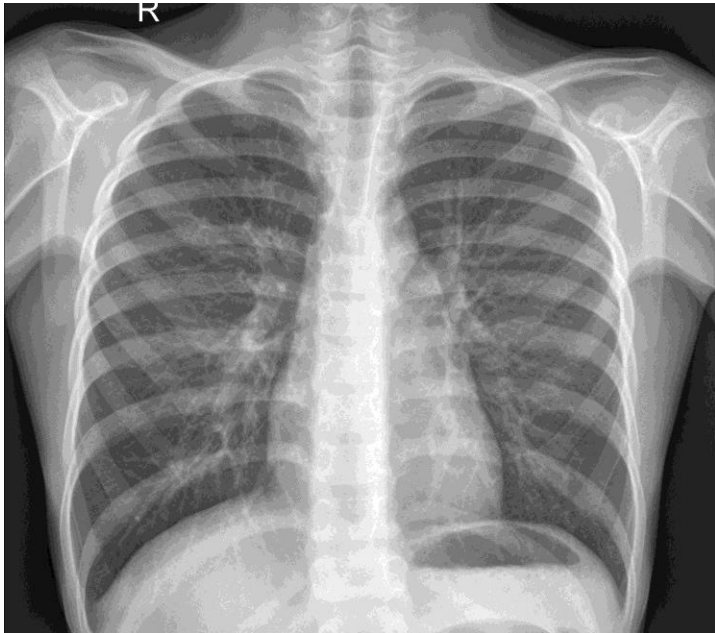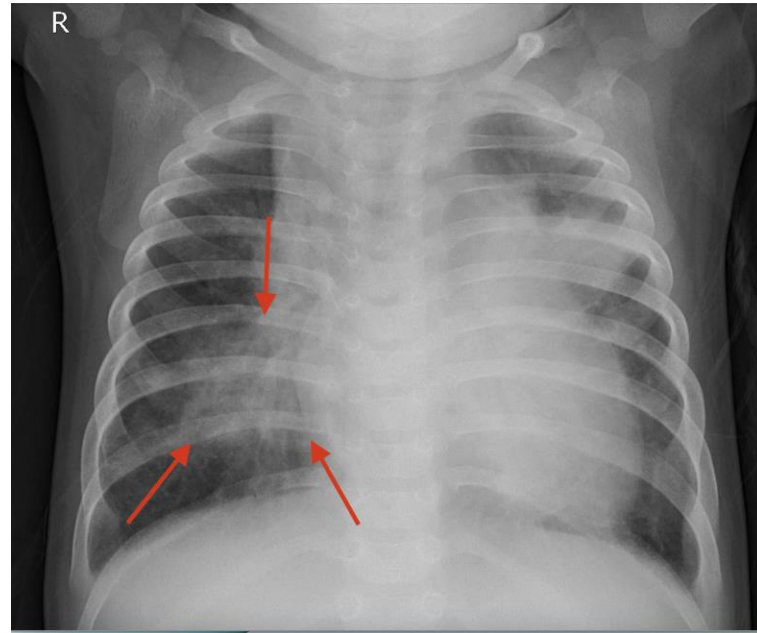TÉCNICO LISBOA

Pneumonia Detection using X-Ray Images

Malin Rekdal   107929
Dennis Marinissen   107693
Siri Westgård Rusten   107899
Mina Mangseth Svorkmo   107882

Introduction
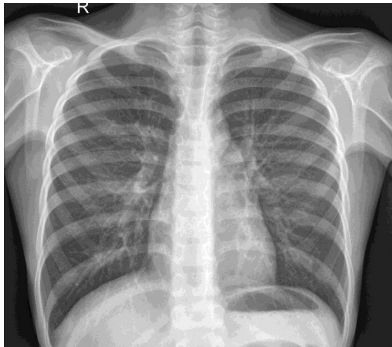

Normal chest

Bacterial pneumonia

Viral pneumonia

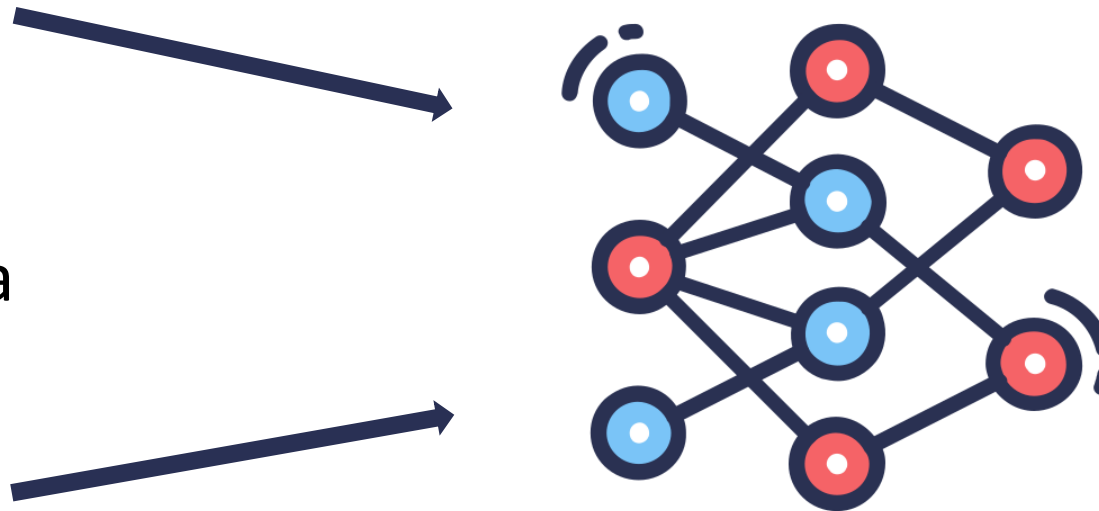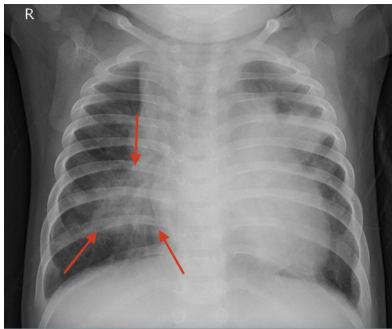Why is pneumonia detection important?

