

# CHEST X-RAY IMAGES (PNEUMONIA) CASE STUDY

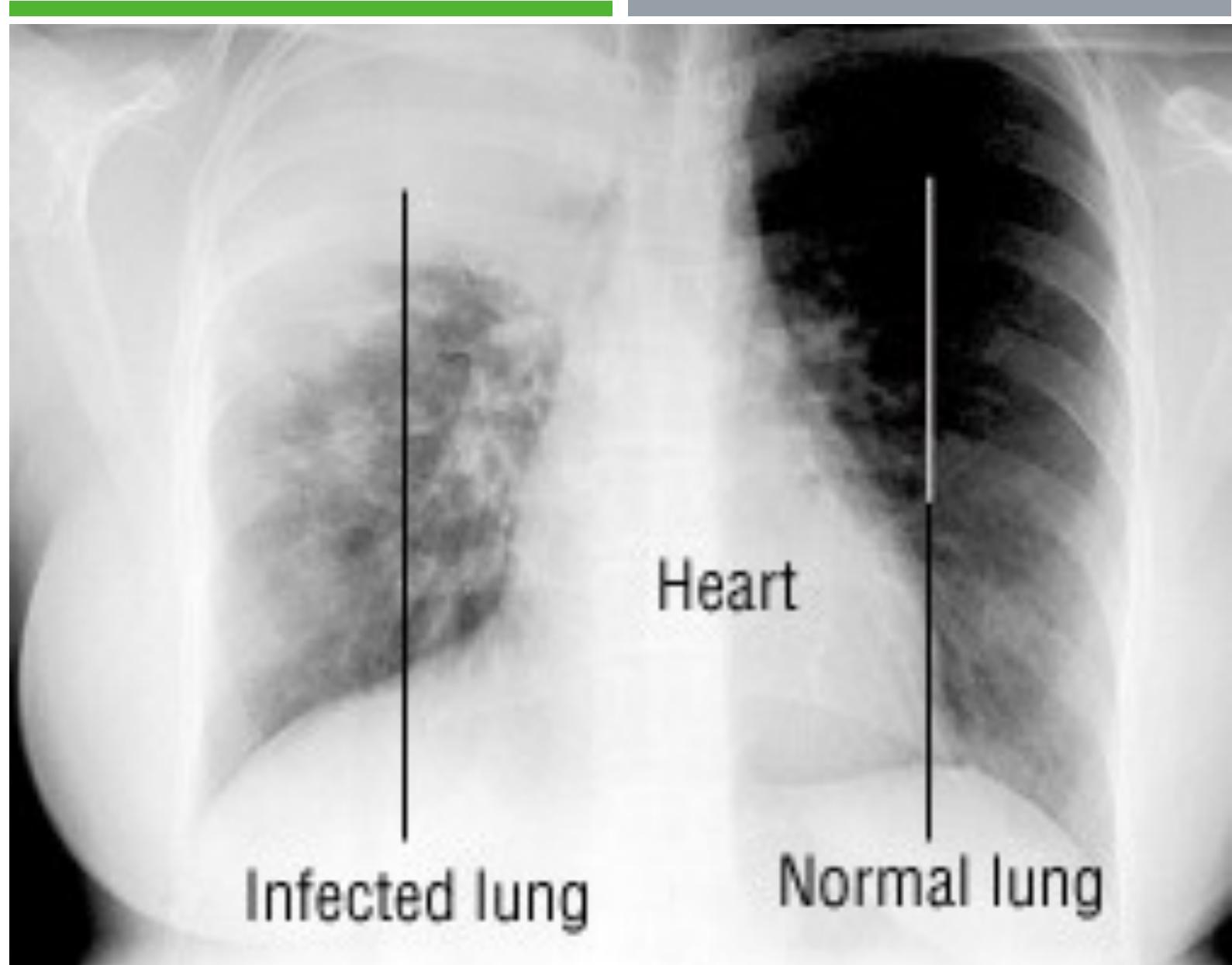
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# DATA

