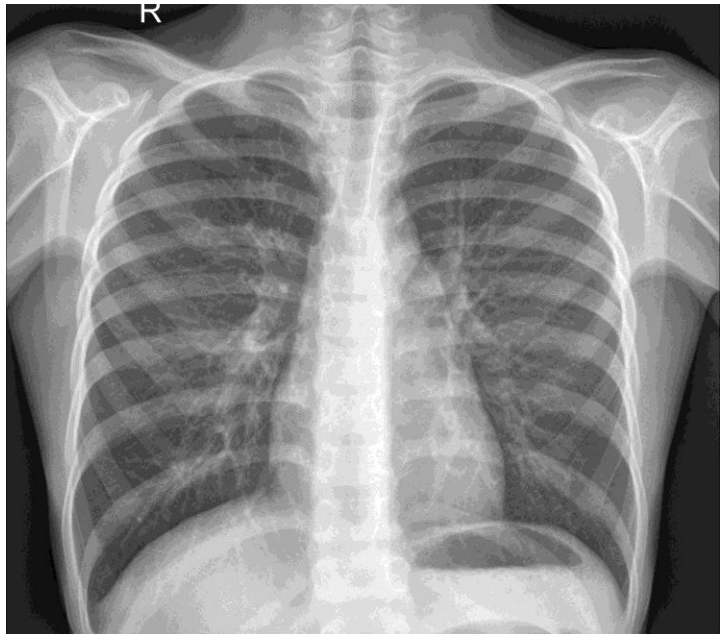
TÉCNICO LISBOA

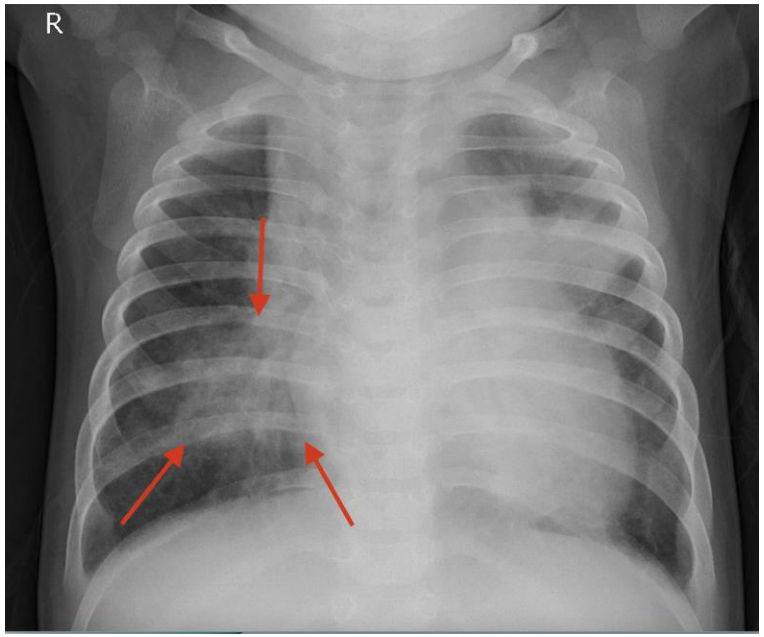
Pneumonia Detection using X-Ray Images

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

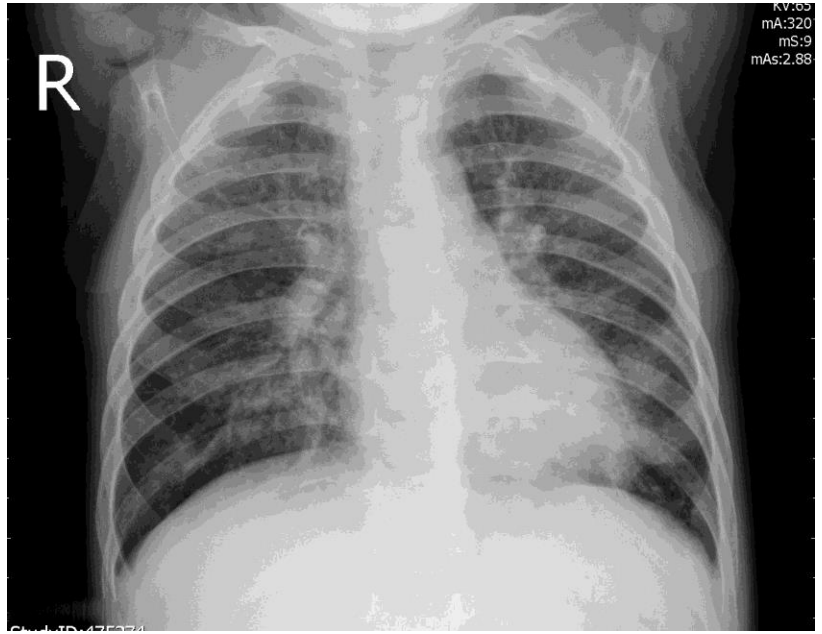
Introduction



Normal chest



Bacterial pneumonia

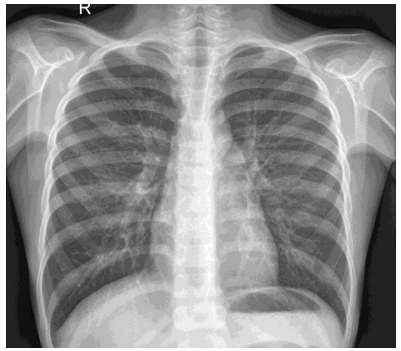


Viral pneumonia

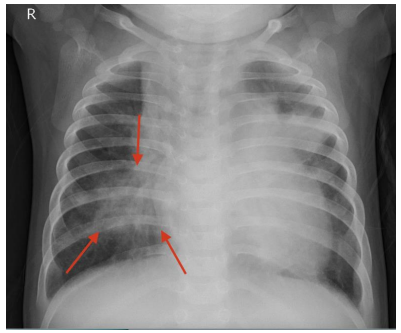
