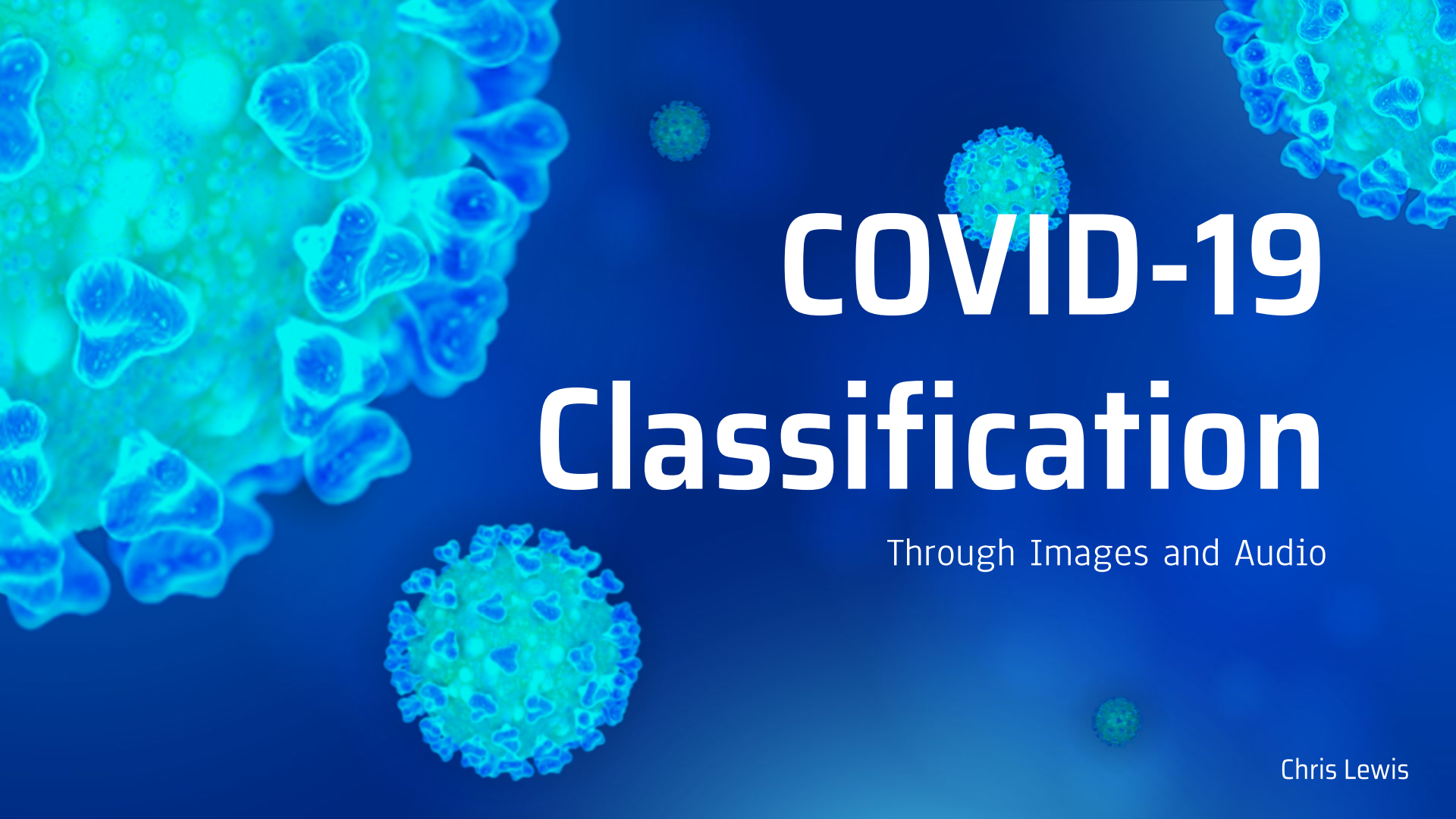


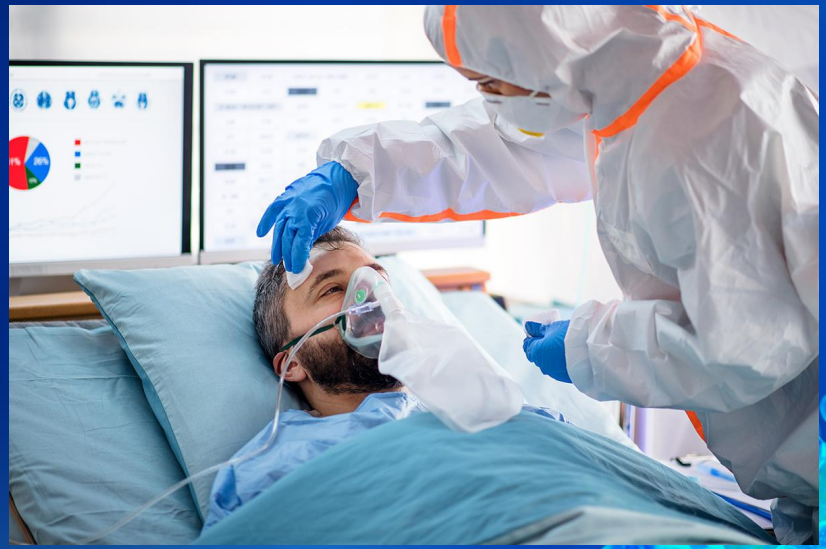
COVID-19 Classification

Through Images and Audio

Chris Lewis

What is COVID-19?

- A strain of a novel coronavirus that has not been previously detected in humans
- Easily transmissible
- Highly contagious
- Not all symptoms are present in those who become infected