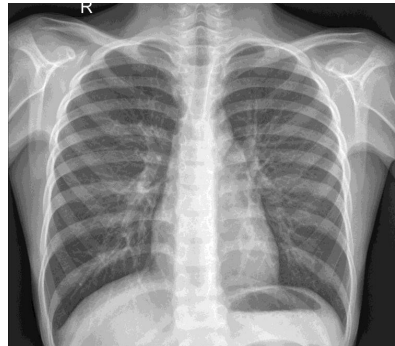# How is the problem addressed? Model Training

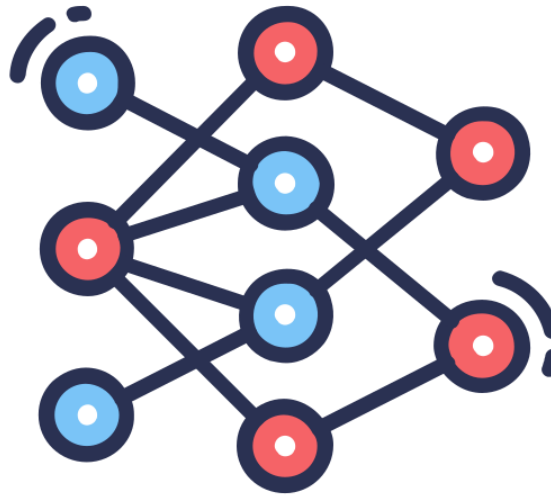Label: Healthy

Label: Pneumonia

How is the problem addressed? Model Inference

input

classification model

class prediction

image

normal

pneumonia

Existing approaches

Convolutional Neural Networks [11, 10]

Transfer Learning ResNet [1, 5], DenseNet [7, 8], AlexNet [3] & VGG-16 [9]

Data Augmentation [10]

Ensemble Learning [6, 4]

One-shot Learning [2]

Existing approaches

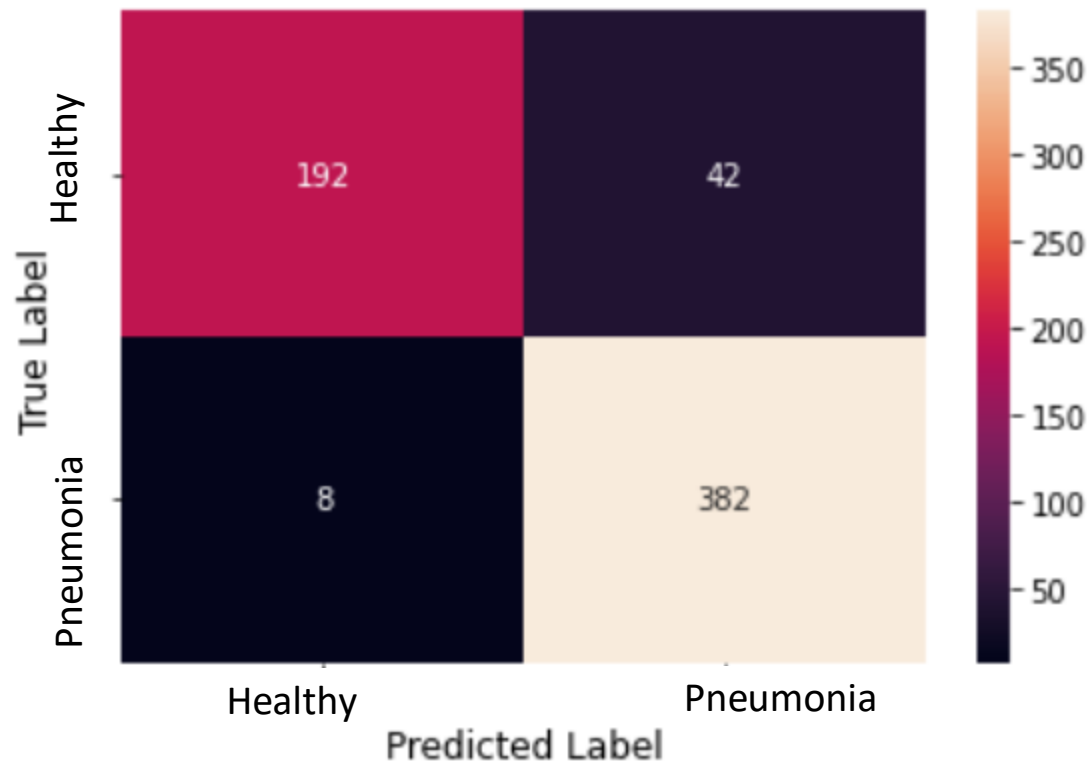Convolutional Neural Networks [11, 10]

