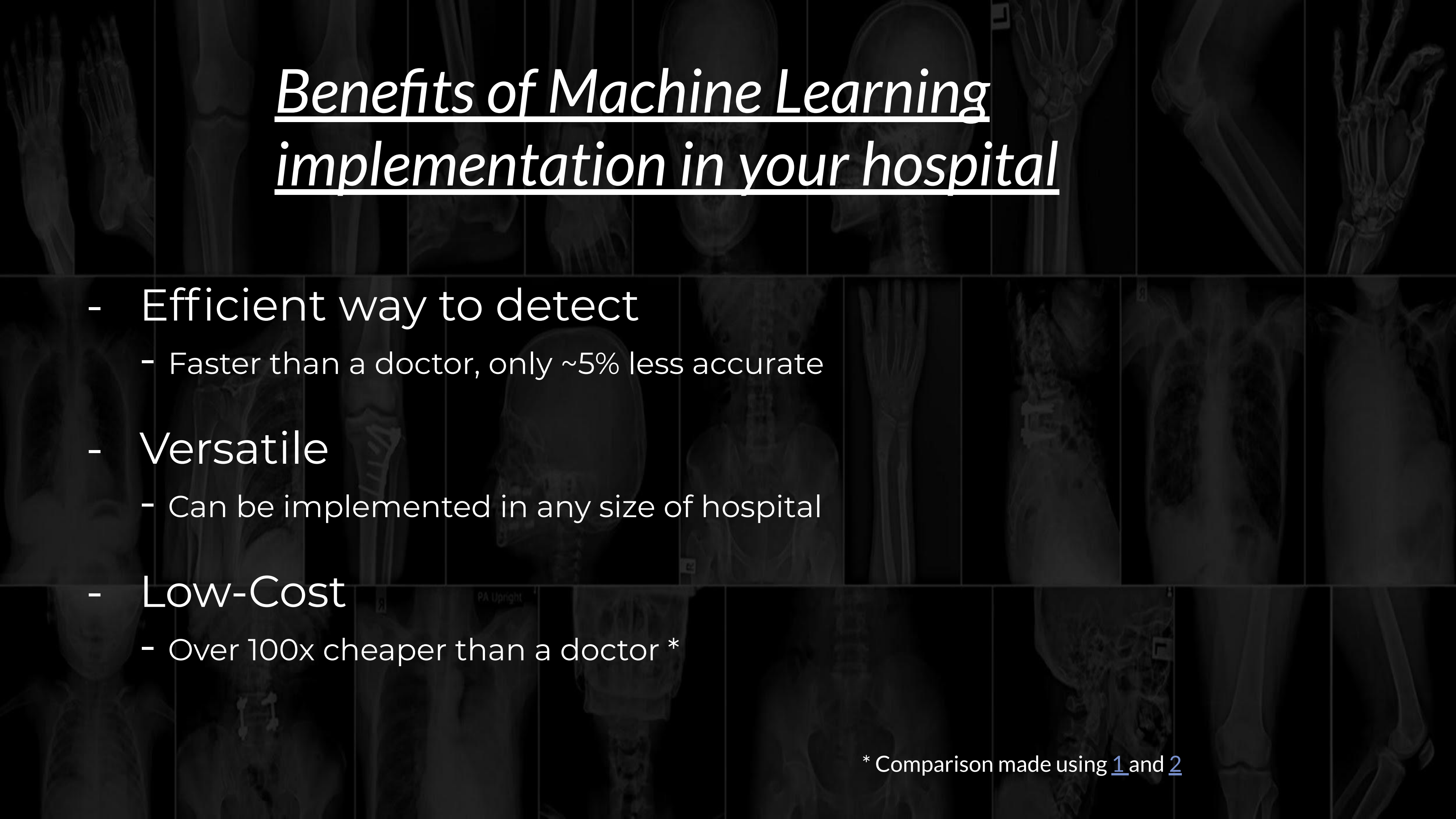
Who are you?