- The dataset comes from Kermany et al. on Mendeley
- Kaggle website  
(<https://www.kaggle.com/paultimothymooney/chest-xray-pneumonia>)
- There are 5,863 X-Ray images (JPEG) and 2 categories (Pneumonia/Normal).
- All chest X-ray imaging was performed as part of patients' routine clinical care.
- All chest radiographs were initially screened for quality control by removing all low quality or unreadable scans
- The diagnoses for the images were then graded by two expert physicians before being cleared for training the AI system

# WHAT IS PNEUMONIA

- Pneumonia is the filling of air vesicles in the lung with an inflamed fluid.
- Viruses, bacteria, and rarely fungal infections cause it.
- Pneumonia can be diagnosed by examining the X-Ray chest radiography by doctors.
- We will build a model that will do this instead of doctors



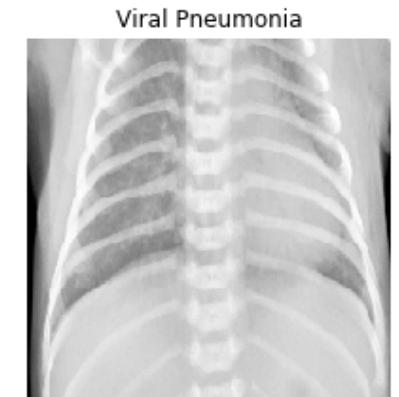
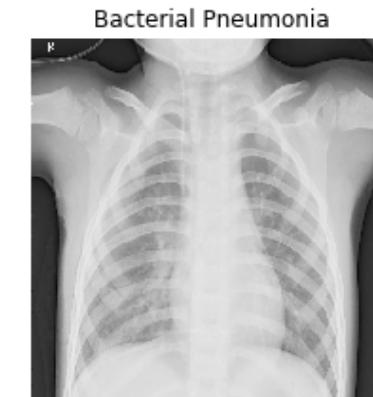
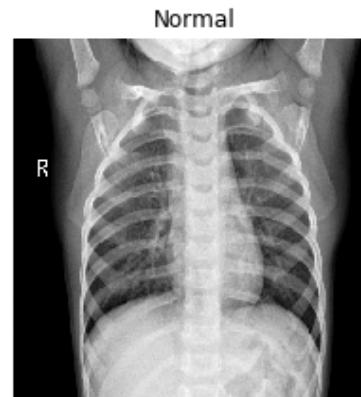
# BUSINESS GOAL

Finding

Finding the best model that can predict if someone has Pneumonia or not

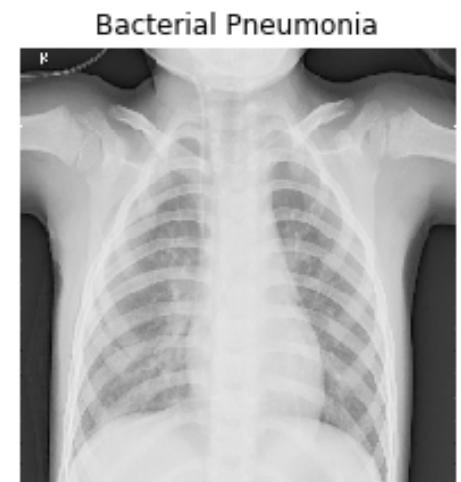
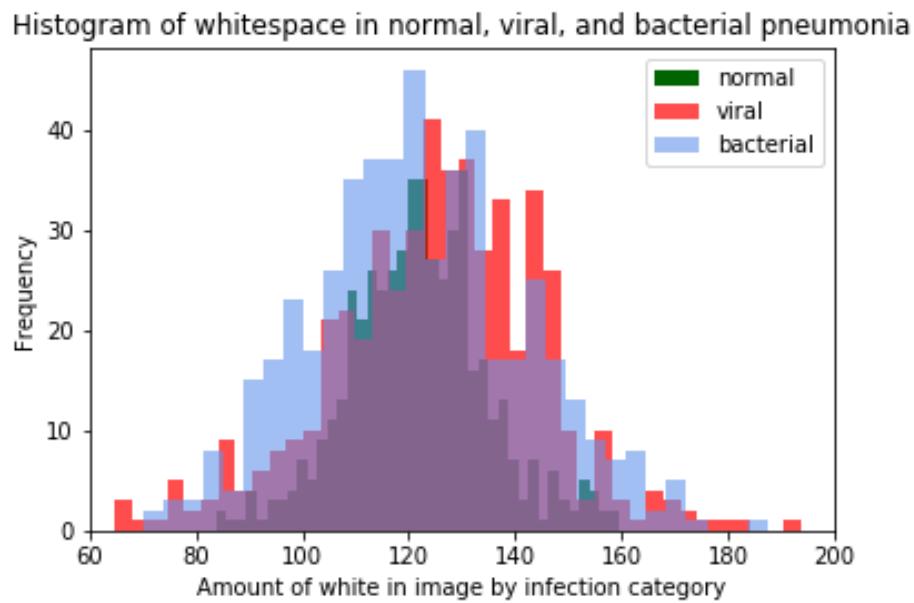
Leverage