Transfer Learning ResNet [1, 5], DenseNet [7, 8], AlexNet [3] & VGG-16 [9]

Data Augmentation [10]

Ensemble Learning [6, 4]

One-shot Learning [2]

Existing solution results [2]
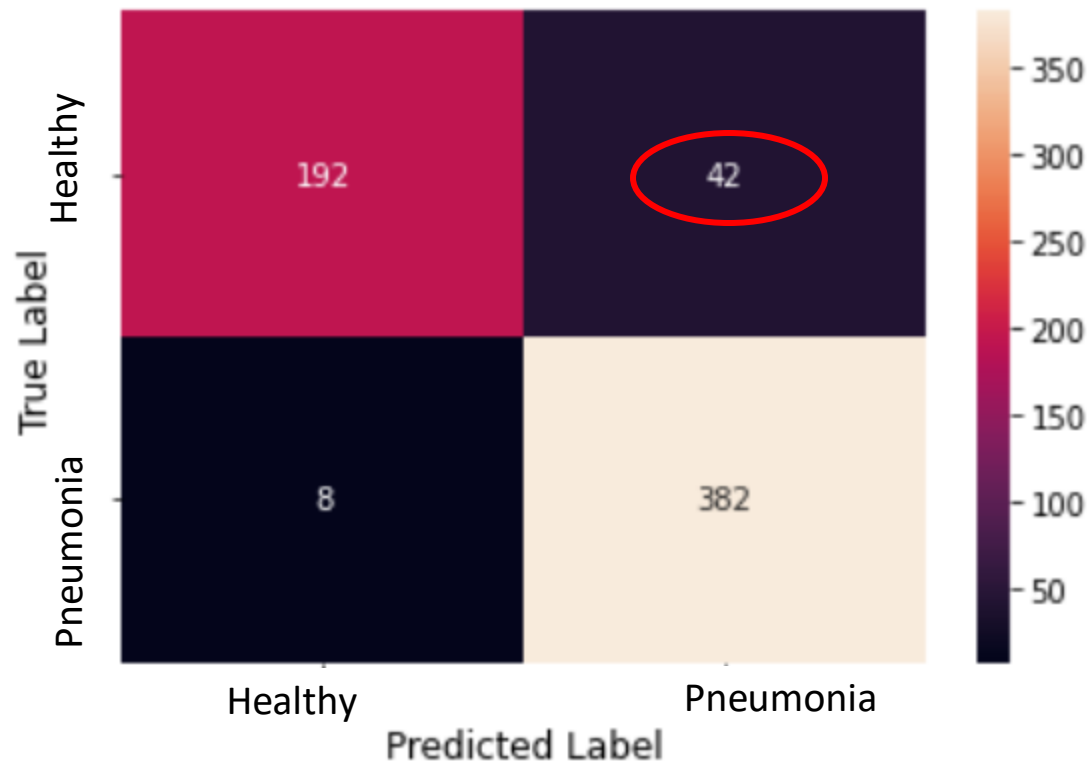

	precision	recall	f1-score	support
Healthy	0.96	0.82	0.88	234
Pneumonia	0.90	0.98	0.94	390

Accuracy: 0.92

Existing solution results [2]

	precision	recall	f1-score	support
Healthy	0.96	0.82	0.88	234
Pneumonia	0.90	0.98	0.94	390

Accuracy: 0.92

Data availability

	Healthy	Pneumonia	Total
Train set	1349	3883	**5232**
Test set	234	390	**624**
Total	**1583**	**4273**	**5856**