- Politician in a developing country
  - Main focus
- Managing function in a hospital
  - Independent of the size
- Someone from another area exploring the possibility of image classification
  - The image classification can be applied to several areas



Benefits of Machine Learning implementation in your hospital

- Efficient way to detect
  - Faster than a doctor, only ~5% less accurate
- Versatile
  - Can be implemented in any size of hospital
- Low-Cost
  - Over 100x cheaper than a doctor *

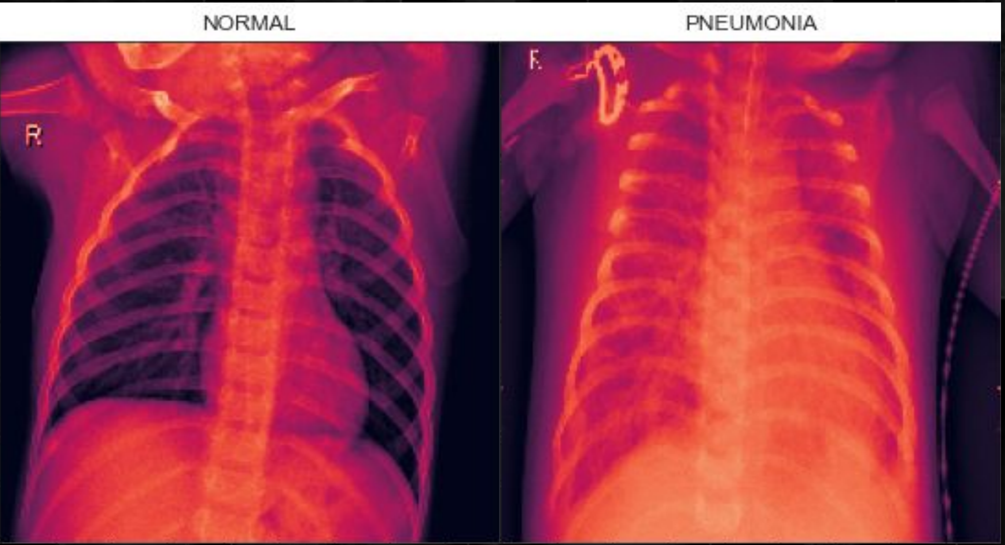
* Comparison made using 1 and 2

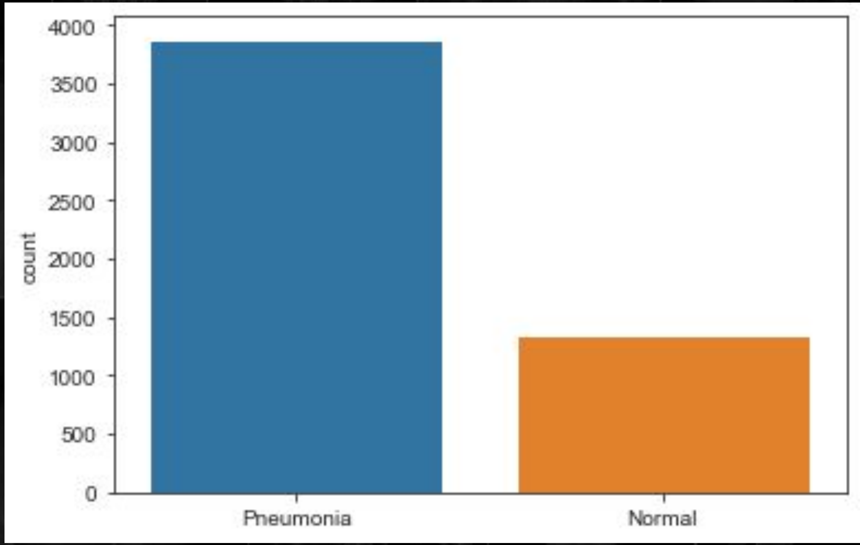
The Data

About 6000 X-ray images from kids ranging between 1 and 5 years old from Guangzhou(广州) Women and Children’s Medical Center