Why is pneumonia detection important?

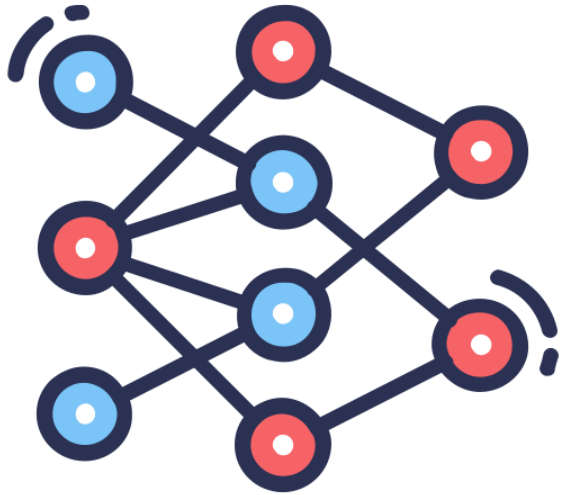
How is the problem addressed? Model Training

Label: Healthy



Label: Pneumonia





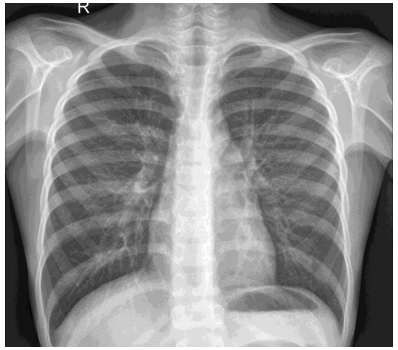
How is the problem addressed? Model Inference

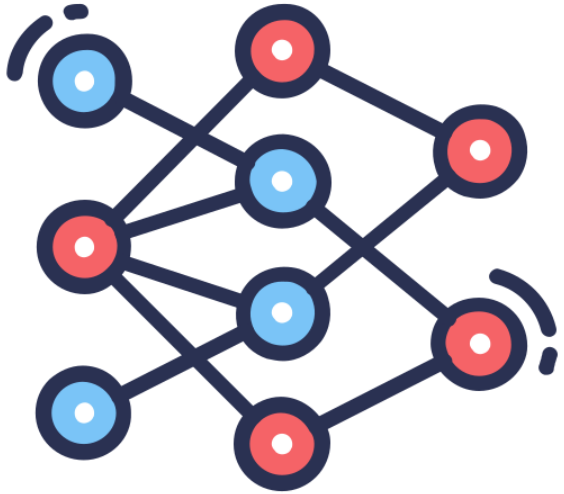
input

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]