Training Data

Data ava

Data availability

	Healthy	Pneumonia	Total
Train set	1349	3883	**5232**
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Training Data
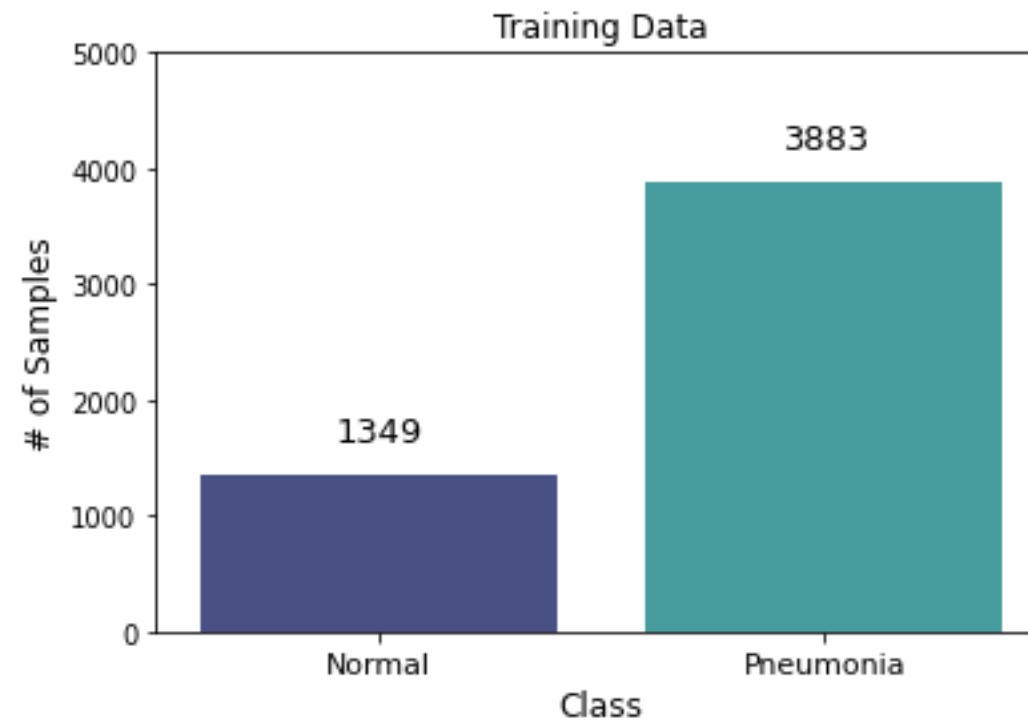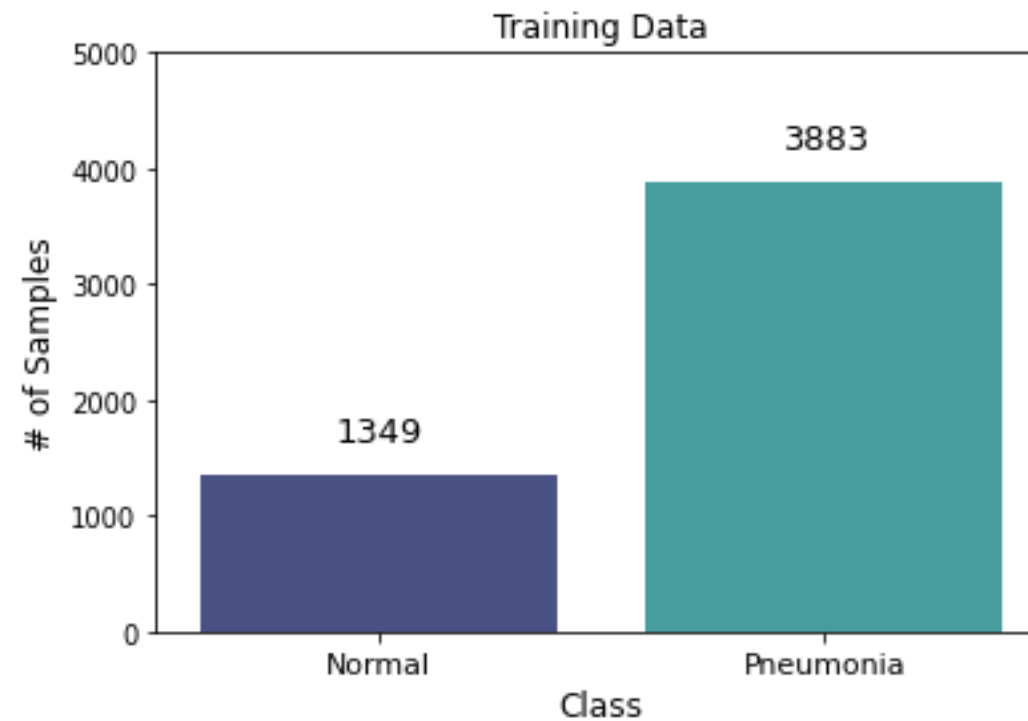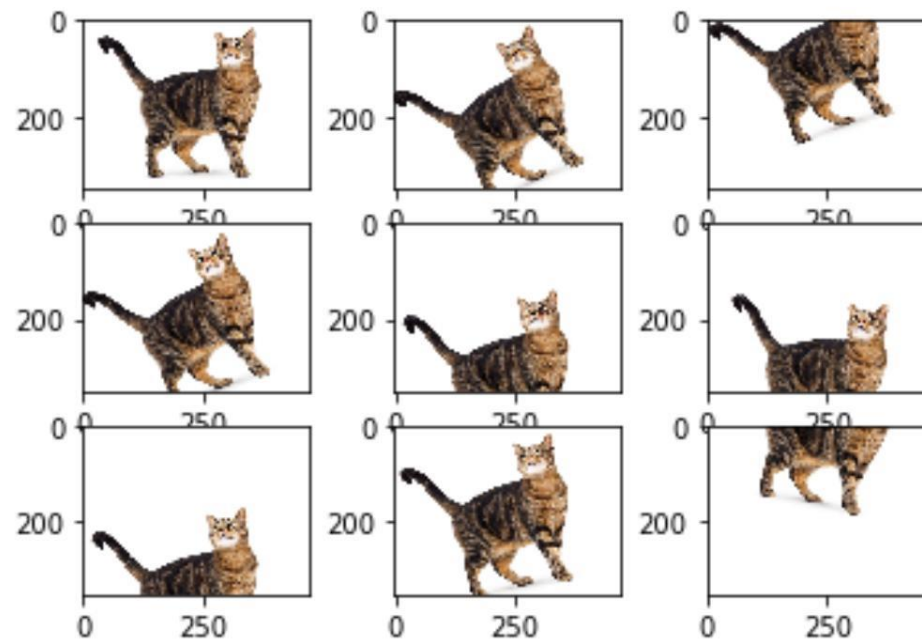
Data augmentation

