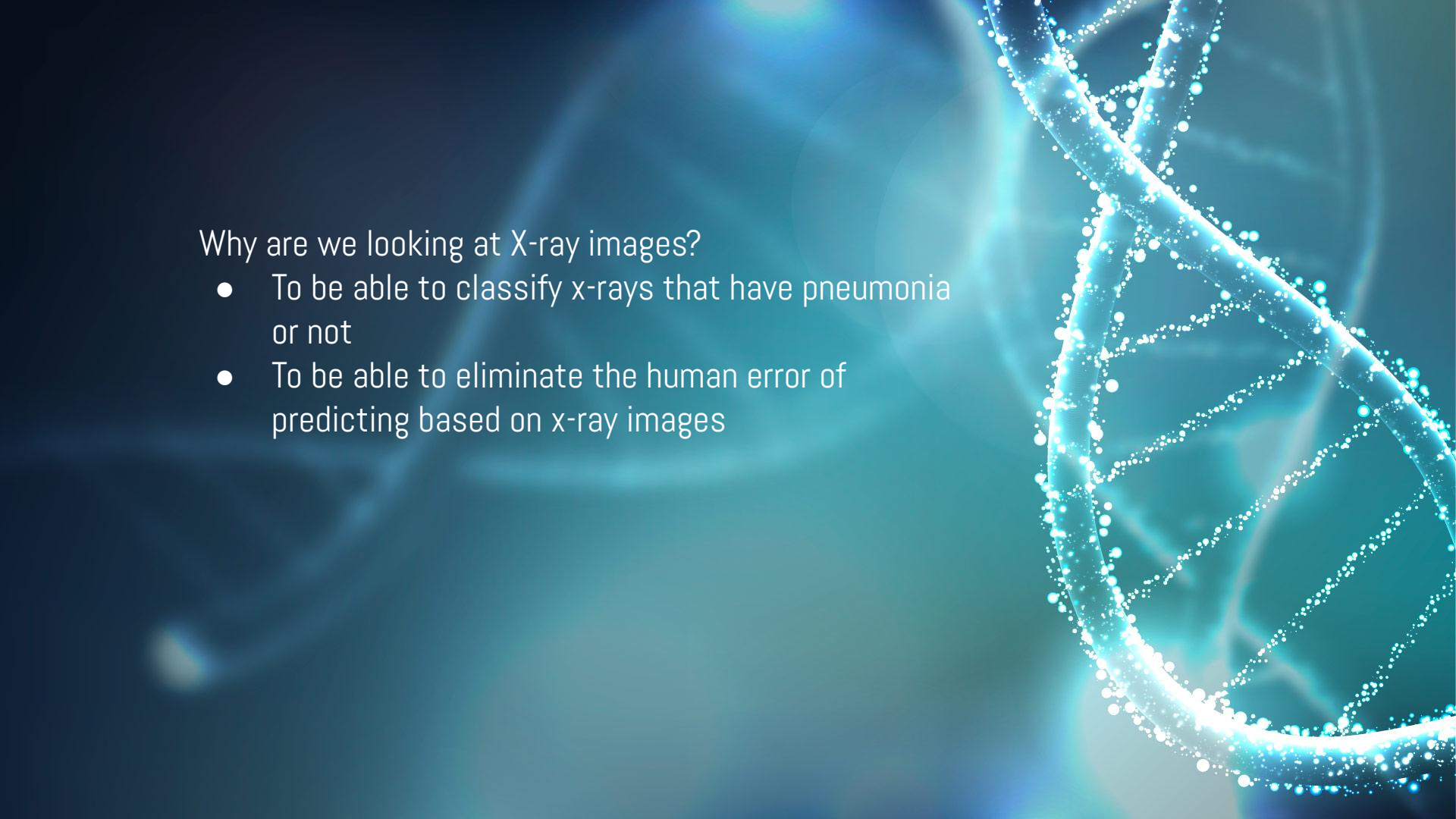
Detecting Pneumonia in X-ray Images

Andrew Perry, March, 2021

Why are we looking at X-ray images?

- To be able to classify x-rays that have pneumonia or not
- To be able to eliminate the human error of predicting based on x-ray images



What is Pneumonia

Pneumonia is an infection that inflames the air sacs in one or both lungs. The air sacs may fill with fluid or pus, causing cough with cough, fever, chills, and difficulty breathing.

Causes: Many germs can cause pneumonia. The most common are bacteria and viruses in the air we breathe.