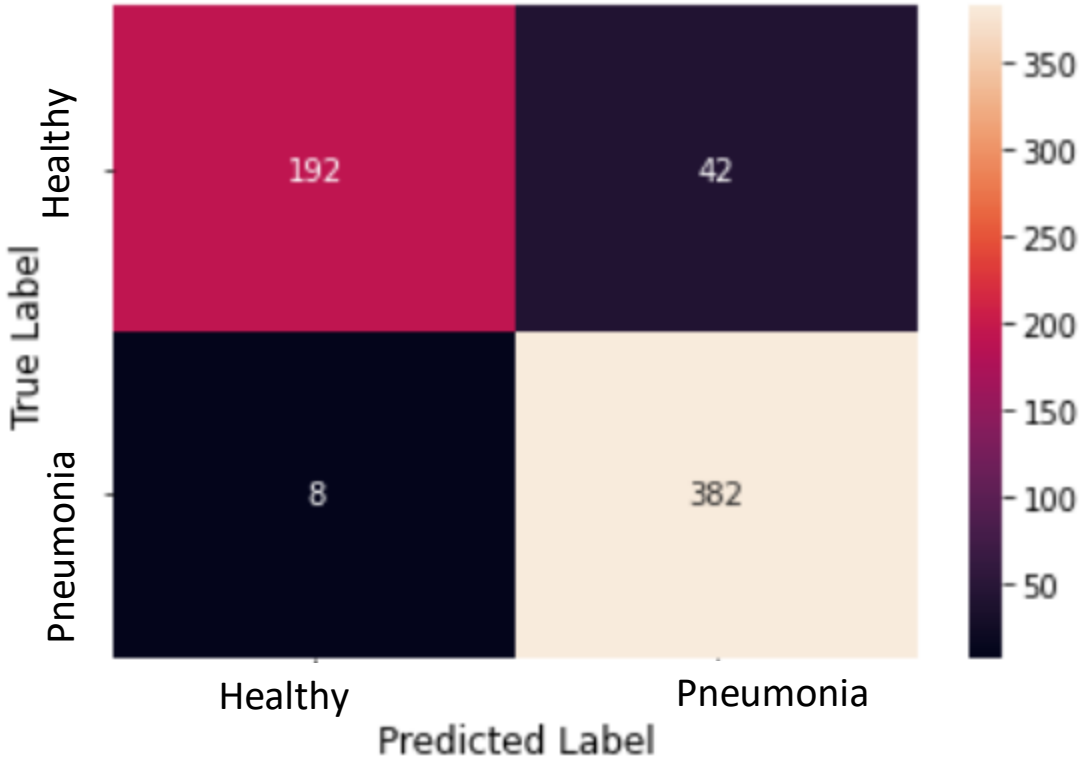
Transfer Learning ResNet [1, 5], DenseNet [7, 8], AlexNet [3] & VGG-16 [9]

Data Augmentation [10]

Ensemble Learning [6, 4]

One-shot Learning [2]

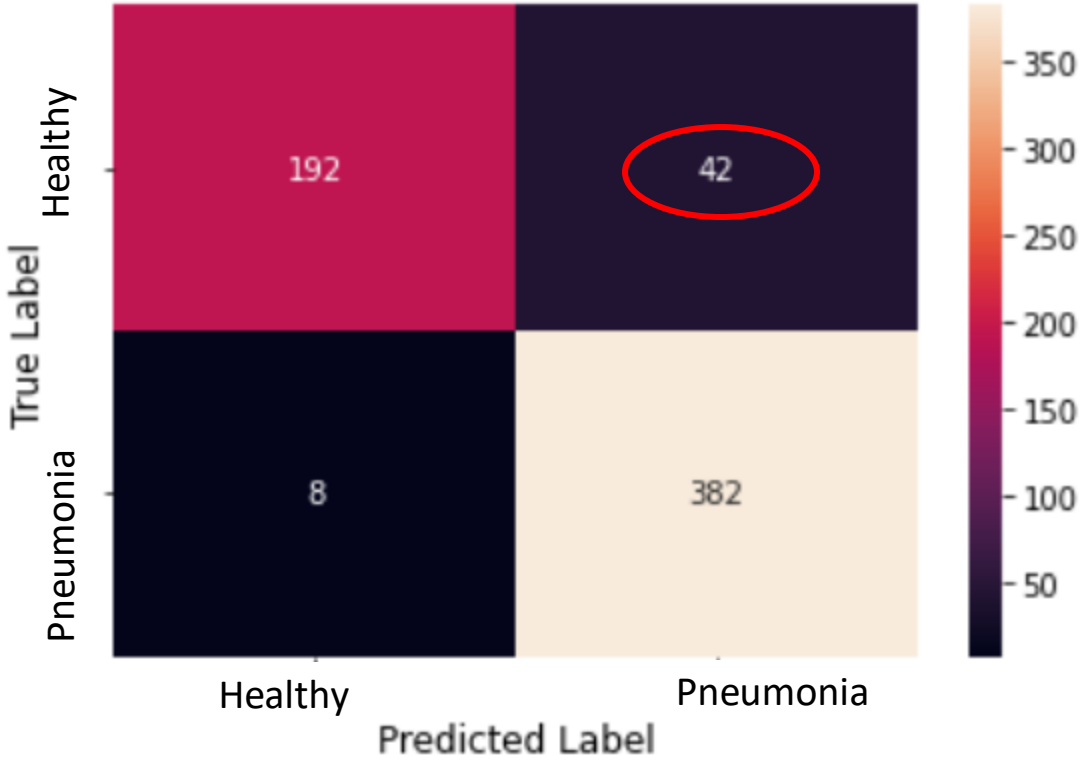
Existing solution results [2]