Data augmentation

	Healthy	Pneumonia	Total
Train set	1349	3883	**5232**
Test set	234	390	**624**
Total	**1583**	**4273**	**5856**

	Healthy	Pneumonia	Total
Train set	3849	3883	**7732**
Test set	234	390	**624**
Total	**4083**	**4273**	**8356**

Main modules

dataset

+

generated data

Dataset Balancing

Data Augmentation

TRAIN

Pre-trained
DenseNet201
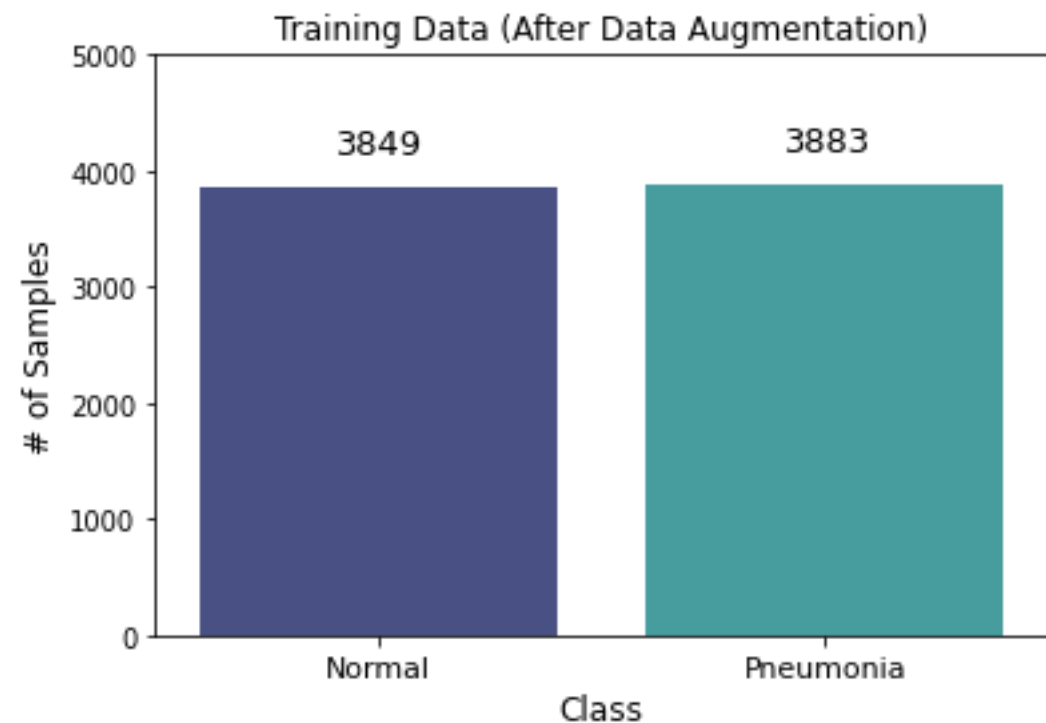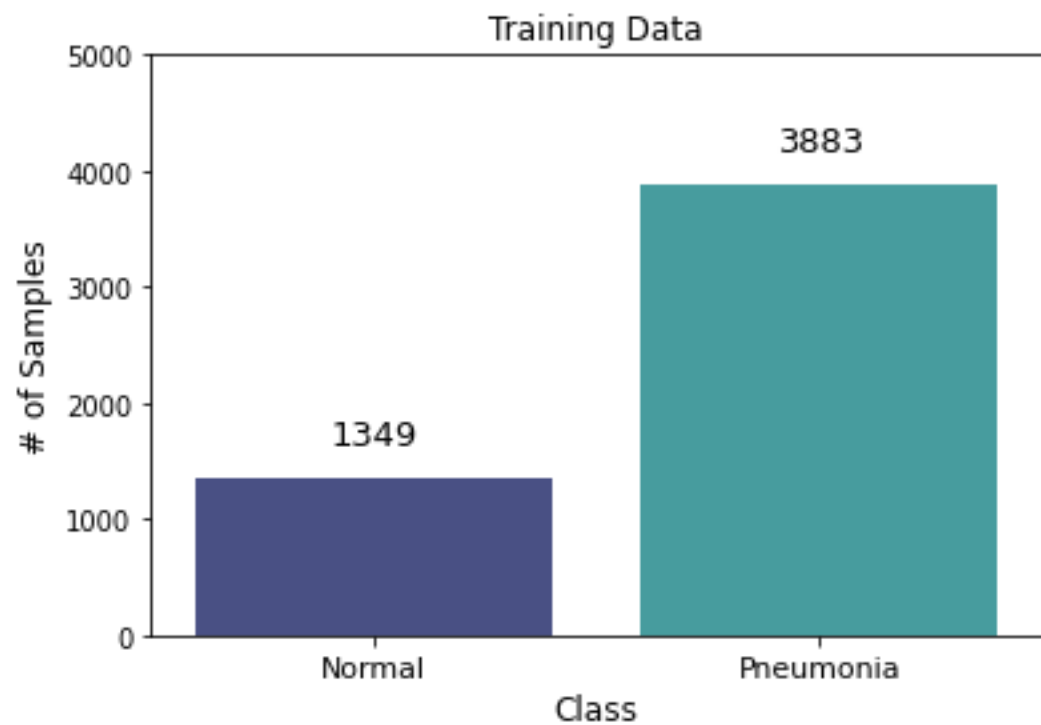
Pneumonia
detection model
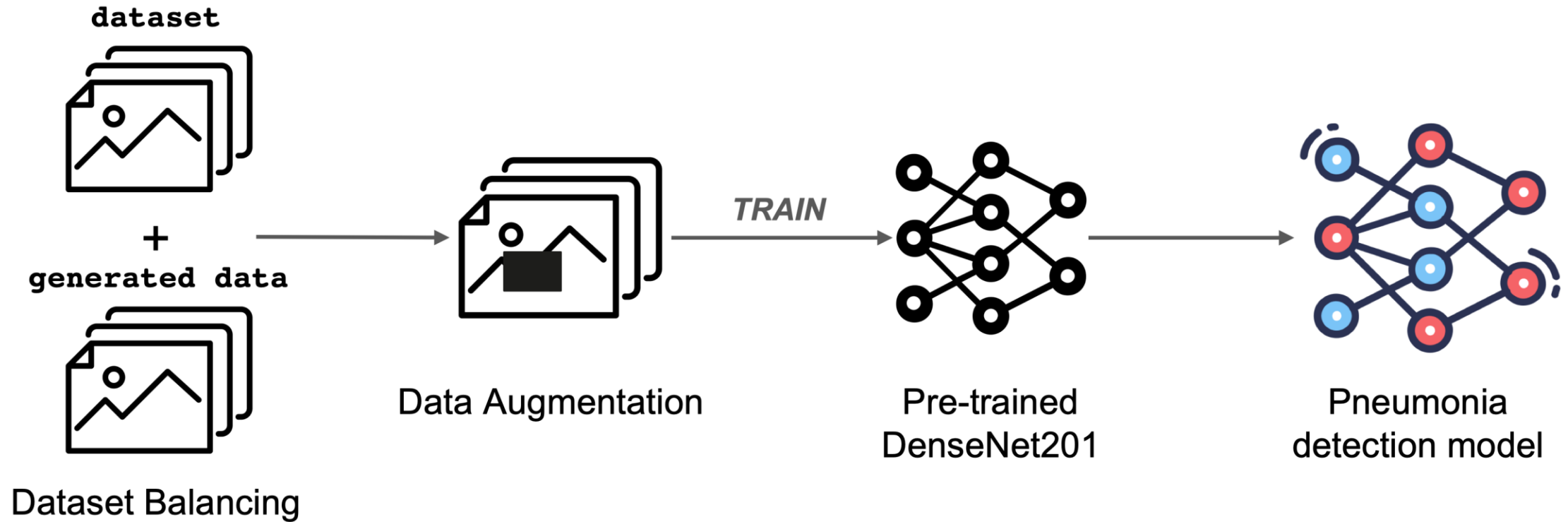
The architecture used