- Significant percentage of those infected are asymptomatic

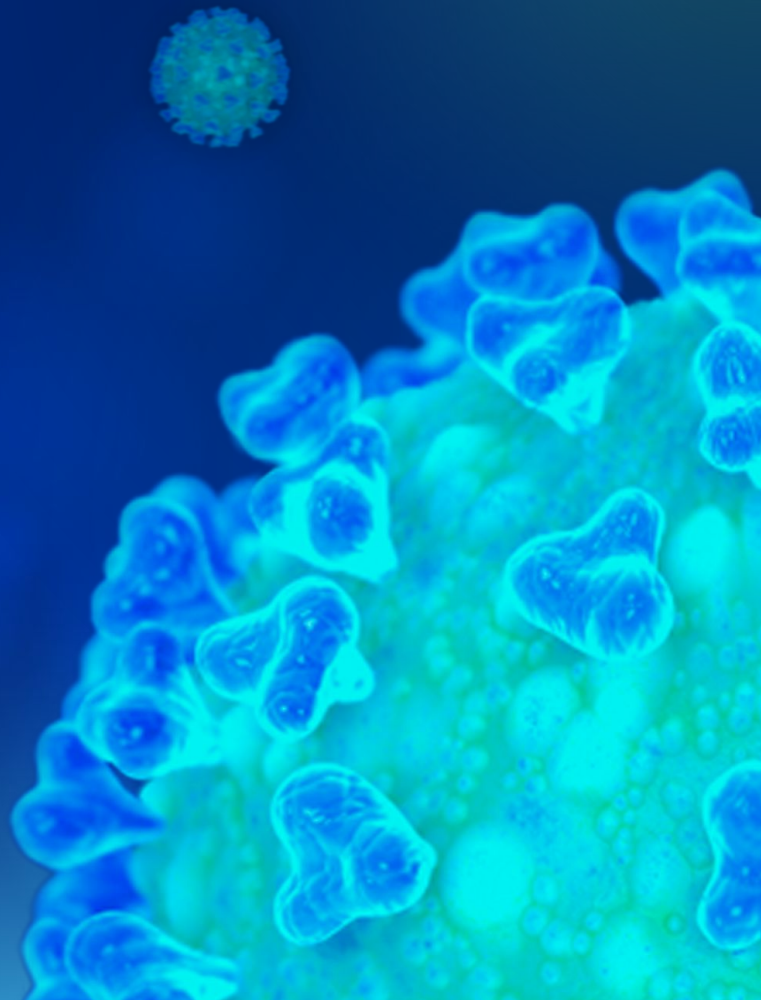


Modes of Transmission:

- Contact
- Droplet
- Airborne

Severity and Symptoms:

- Range from Asymptomatic ⟶ Severe
- Very few telltale symptoms:
  - Immediate and significant loss of taste and / or smell
  - “Covid toes”
  - Dry cough and shortness of breath