Leverage deep learning to expand access to timely diagnosis.



# INITIAL EXPLORATION

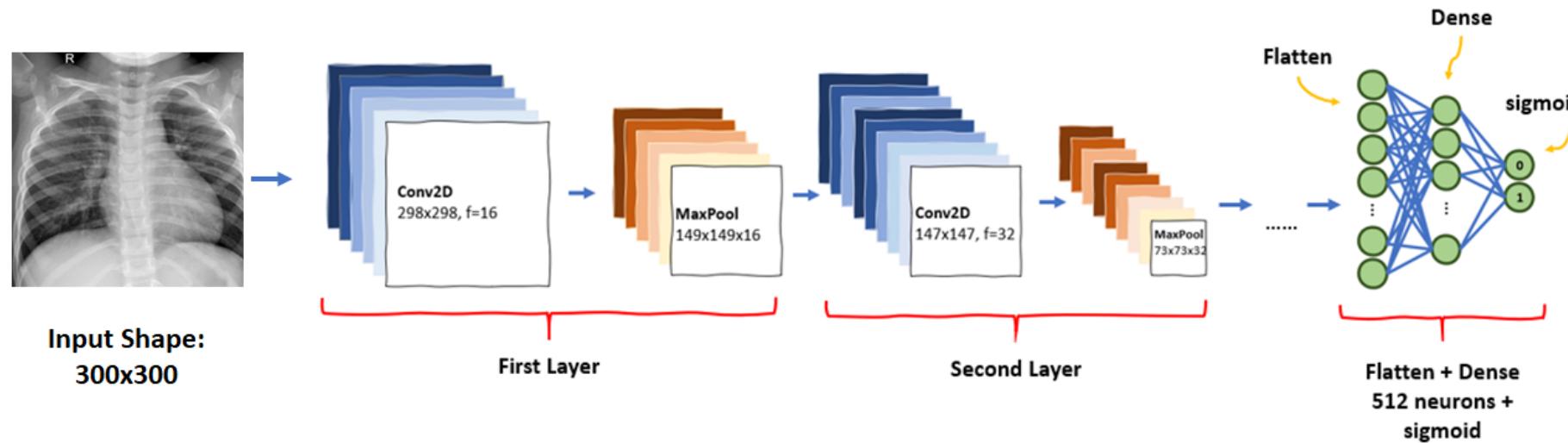
- Black in the image corresponds to open space.
- White in the image equals mass