	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]

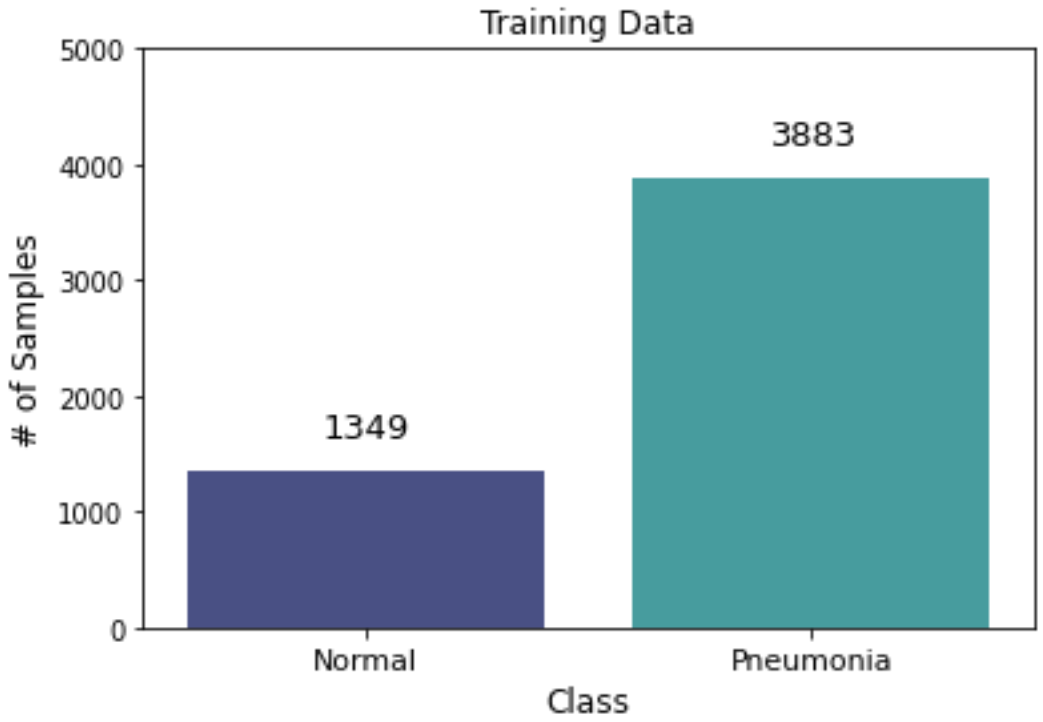


	precision	recall	f1-score	support
Healthy	0.96	0.82	0.88	234
Pneumonia	0.90	0.98	0.94	390

Accuracy: 0.92

Data availability

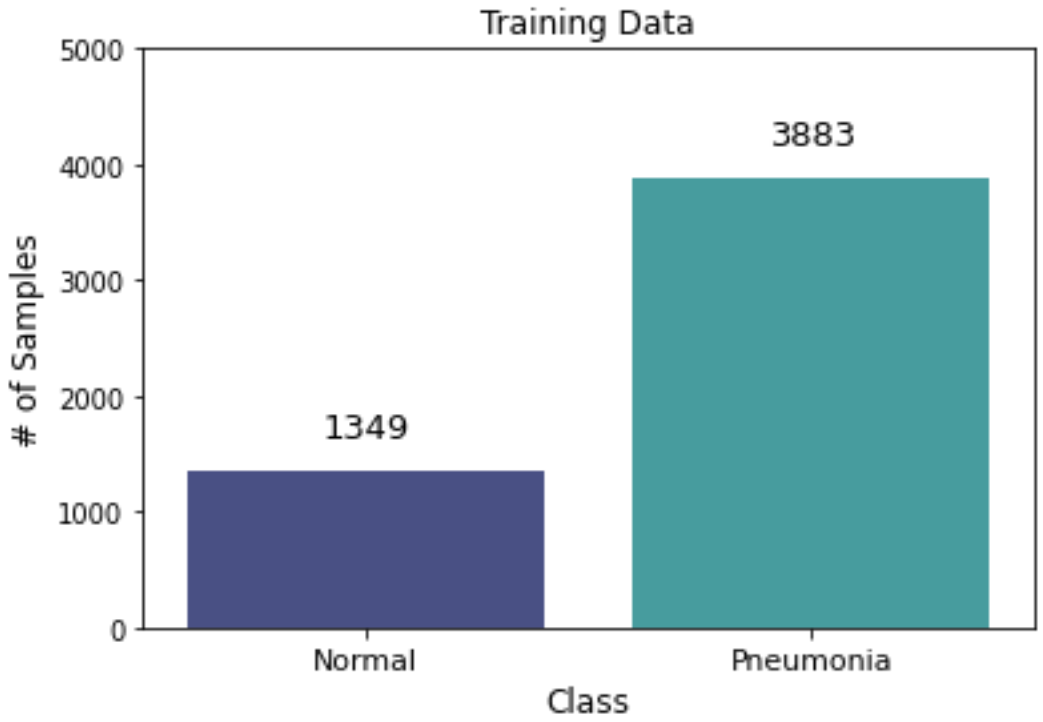
	Healthy	Pneumonia	Total
Train set	1349	3883	**5232**
Test set	234	390	**624**
Total	**1583**	**4273**	**5856**