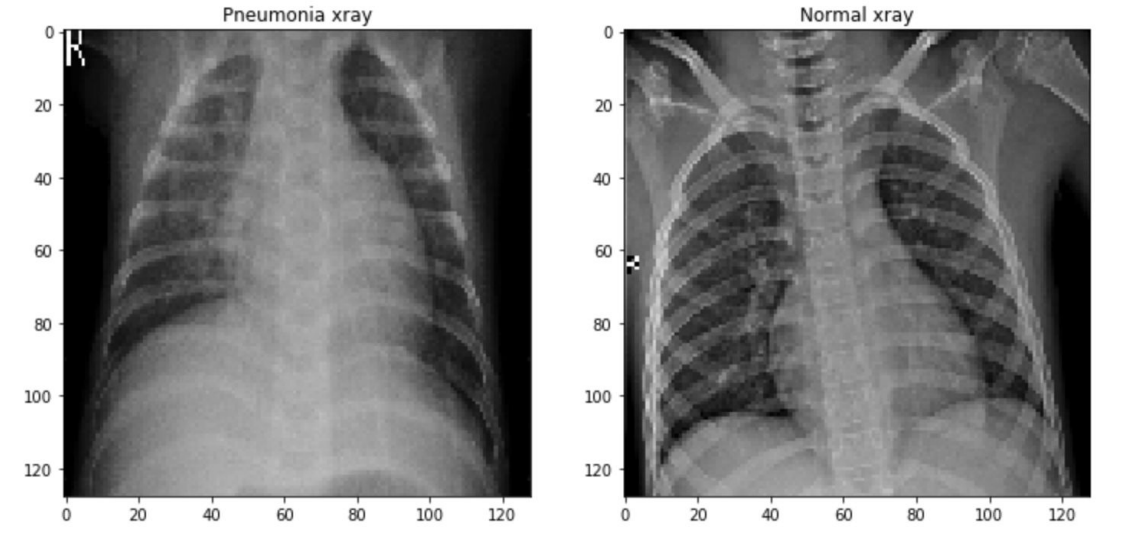
- Bacteria
- Bacteria - like organisms
- Fungi
- Viruses, including COVID-19

Risk Factors: Pneumonia can affect anyone. But the two age groups at the highest risk are:

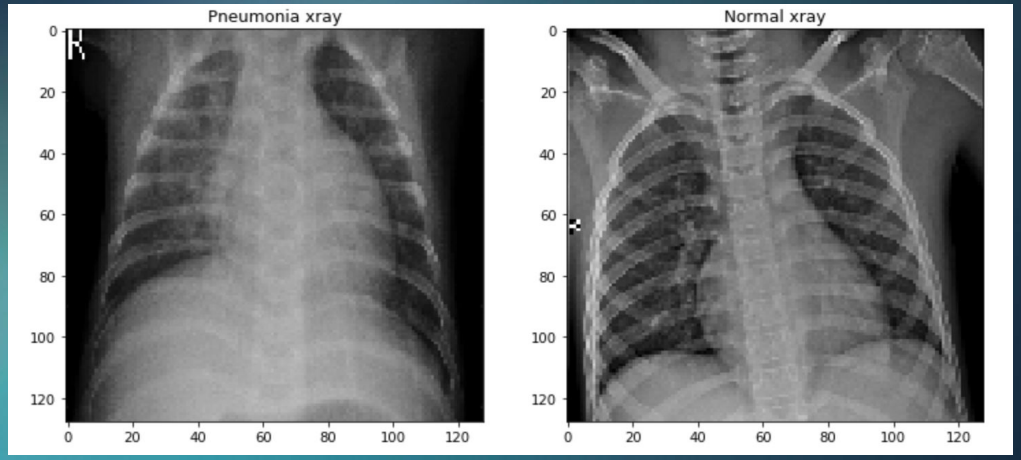
- Children who are 2 years old or younger
- People who are age 65 or older