Our Social Defense

- Social distancing
- Use of masks in the community
- Hand hygiene
- Surface cleaning and disinfection
- Ventilation
- Avoidance of crowded indoor spaces

Some COVID Statistics

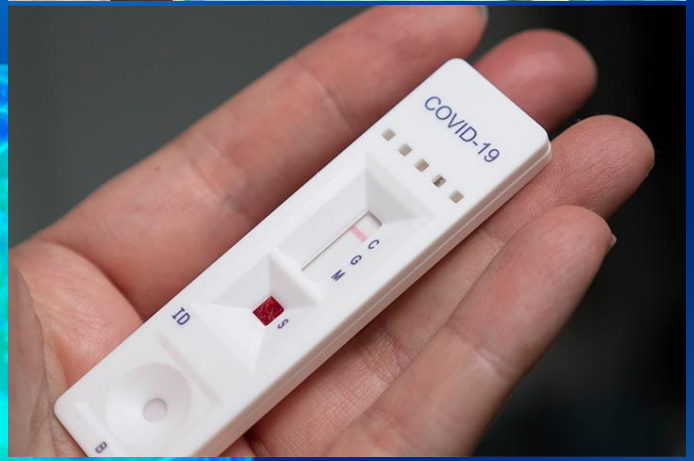
100,000,000+
Confirmed cases worldwide

2,000,000+
Deaths worldwide

20,000+
Daily ICU Hospitalizations
In the United States since early December 2020

100,000+
Daily Hospitalizations
In the United States since early December 2020

Types of Testing for COVID



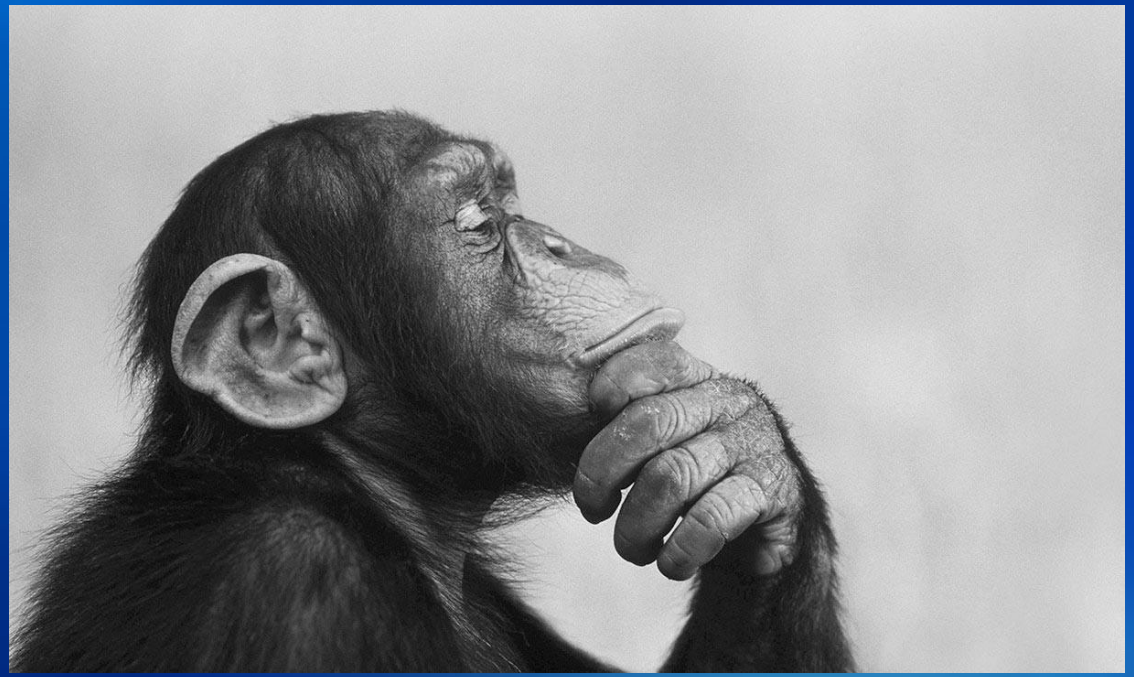
Viral Testing:

- Used if suspected of having a current COVID infection
- Two subtypes:
  - Molecular
  - Antigen

