Pneumonia Detection in Chest X-Ray Images.

Using Neural Networks.

OVERVIEW

Business Problem

The Data

Models used

Results

Business Problem

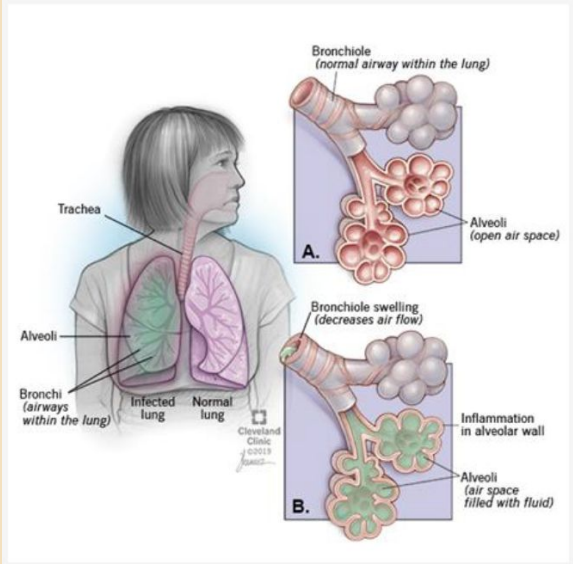
- Building a model that can classify whether the patient is suffering from Pneumonia or not.
- Using chest X-Ray Images.
- Metrics used:
- Accuracy
- Recall

Pneumonia Background:

- Pneumonia is an infection that causes the lungs air sacs to inflame with fluid/pus making breathing difficult.
- Caused by Bacteria,Viruses,Fungi.
- Severe pneumonia can inflame the lungs to a point where they cannot take enough oxygen or expel enough carbon-di-oxide.

It causes:

- Cough
- Fever
- Chills
- Breathing issues.



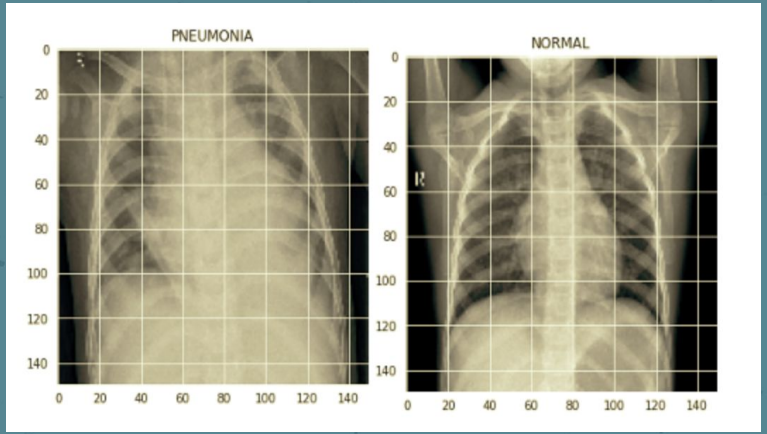
Data:

01 Source: Kaggle

02 No of X-Ray Images(JPEG:

5,863, divided in 2 categories(Pneumonia/Normal

- Train: 5216
- Test: 624
- Validation: 16



Models Implemented:

Convolutional Neural Network Model.

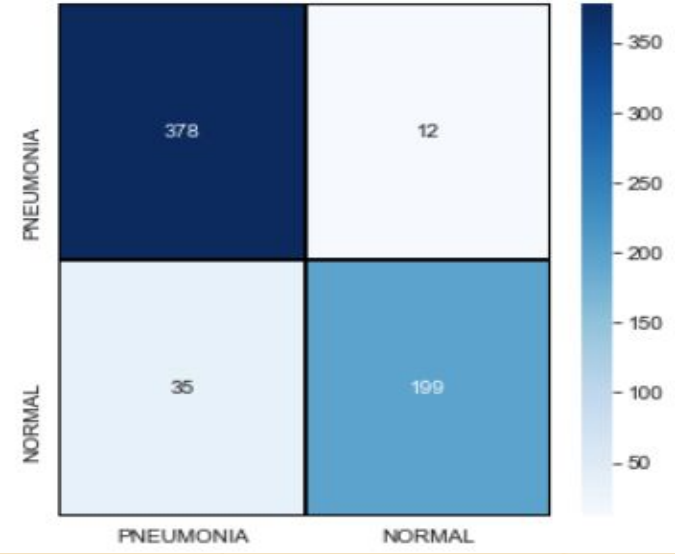
Proposed two CNN models-

- One with a dropout layer
- One without a dropout layer

Data augmentation was applied.

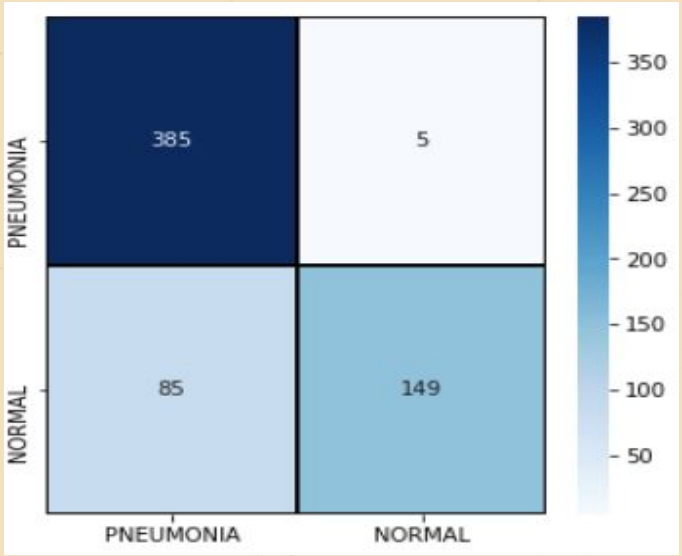
CNN model Results:

Without a dropout layer:



	precision	recall	f1-score	support
Pneumonia(class 0)	0.92	0.97	0.94	390
Normal(Class 1)	0.94	0.85	0.89	234
accuracy			0.92	624
macro avg	0.93	0.91	0.92	624
weighted avg	0.93	0.92	0.92	624

With a dropout layer:



	precision	recall	f1-score	support
Pneumonia(class 0)	0.82	0.99	0.90	390
Normal(Class 1)	0.97	0.64	0.77	234
accuracy			0.86	624
macro avg	0.89	0.81	0.83	624
weighted avg	0.87	0.86	0.85	624

Conclusion

- CNN(without dropout layers)performed best with an accuracy of 93%.
- Results are not completely reliable.
- If model's recall and accuracy scores are good it can surely help in reducing patient wait times.
- Using Transfer learning methods can provide room for improvement.

Way forward:

- Training selected models with a a higher no of epochs to try to reach convergence.
- Gathering more data for a better model.
- Testing this data on different models.
- This work can be extended to detect and classify X-Ray images with lung cancer & Pneumonia.

Thank you

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