# MODEL STRUCTURES

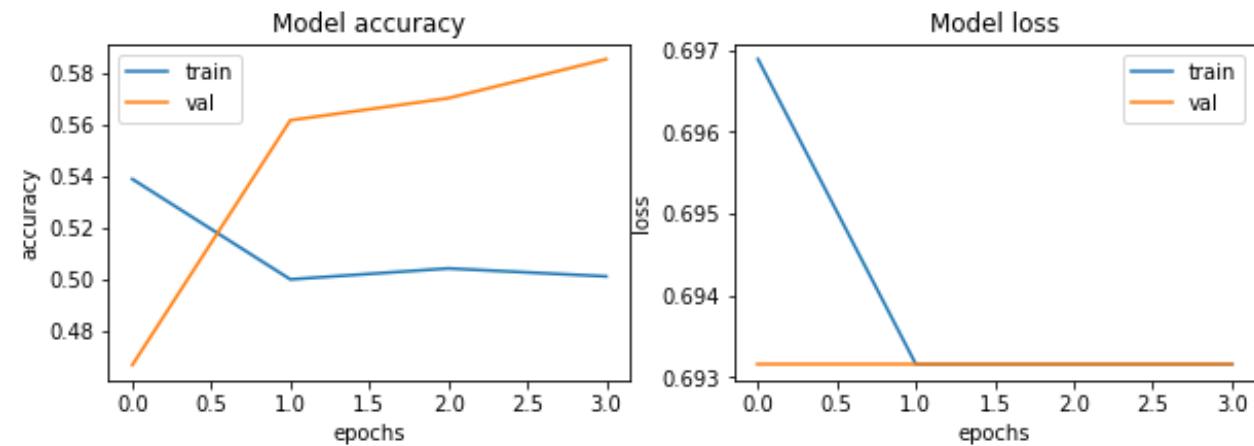
- Structure of CNN model will be like (Conv2D->relu -> MaxPool2D -> Dropout)x2 -> Flatten -> Dense -> Dropout -> Out
- I used five convolutional blocks comprised of convolutional layer and max-pooling.
- I have used dropouts to reduce over-fitting on the third Model.
- Activation function was Relu throughout except for the last layer where it was Sigmoid as this is a binary classification problem.
- I have used Adam as the optimizer
- I have also used EarlyStopping to prevent overfitting

## Pneumonia Detection using Convolutional Neural Network (CNN)



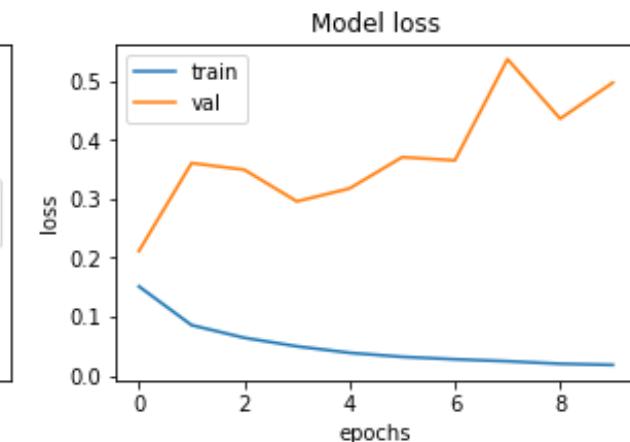
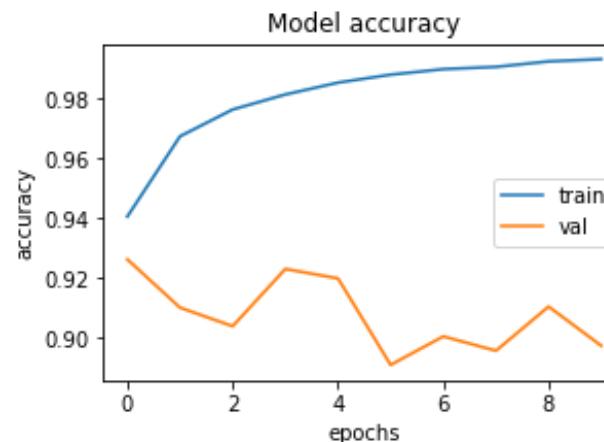
# MODEL 1

- After running our first model we got an accuracy score of: 0.5011 and al\_accuracy: 0.5855
- Unfortunately, our model has low accuracy scores
- Based on the graph was unable to learn the training dataset