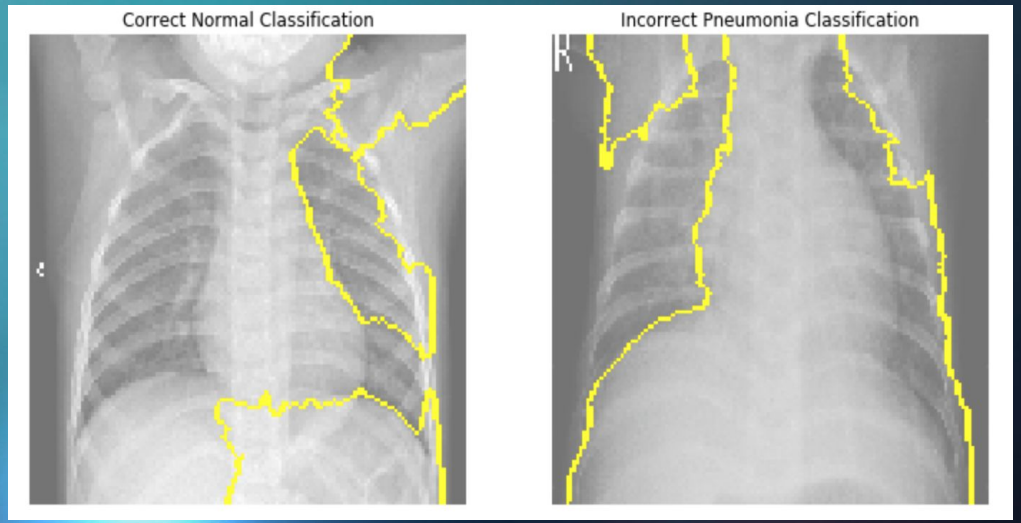
Data

- The data was broken up into 3 separate categories: Train, Test and Val
- Train
  - Normal - 1341
  - Pneumonia - 3875
- Test
  - Normal - 234
  - Pneumonia - 390
- Val
  - Normal - 8
  - Pneumonia - 8



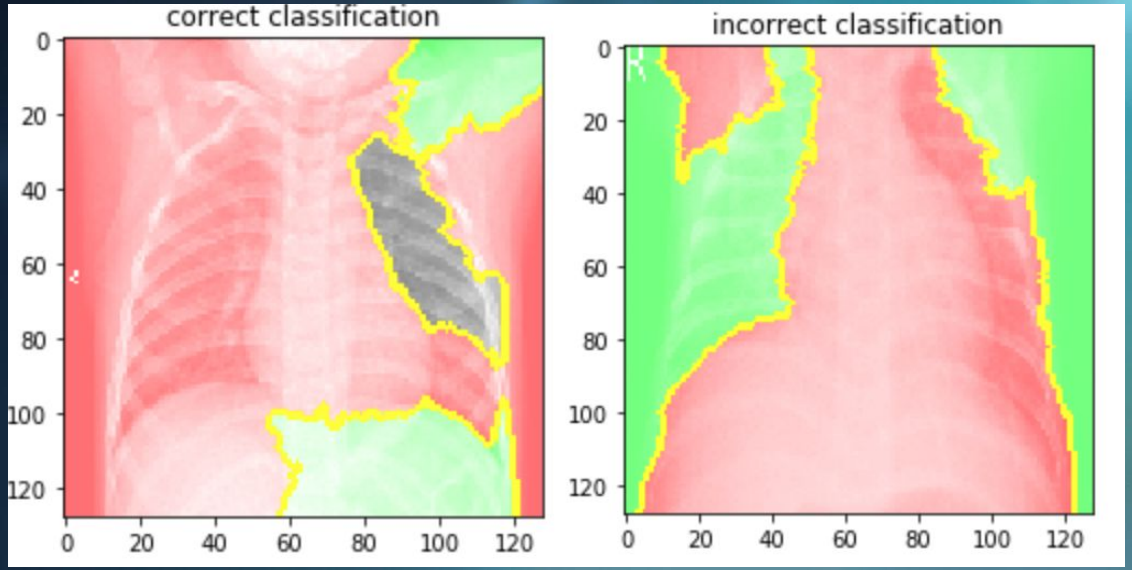
Results


Pneumonia xray
Normal xray
0
20
40
60
80
100
120


Correct Normal Classification
Incorrect Pneumonia Classification

Using Lime package in pandas I was able to look at what the models look at and decide what are the important things to look at in the image to classify whether a patient has pneumonia or not

Green = pro Red = con



Conclusion

Recommendations

To save the X-ray images with higher pixel density so that we can see a clearer picture

Don't just use one model Try different options so that you can compare results.

Start with simple model then just keep adding layers as needed

Future work

With more time:

I would look more into freezing and unfreezing specific layers of the transfer learning model to fine tune them

Try out a schedule learning rate decay model

Try with more epochs and different batch sizes

Research more successful tuning methods to improve accuracy score

Thank you for your time

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