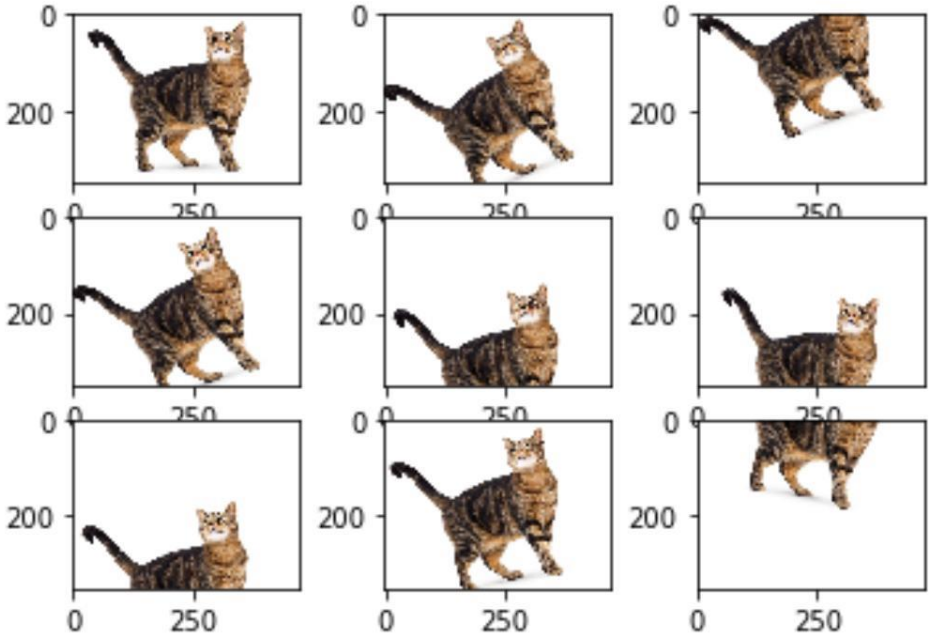
Data ava

Data availability

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



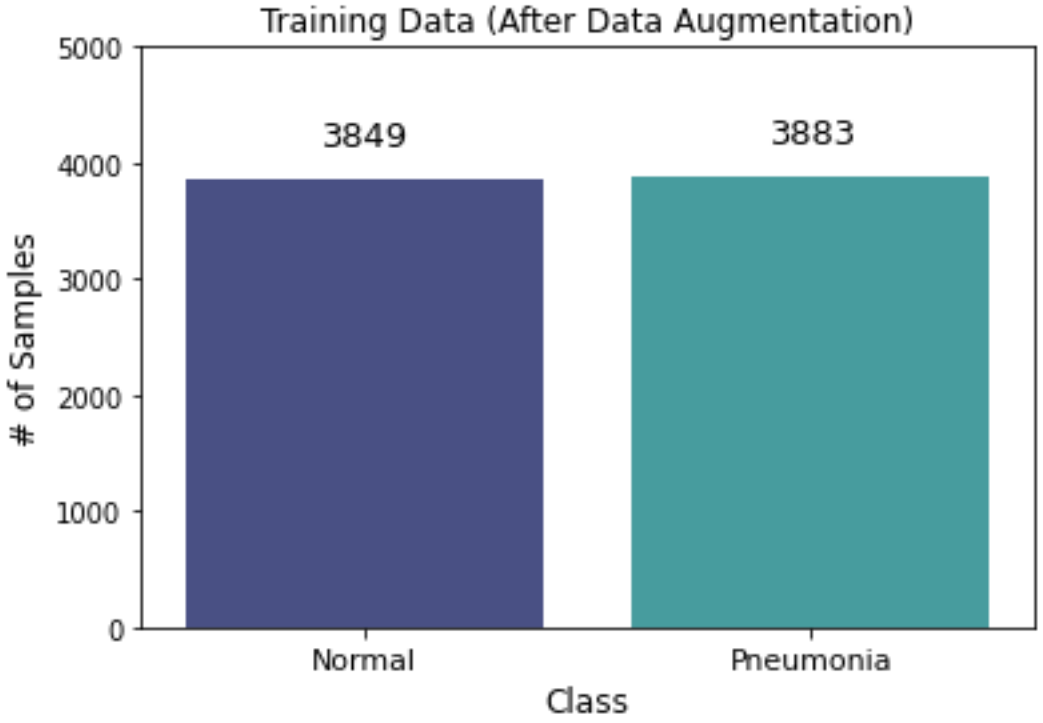
Data augmentation



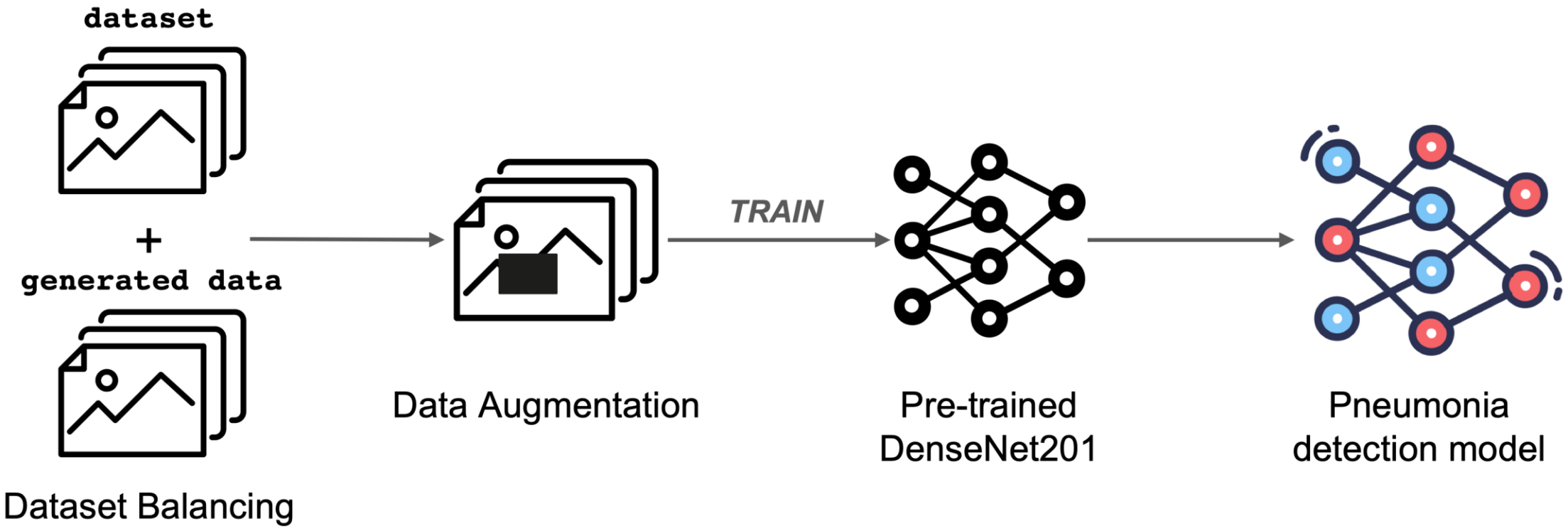
