PNEUMONIA IMAGE CLASSIFICATION WITH DEEP LEARNING

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PROJECT PROBLEM

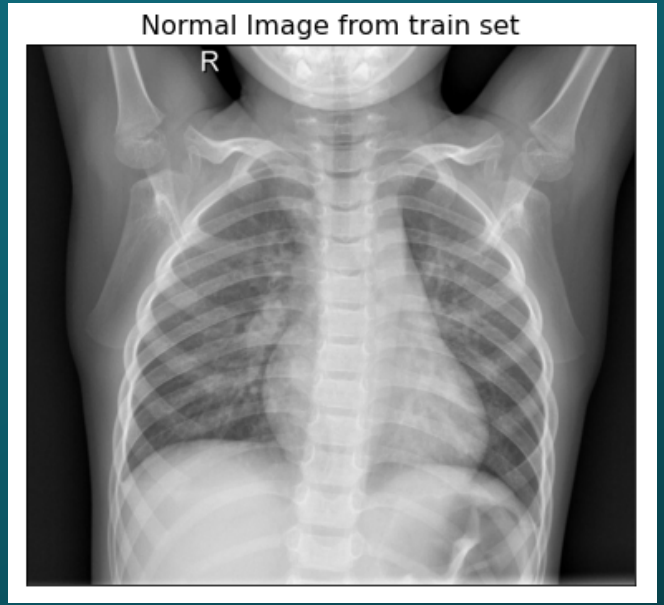
Chest x-ray image analysis is the common and basis diagnosis method in medical field. In order to assess different pathologies, the imaging exam has been used for long time. An automation analysis can minimize the workloads, improve efficiency and reduce the potential of human errors. Thus, this project the CNN model will be built in order to classify chest x-ray images.

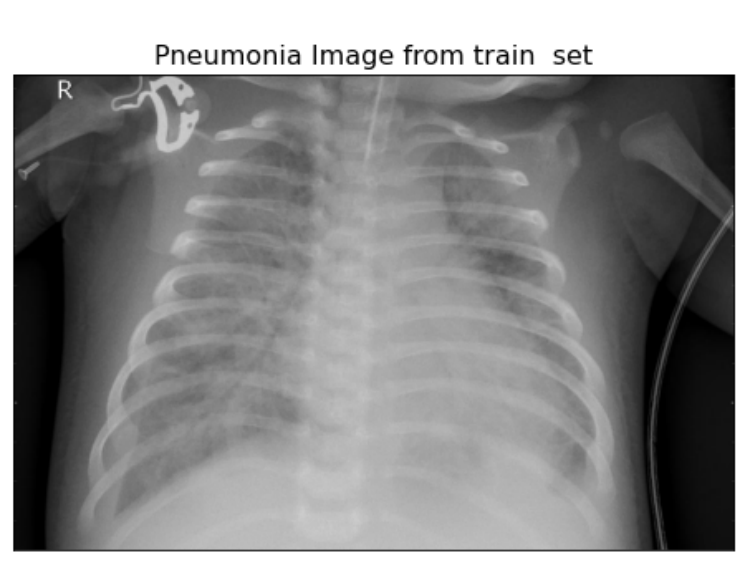
DATASET

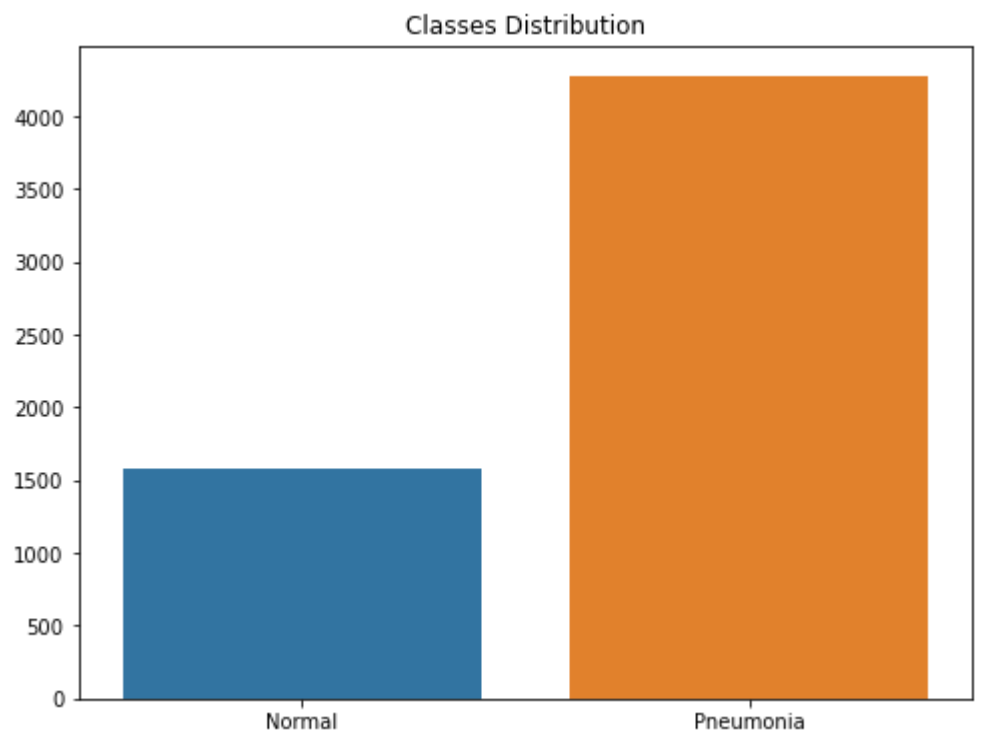
Chest X-ray images (anterior-posterior) were selected from retrospective cohorts of pediatric patients of one to five years old from Guangzhou Women and Children's Medical Center, Guangzhou. All chest X-ray imaging was performed as part of patients' routine clinical care.