Sourced from Cell

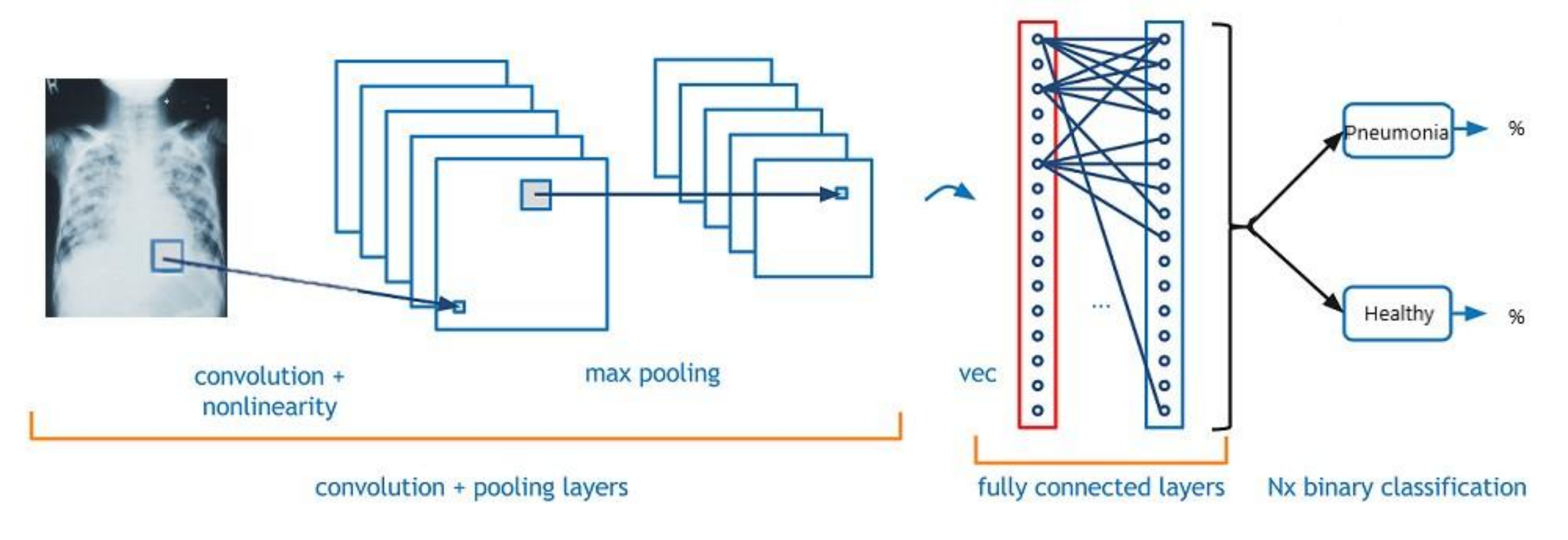
MENDELEY



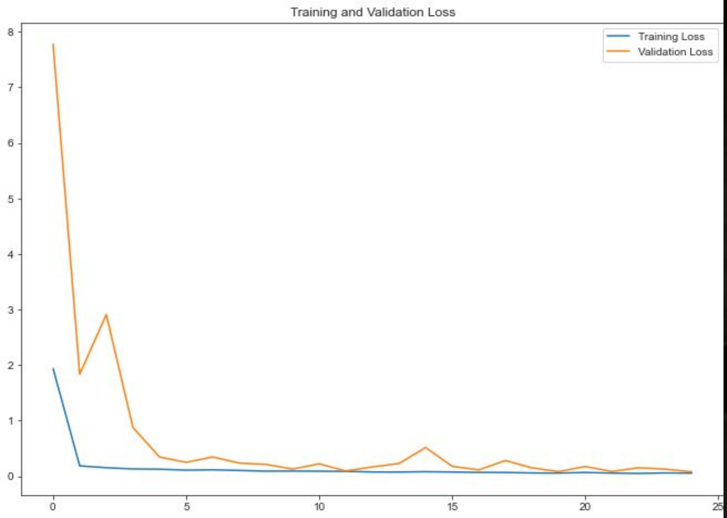


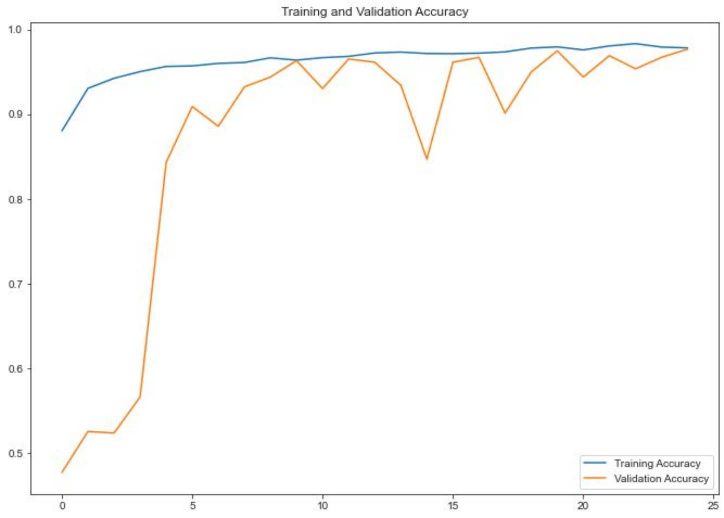
How to detect pneumonia from images?

- CNN!



Final Model





First Model:
Loss : 0.7252
Recall : 0.8293

Final Model:
Loss: 0.2129
71% improvement

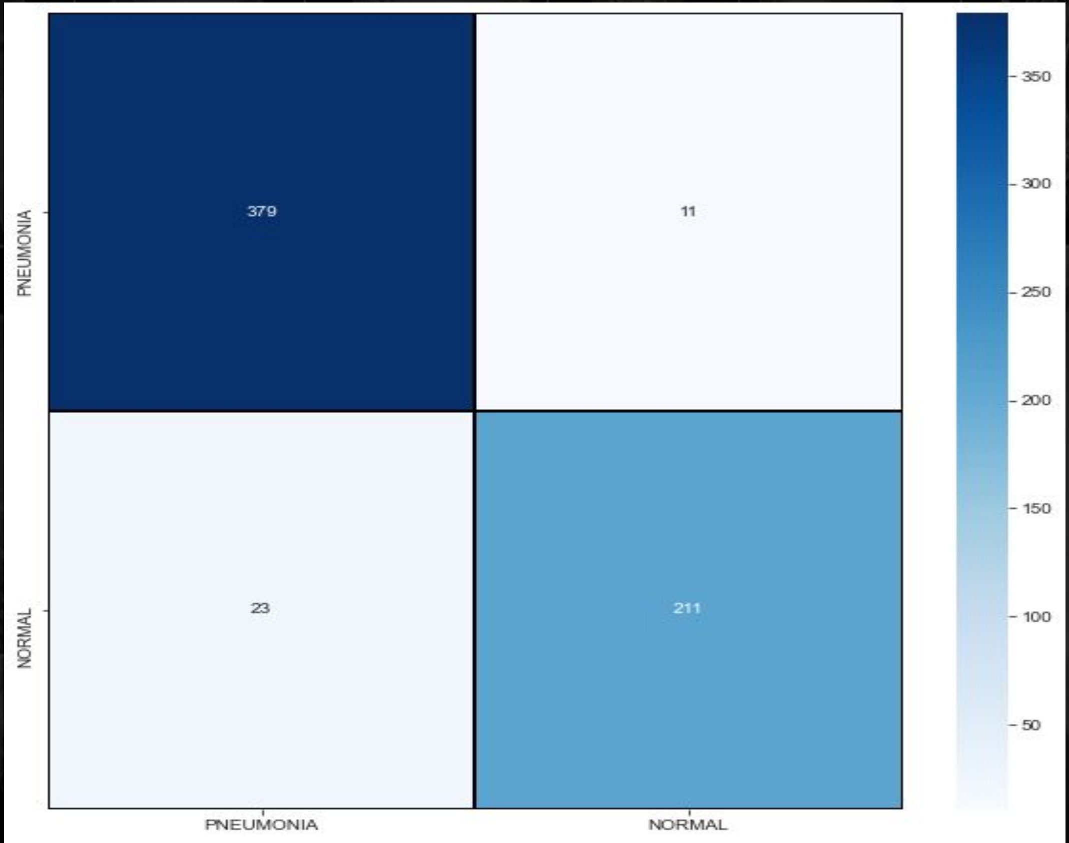
Recall: 0.9593
16% improvement

Confusion Matrix

And our room for improvement

True Positive : 61.7%
True Negative : 33.8%

False Positive : 3.8%
False Negative : 1.7%



Conclusion:

- *Development of reliable model*
- *Efficiency is key!*
- *A tool to increase hospital workflow and productivity*

Thank You!!!

Questions?