Antibody Testing:

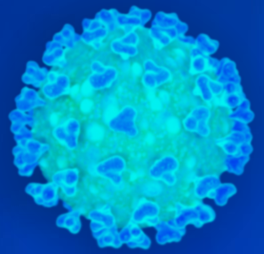
- Used to determine if a past COVID infection occurred

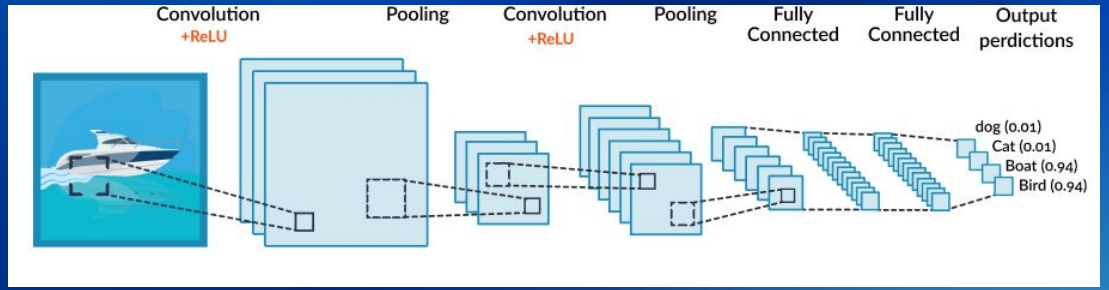
How Else Can We Determine if Someone Currently Has COVID-19?



X-Ray Image Classification

1. Gathered dataset via Kaggle's API
2. Contained 3800+ high quality chest x-ray images
3. Multiple classes: Healthy, Viral Pneumonia, COVID
4. Used CLAHE as a preprocessing technique
5. Created a Sequential Convolutional Neural Network



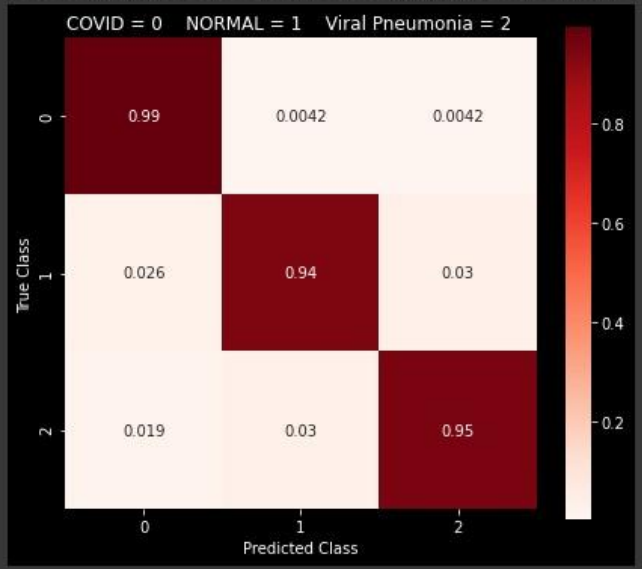


Ex. of CNN architecture; not exactly what our model used

X-ray Model Evaluation Results

Classification Report

	precision	recall	f1-score	support
0	0.95	0.99	0.97	240
1	0.97	0.94	0.95	269
2	0.97	0.95	0.96	270
accuracy			0.96	779
macro avg	0.96	0.96	0.96	779
weighted avg	0.96	0.96	0.96	779