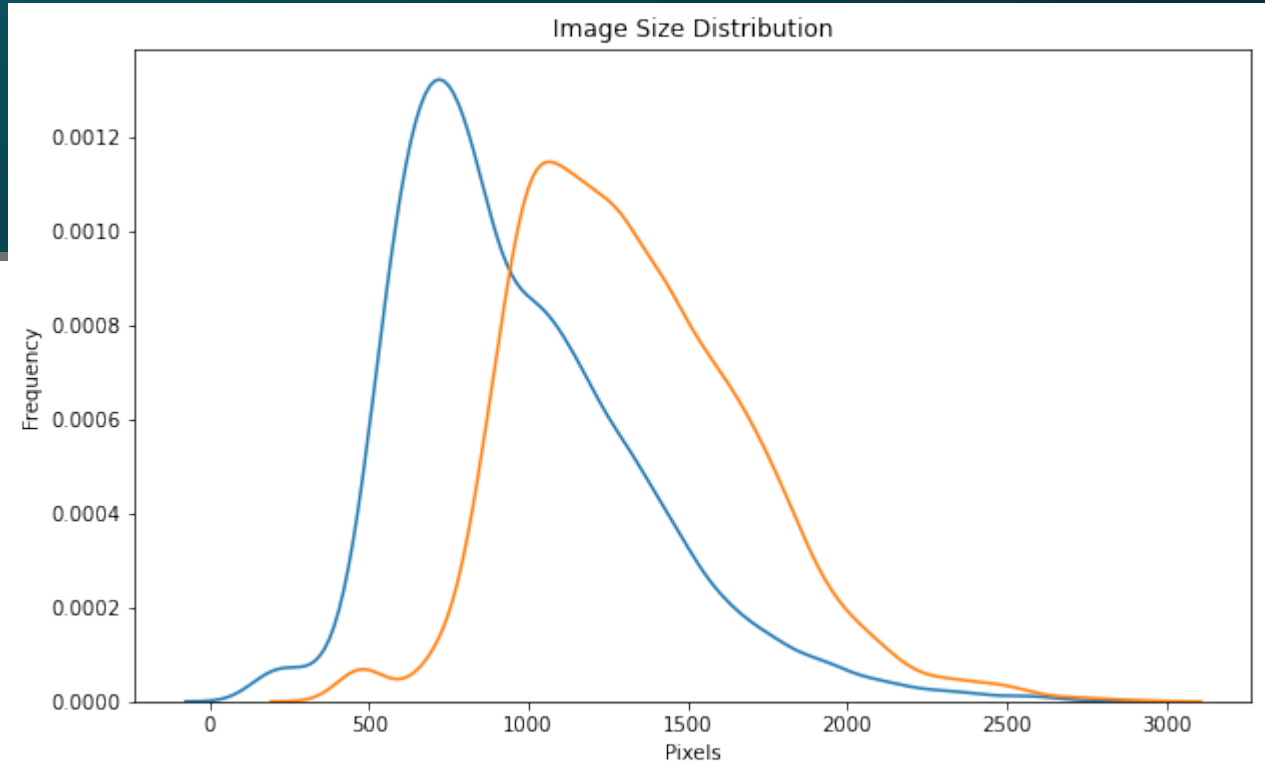
DATA OBSERVATION

Train dataset has 5218 images:
1342 Normal and 3876 Pneumonia
Test dataset has 624 images:
234 Normal and 390 Pneumonia
Val dataset has 18 images:
9 Normal and 9 Pneumonia