Existing solution results [2]
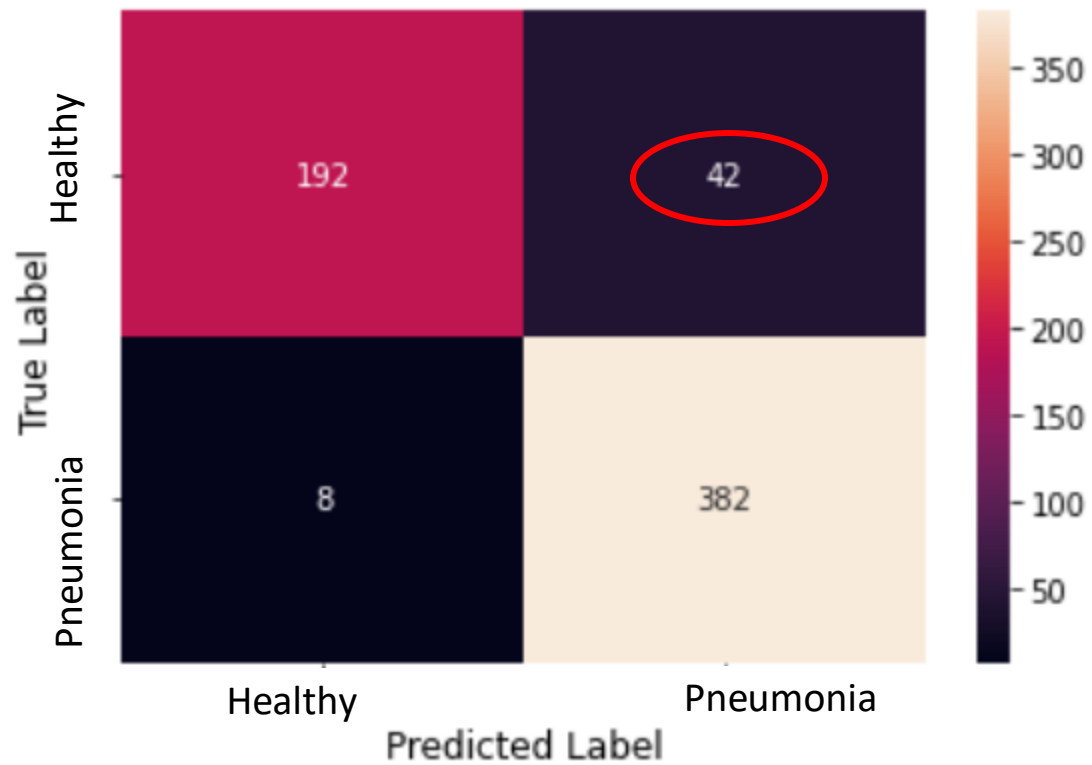
	precision	recall	f1-score	support
Healthy	0.96	0.82	0.88	234
Pneumonia	0.90	0.98	0.94	390

