CNN - X ray classification

Classifying Pneumonia from x ray images using a Convolutional Neural network

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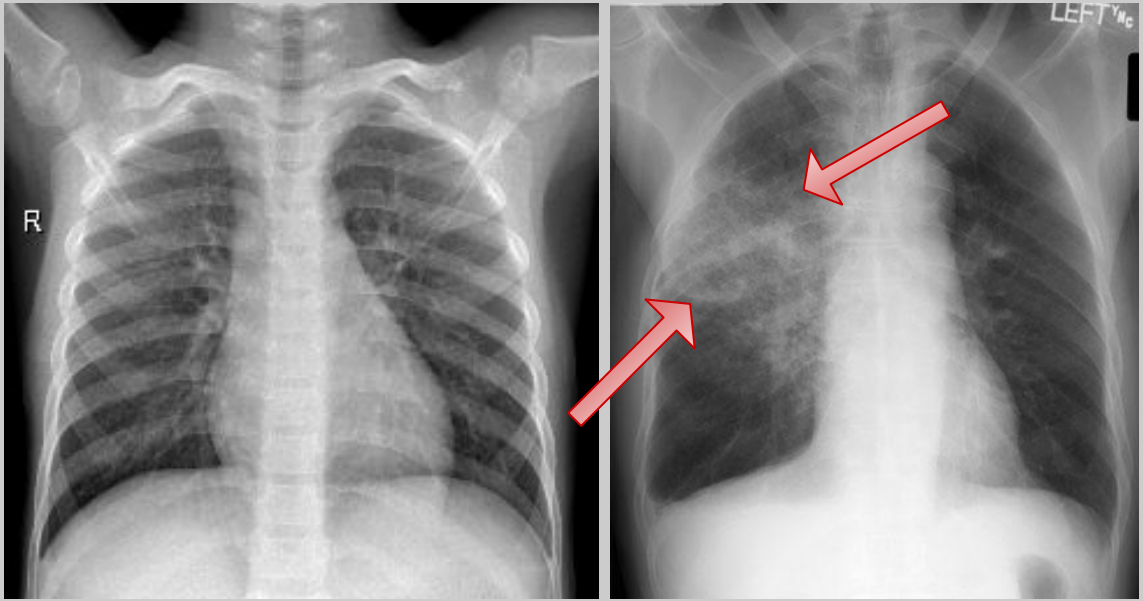
What is the Pneumonia?

Pneumonia is a lung inflammation caused by bacterial or viral infection. The lungs fill with fluid or pus making it difficult to breath.

Pulmonary opacity on chest x-rays is established for diagnosis.