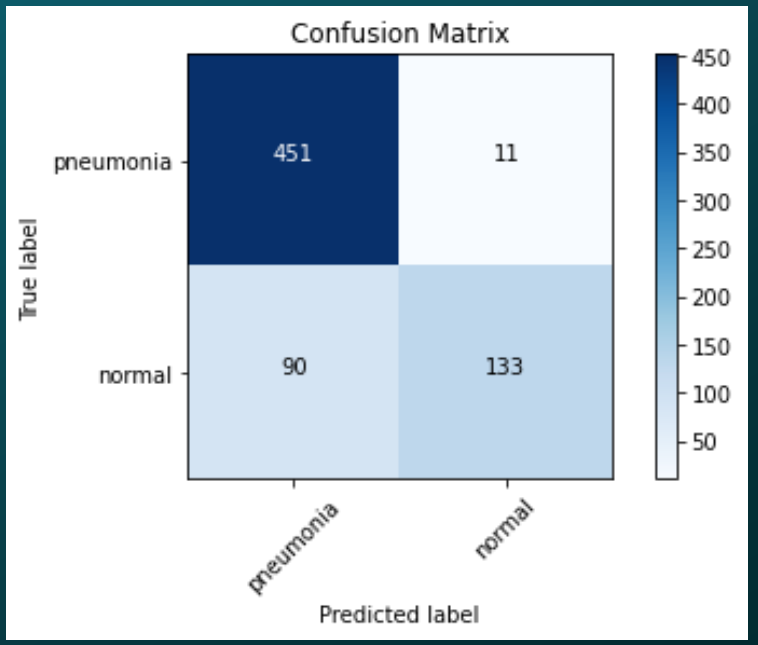


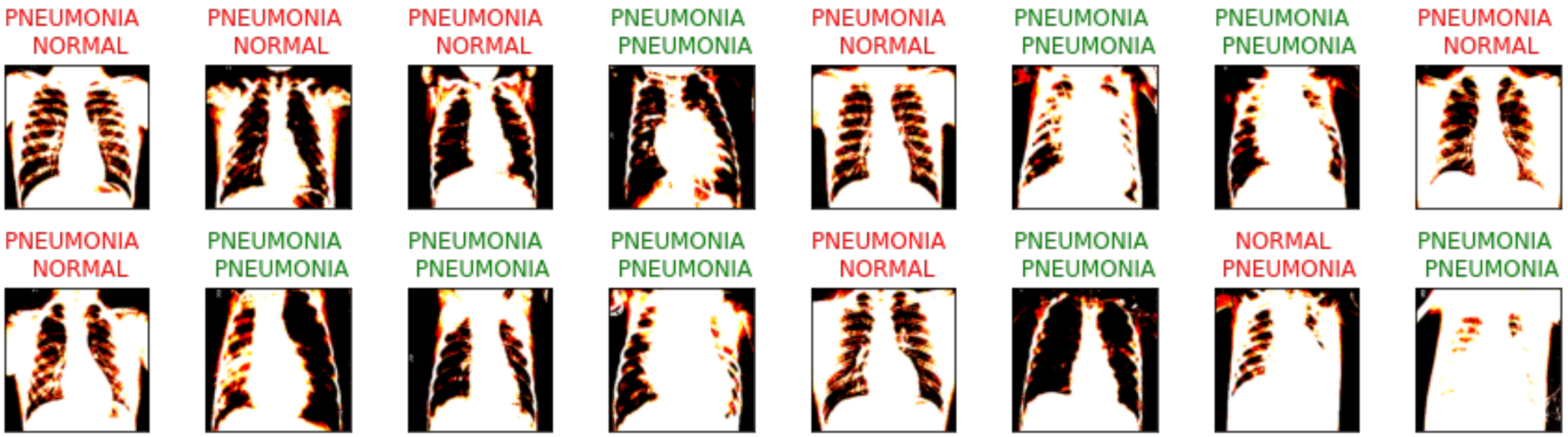
DATA PROCESSING

- Rescale images by 225
- Resize images to 224x224 pixels
- 10 degrees random rotations
- Shear transformation, zooming and horizontal flipping
- Subtract mean RGB value

RESULTS

	precision	recall	f1-score	support
0	0.83	0.98	0.90	462
1	0.92	0.60	0.72	223
accuracy			0.85	685
macro avg	0.88	0.79	0.81	685
weighted avg	0.86	0.85	0.84	685





CONCLUSION

The current model can classify and distinguish Pneumonia patients and normal people very well. Both the accuracy of training and testing data is very high. When we deal with medical diagnosis, a false positive (i.e. prediciting illness when the patient is healthy) is less critical than a false negative (predicting healthiness when the patient is sick). The number of false negatives obtained with the model presented here is extremely low. Therefore, the machine developed here as a reliable ancillary tool for Pneumonia detection.

FUTURE WORK

- Add more training data to ensure performance.
- Use Grid Search for better optimization.
- Be able to categorize Pneumonia types.
- Be able to classify other diseases from X-ray images.

THANK YOU