Data augmentation

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

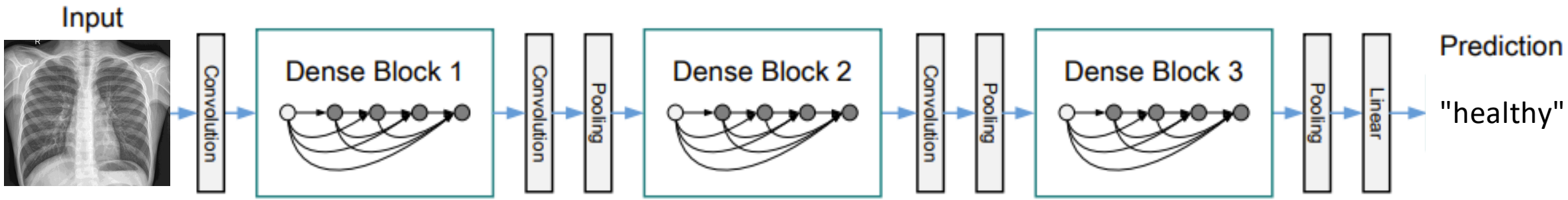
	Healthy	Pneumonia	Total
Train set	3849	3883	**7732**
Test set	234	390	**624**
Total	**4083**	**4273**	**8356**