Accuracy: 0.92

Results
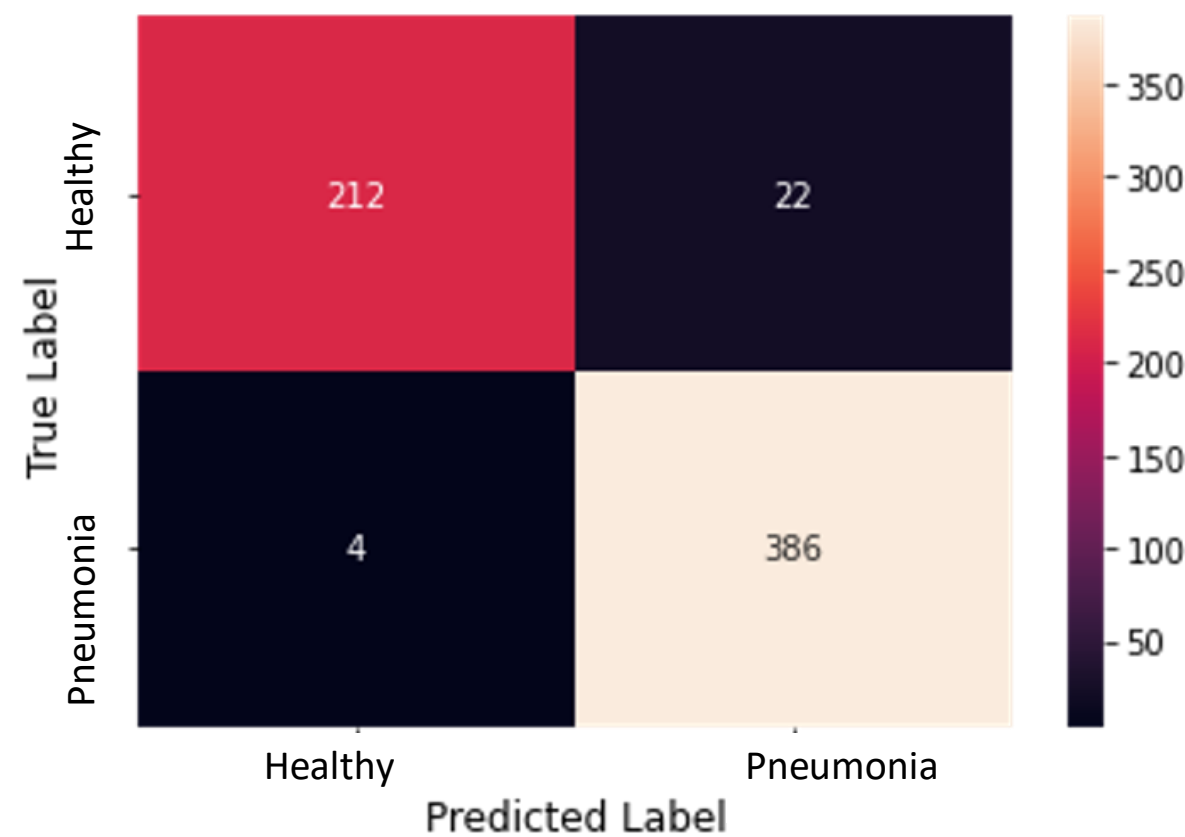
	Precision	Recall	F1-score	Support
Healthy	0.98	0.91	0.94	234
Pneumonia	0.95	0.99	0.97	390