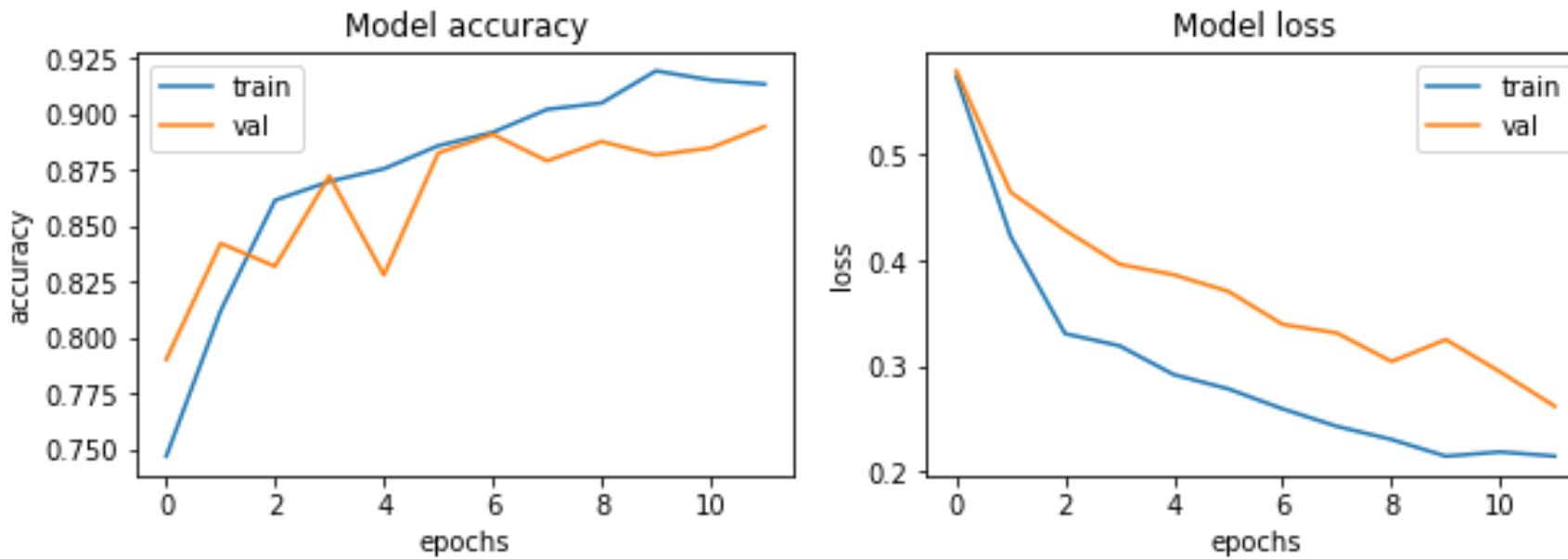


## MODEL 2

- After running our second model we got an accuracy score of: 0.9933 and val\_accuracy: 0.8974 which is better than the last Model
- You can clearly see from the preceding outputs that we still end up overfitting the model
- After the the 3 epochs



## MODEL 3



- After running our third model we got an accuracy score of: 0.9131 and val\_accuracy: 0.8942
- As we can see we lost accuracy a the val\_accuracy is almost close to Model 2
- We reduced the overfitting significantly by adding dropout and validation steps
- The train and validation accuracy are quite close to each other, indicating that the model is not overfitting

## FURTHER ANALYSIS & CONCLUSION



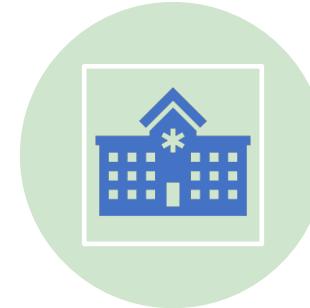
Adding more chest x ray images to the dataset is likely to help



Adding more layers to improve our model accuracy and reduce overfitting



It would be nice to see how our model perform by comparison with doctors



Can our model do a better classification than the doctors?



ANY QUESTIONS?