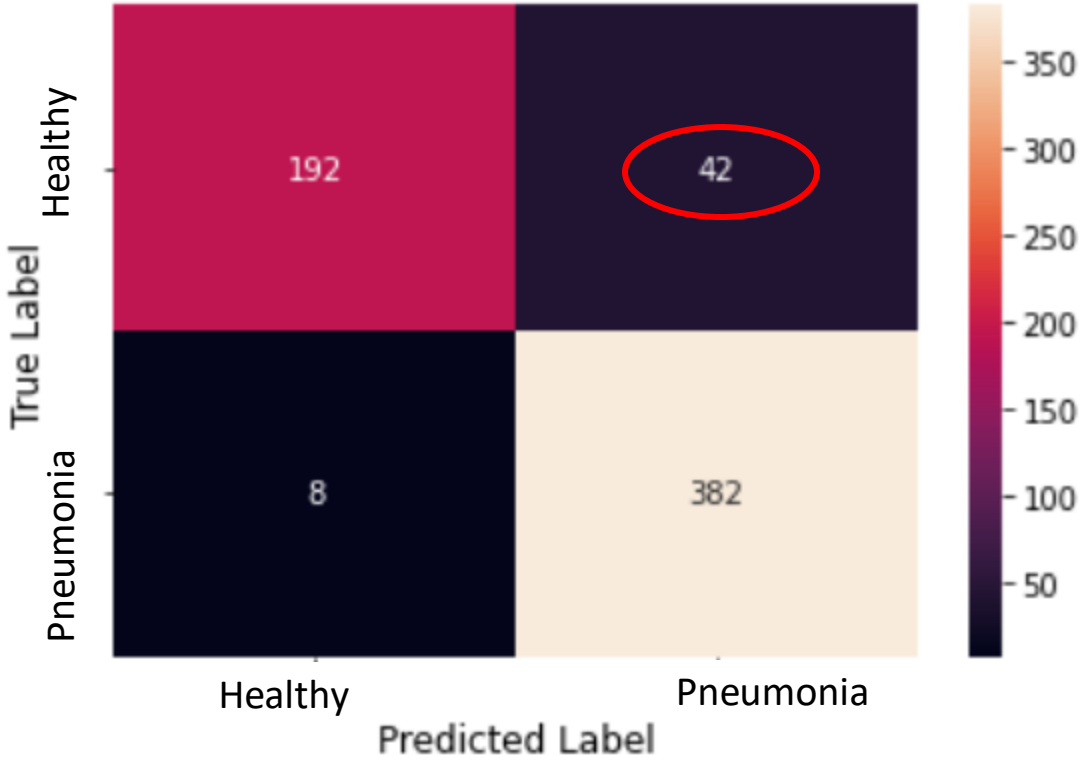
Main modules



The architecture used



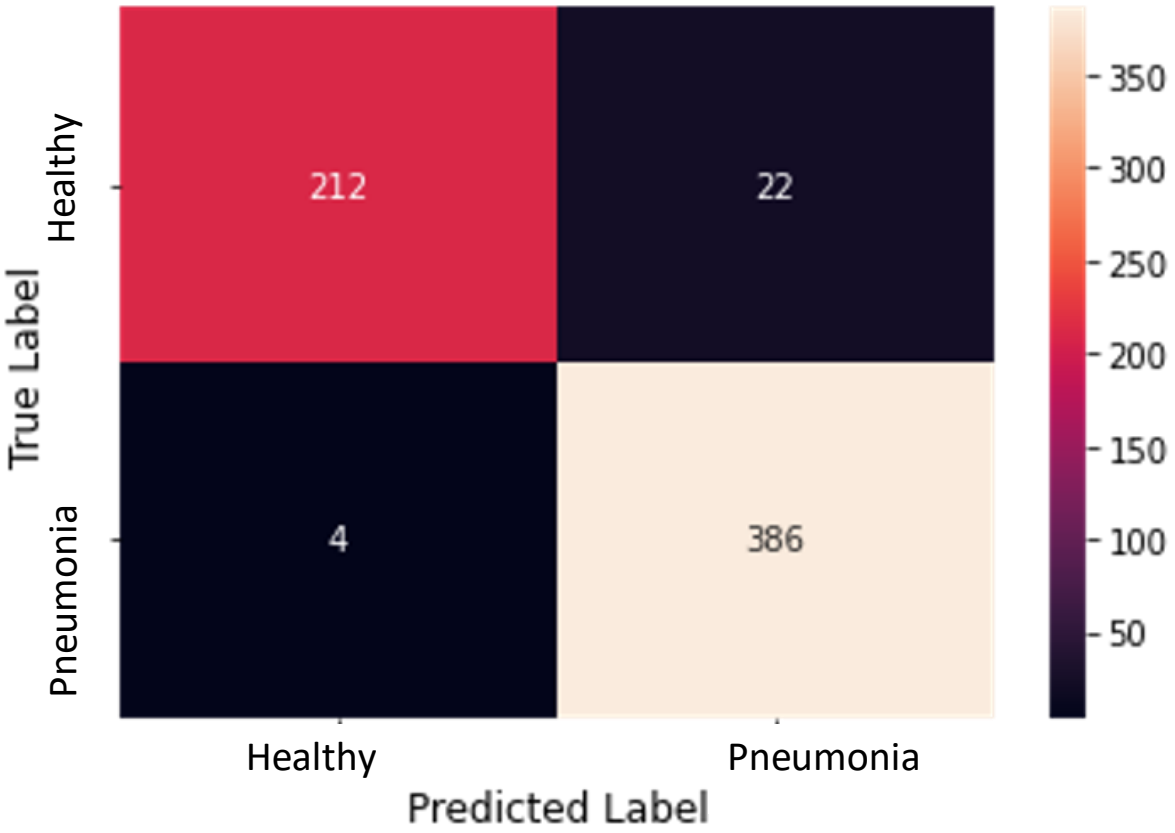
Existing solution results [2]