Accuracy: 0.96

Results
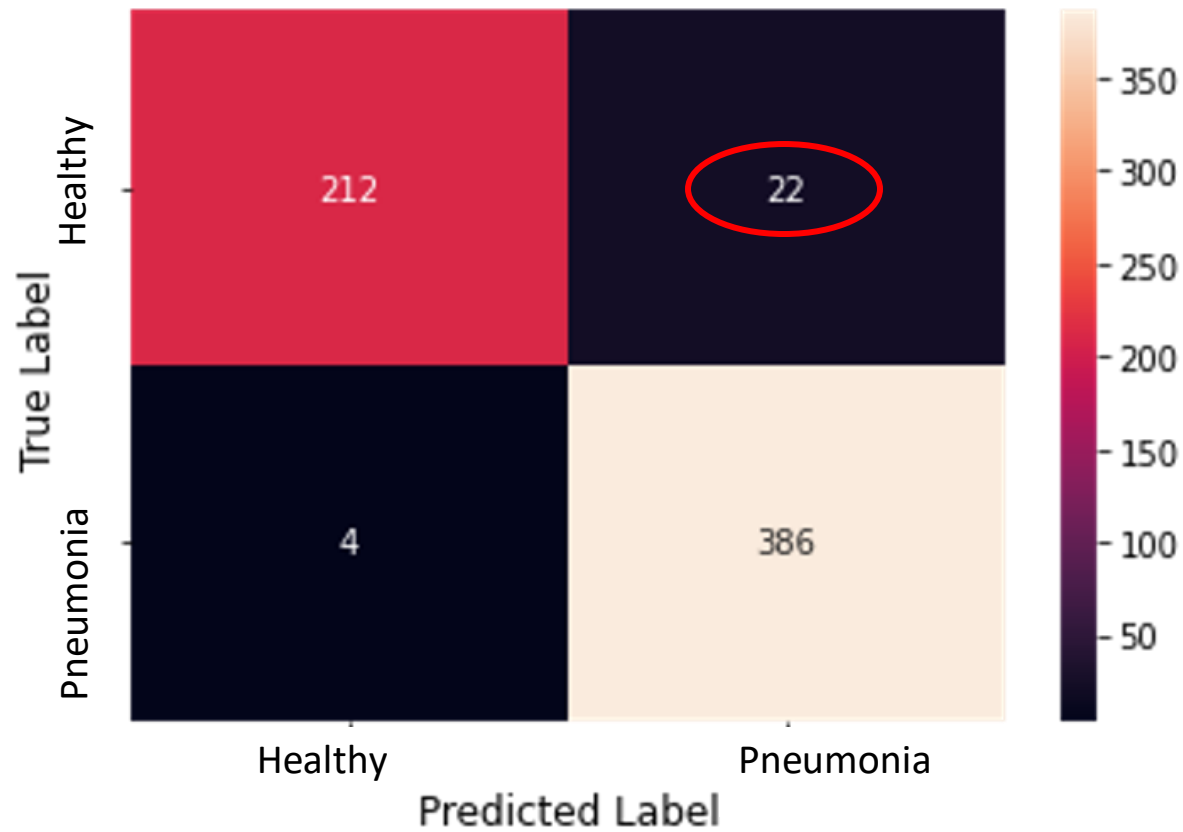
	Precision	Recall	F1-score	Support
Healthy	0.98	0.91	0.94	234
Pneumonia	0.95	0.99	0.97	390

Accuracy: 0.96

3883

1349

Normal   Pneumonia

↓

3849   3883

Normal   Pneumonia
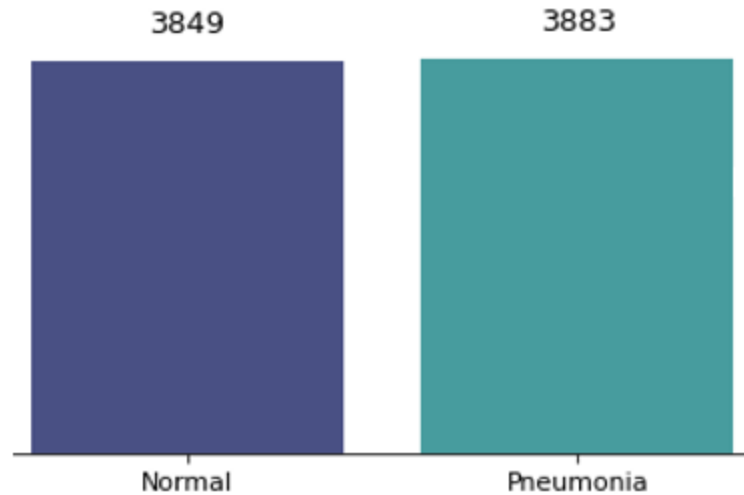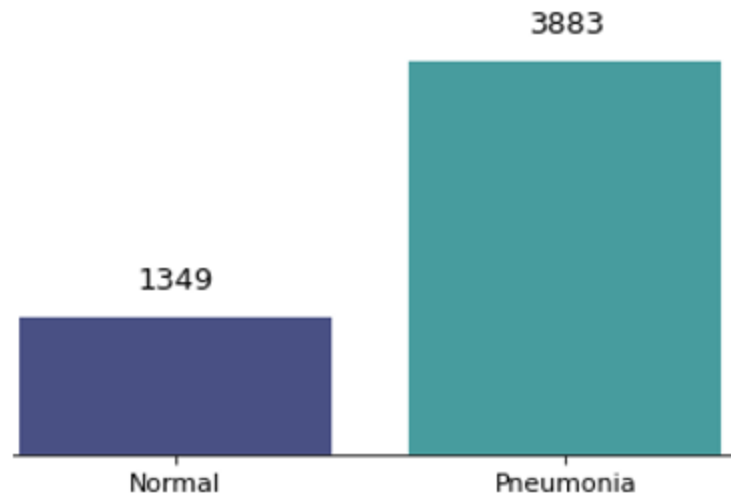
ResNet
↓
DenseNet

Soo…. can we replace medical professionals ?

Soo…. can we replace medical professionals ?

NO

(Not yet)

But…. can we ASSIST medical professionals?

But…. can we ASSIST medical professionals?