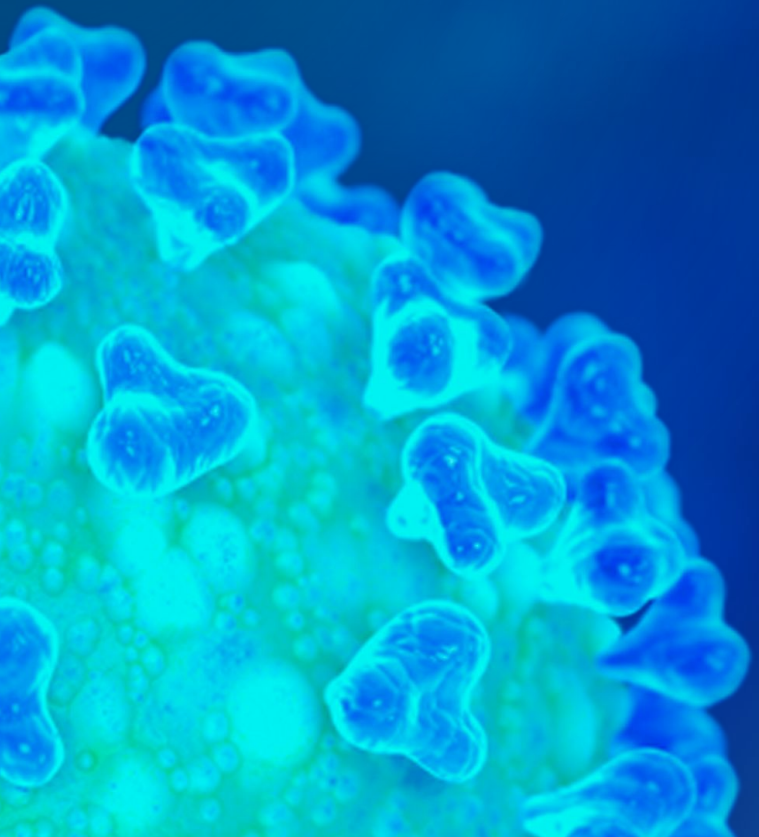


- 99% recall on COVID class
- Accuracy of 96.15%
-

Classifying COVID via Audio Spectrograms

1. Gathered cough audio from University of Stanford's Virufy dataset via Github
2. Using Librosa's library, created mel-spectrogram images for each segmented mp3 audio
3. Saved images in their respective folders
4. Created train, test, split folders
5. Trained Sequential Neural Network model off the images

Virufy Model Evaluation Results



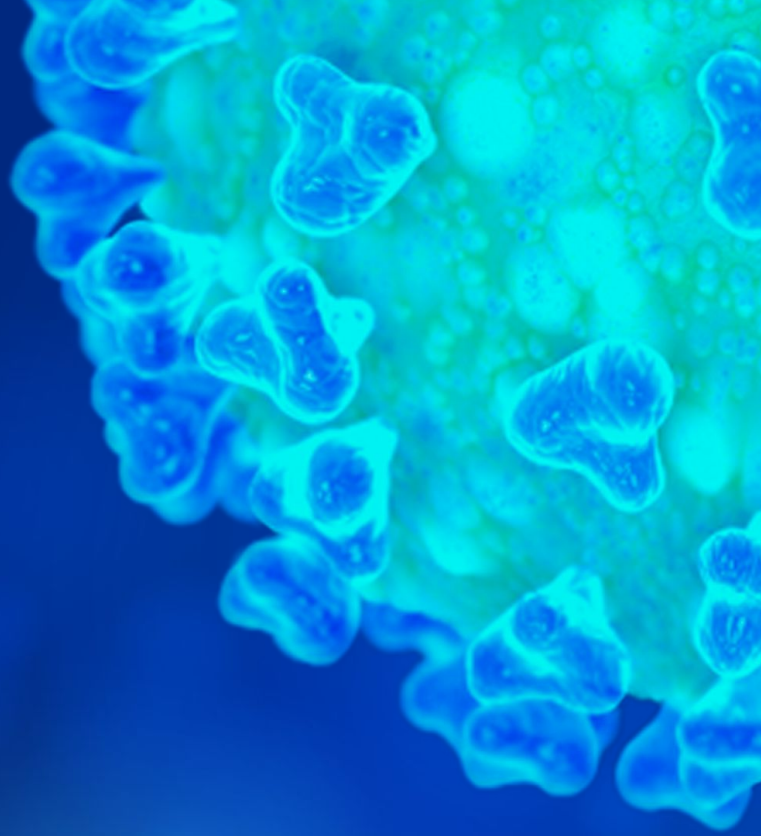
CoughVid Audio Dataset

1. Gathered CoughVid cough audio via Zenodo
2. Inspected, scrubbed, and preprocessed coughvid dataset
3. Combined with Virufy audio dataset
4.

Further Research:

Thanks for your time!

Are there any questions?



References

1. https://www.vdh.virginia.gov/coronavirus/covid-19-testing/#:~:text=There%20are%20two%20main%20types,)%20and%20antibody%20tests.
2.

Appendix