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

Accuracy: 0.92

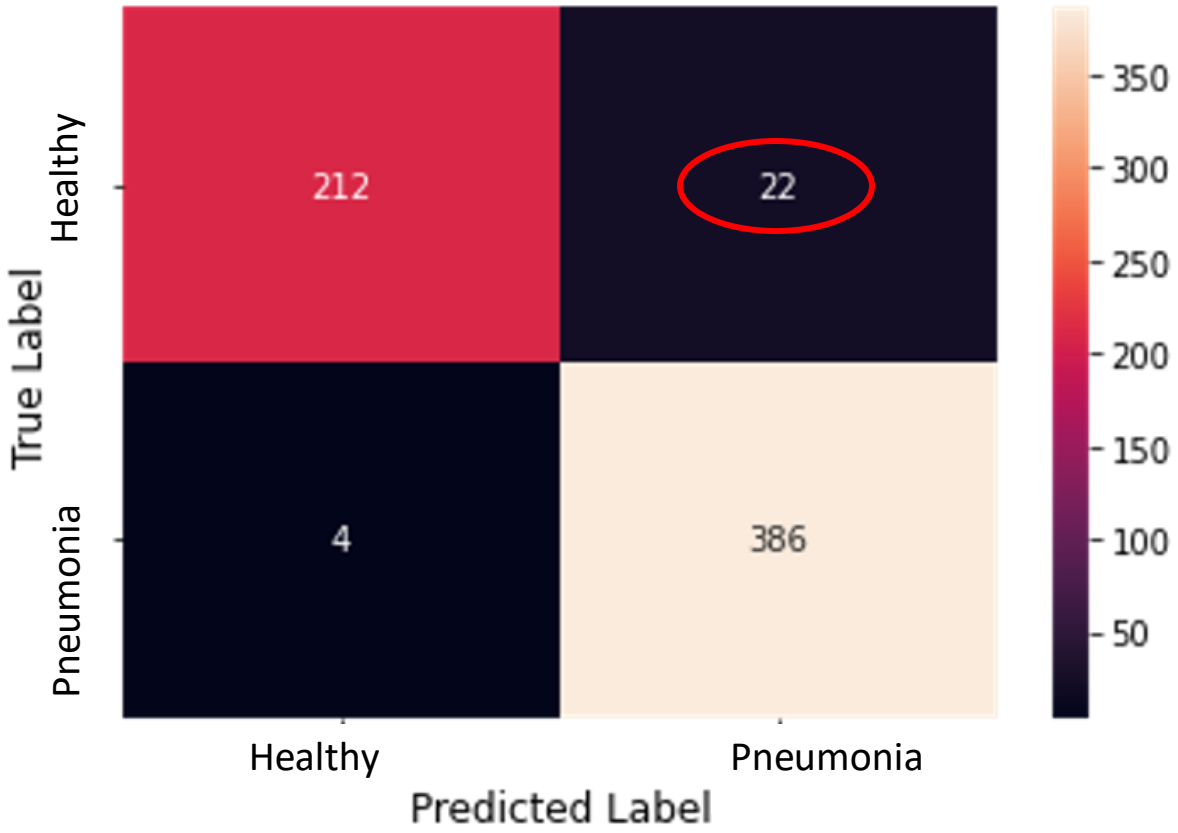
Results



	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

ResNet

↓

DenseNet

Soo…. can we replace medical professionals ?

Soo…. can we replace medical professionals ?

But…. can we ASSIST medical professionals?

But…. can we ASSIST medical professionals?