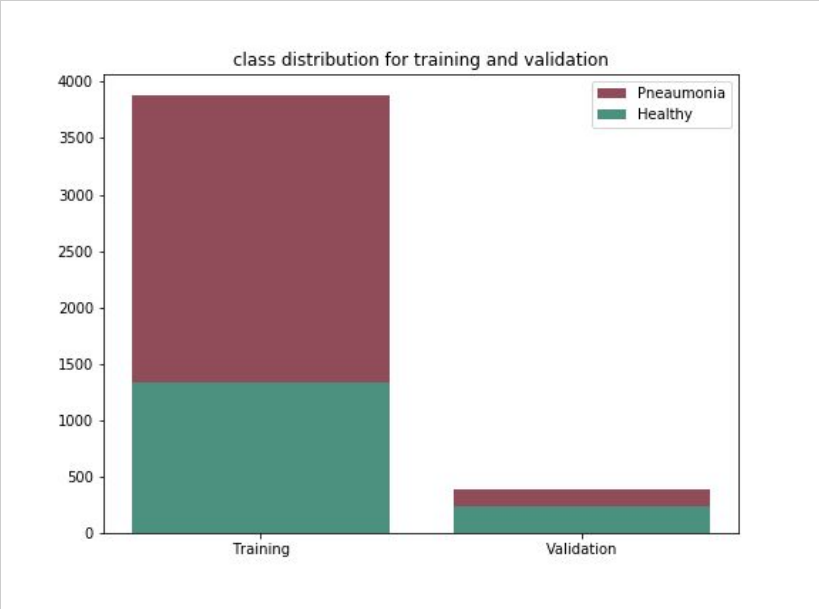


Data

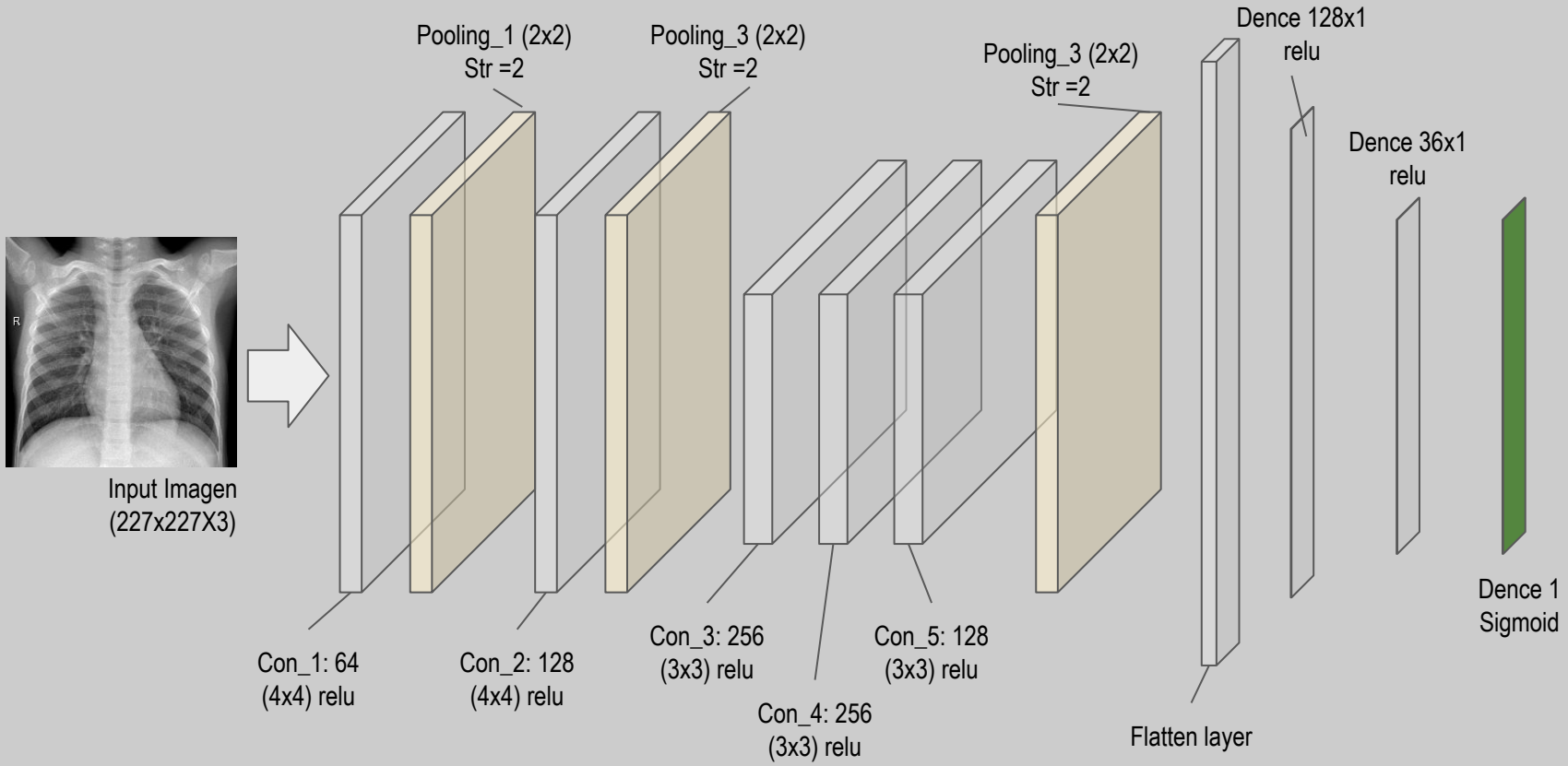
- 5216 training images,
  - 3875 instances of pneumonia ~ 75%
  - 1341 instances of healthy lungs ~25%

- 624 validation images,
  - 390 instances of pneumonia ~62%
  - 234 instances of healthy lungs ~ 38

- 16 testing images, 8 of each class



AlexNet Architecture



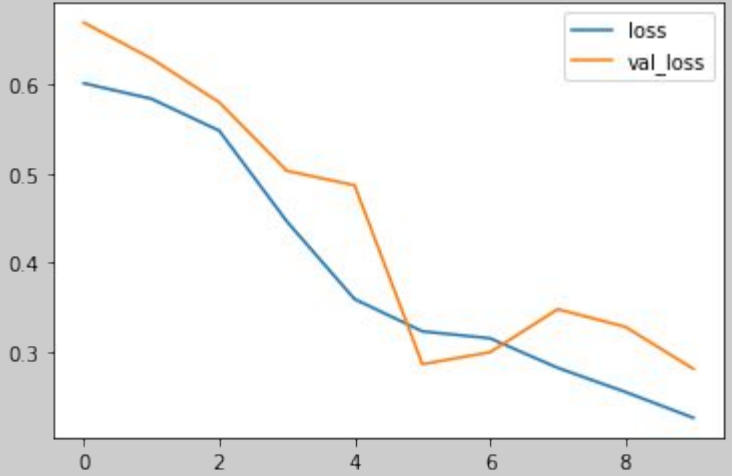
Model Performance:

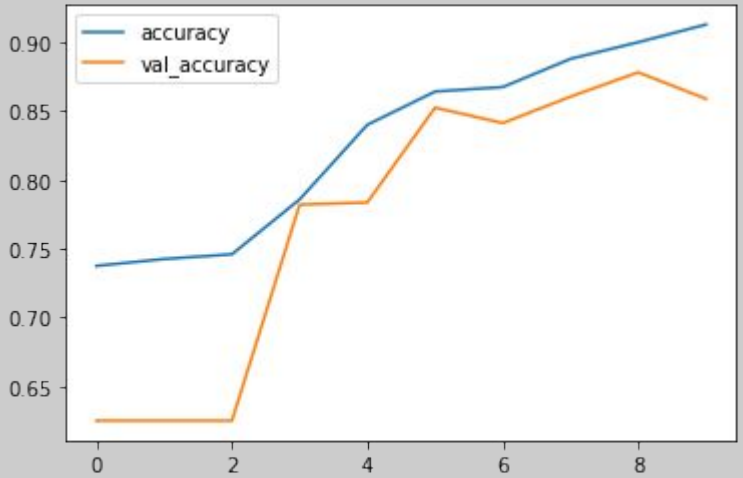
- 1,728,513 parameters with 11 hidden layers
- The model ran for 10 epochs with a batch size of 256
- Accuracy: 0.8589
- Loss: 0.2813

For the small testing group

- Precision: 0.62
- Recall: 1.0

	Normal	Pneumonia
Normal	3	5
Pneumonia	0	8





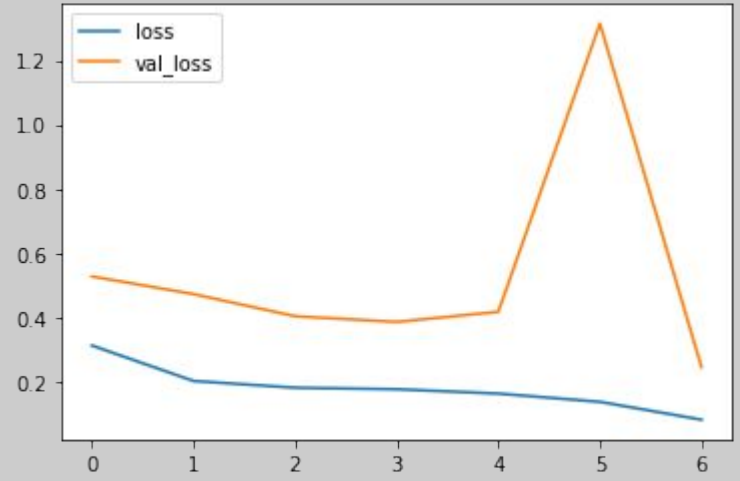
Transfer Learning (Xception)

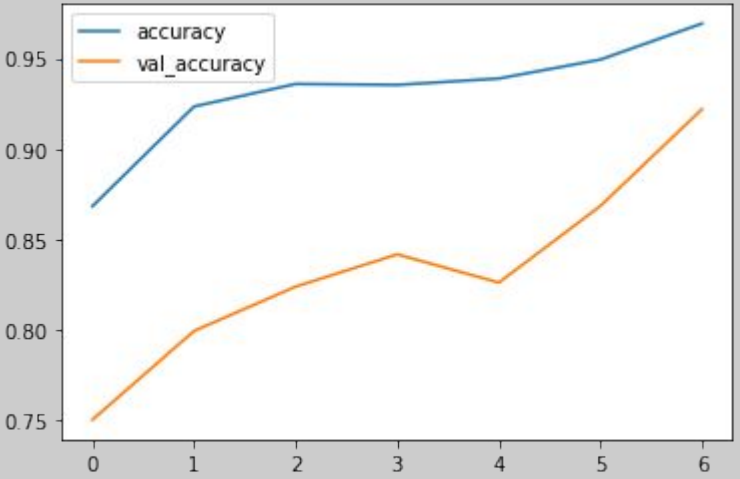
- 20,863,529 parameters with 71 hidden layers
- The model ran for 5 epochs frozen layers and then 2 more epochs with all the layers.
- Accuracy: 0.9135
- Loss: 0.4247

For the small testing group

- Precision: 1.00
- Recall: 0.88

	Normal	Pneumonia
Normal	8	0
Pneumonia	1	7





Conclusions

- The model has a very good recall score which is key in identifying sick patients
- With a more accurate model, we can improve efficiency at diagnosing

Future work:

- Experiment with more Architectures, and more testing
- Extend the dataset, look at Covid-19 X-rays