Appendix

github.com/ChristosMaglaras

christos-maglaras.medium.com/

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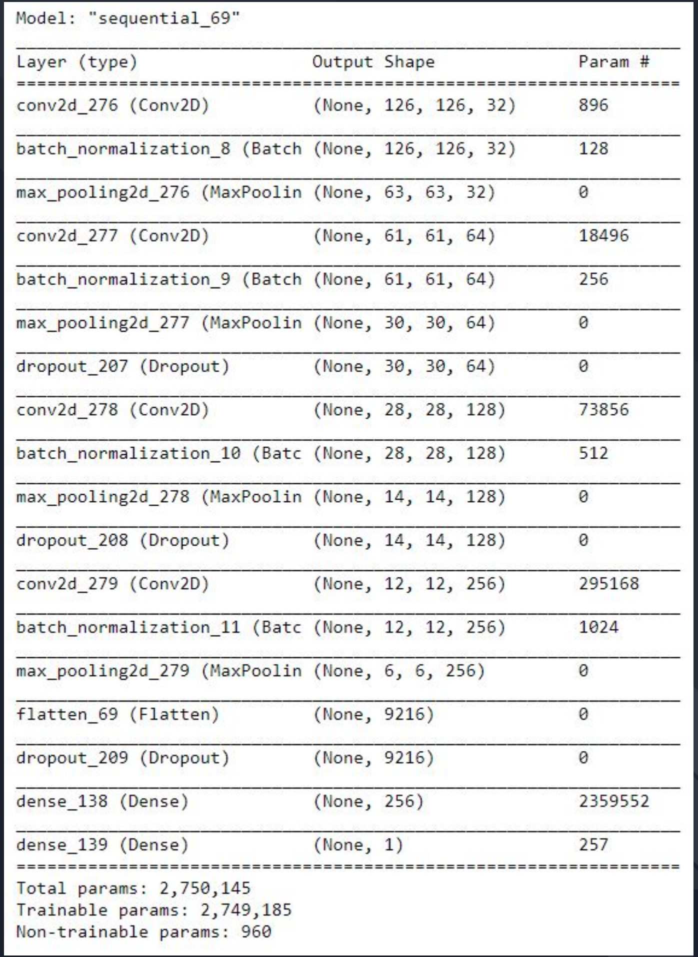

```
Model: "sequential_69"
_________________________________________________________________
Layer (type)                 Output Shape              Param #
=================================================================
conv2d_276 (Conv2D)          (None, 126, 126, 32)      896
_________________________________________________________________
batch_normalization_8 (Batch (None, 126, 126, 32)      128
_________________________________________________________________
max_pooling2d_276 (MaxPoolin (None, 63, 63, 32)        0
_________________________________________________________________
conv2d_277 (Conv2D)          (None, 61, 61, 64)        18496
_________________________________________________________________
batch_normalization_9 (Batch (None, 61, 61, 64)        256
_________________________________________________________________
max_pooling2d_277 (MaxPoolin (None, 30, 30, 64)        0
_________________________________________________________________
dropout_207 (Dropout)        (None, 30, 30, 64)        0
_________________________________________________________________
conv2d_278 (Conv2D)          (None, 28, 28, 128)       73856
_________________________________________________________________
batch_normalization_10 (Batc (None, 28, 28, 128)       512
_________________________________________________________________
max_pooling2d_278 (MaxPoolin (None, 14, 14, 128)       0
_________________________________________________________________
dropout_208 (Dropout)        (None, 14, 14, 128)       0
_________________________________________________________________
conv2d_279 (Conv2D)          (None, 12, 12, 256)       295168
_________________________________________________________________
batch_normalization_11 (Batc (None, 12, 12, 256)       1024
_________________________________________________________________
max_pooling2d_279 (MaxPoolin (None, 6, 6, 256)         0
_________________________________________________________________
flatten_69 (Flatten)         (None, 9216)              0
_________________________________________________________________
dropout_209 (Dropout)        (None, 9216)              0
_________________________________________________________________
dense_138 (Dense)            (None, 256)               2359552
_________________________________________________________________
dense_139 (Dense)            (None, 1)                 257
=================================================================
Total params: 2,750,145
Trainable params: 2,749,185
Non-trainable params: 960
```