
COVID-19 Detection

— Capstone - Saif Kasmani —

What is Covid-19?

COVID-19, or more commonly known as the **Novel Coronavirus disease** is a highly infectious disease that appeared in China towards the end of 2019. This disease is caused by **SARS-CoV-2**, a virus that belongs to the large family of coronaviruses. The disease first originated in **Wuhan, China** in **December 2019** and soon became a global pandemic, spreading to more than **213** countries.

Goal

Use **Machine Learning** algorithms to detect the disease from images of **Chest X-rays** and **CT scans**. Automated applications can be created to help support radiologists.

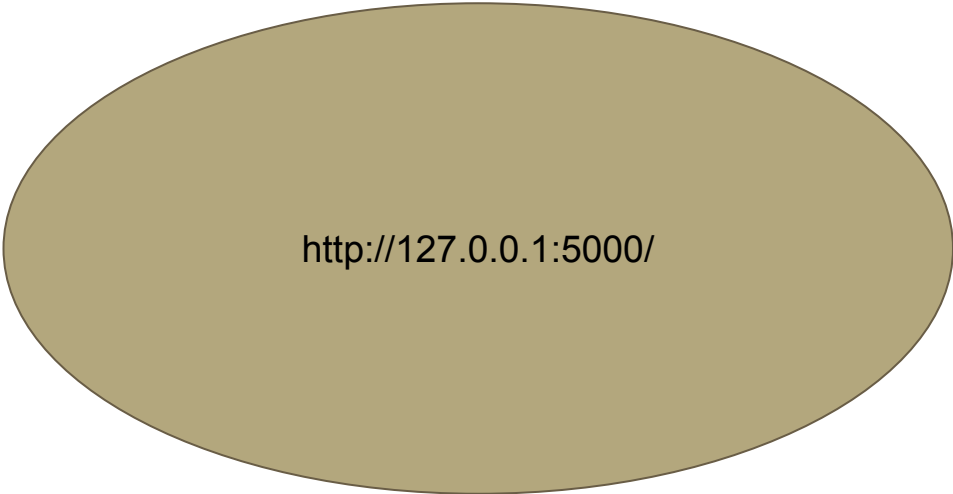
This capstone is an attempt to use four Deep Learning algorithms, namely: **VGG16**, **ResNet50**, **InceptionV3** and **Xception**.

Data set

- **Chest X-ray** images (1000 images)
- **CT Scan** images (750 images)

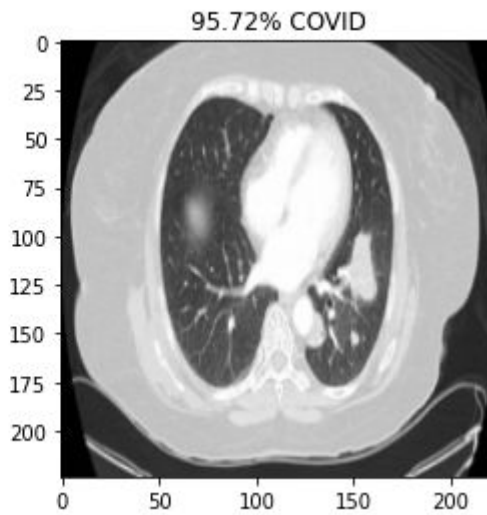
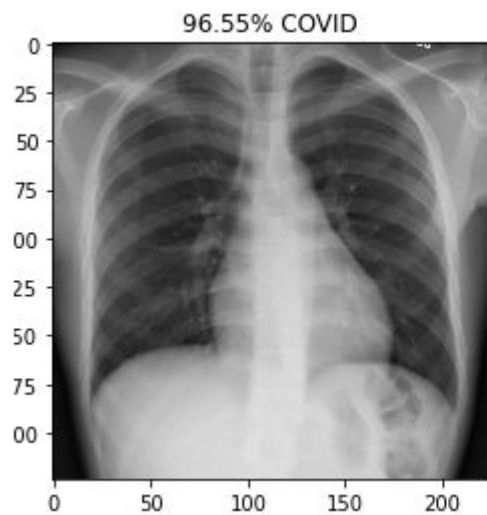
Four algorithms: VGG16, ResNet50, InceptionV3 and Xception were trained separately on Chest X-rays and CT Scans, giving us a total of 8 deep learning models. **80%** of the images were used for **training** the models and the remaining **20%** for **testing** the accuracy of the models.

Working Model



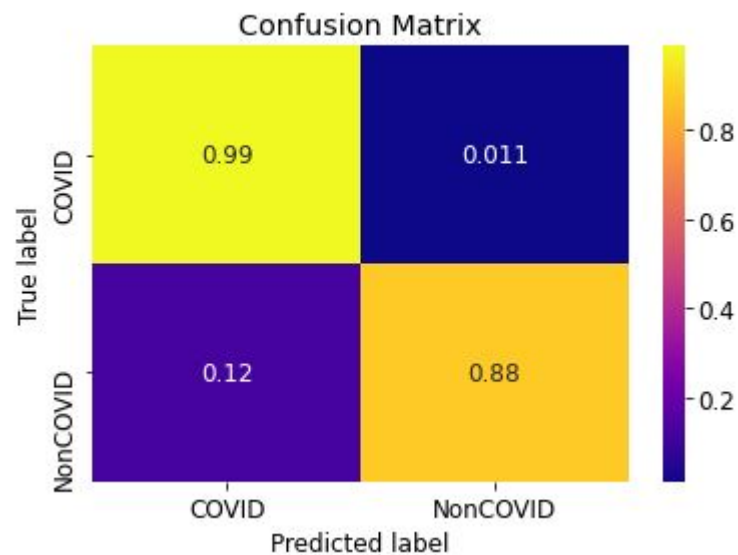
`http://127.0.0.1:5000/`

Evaluating Results



| | precision | recall | f1-score | support |
|--------------|-----------|--------|----------|---------|
| 0 | 0.88 | 0.99 | 0.93 | 87 |
| 1 | 0.99 | 0.88 | 0.93 | 101 |
| accuracy | | | 0.93 | 188 |
| macro avg | 0.93 | 0.93 | 0.93 | 188 |
| weighted avg | 0.94 | 0.93 | 0.93 | 188 |

Confusion Matrix with Normalized Values



Screenshots of Flask App

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HOW TO PROTECT YOURSELF FROM CORONAVIRUS?

Watch the video alongside to know more

[Detect COVID?](#)

INPUT IMAGE



Inception Classification Report

| | precision | recall | f1-score | support |
|--------------|-----------|--------|----------|---------|
| 0 | 0.92 | 0.99 | 0.96 | 87 |
| 1 | 0.99 | 0.93 | 0.96 | 101 |
| accuracy | | | 0.96 | 188 |
| macro avg | 0.96 | 0.96 | 0.96 | 188 |
| weighted avg | 0.96 | 0.96 | 0.96 | 188 |

Inception Prediction Result

84.19% NonCOVID

VGG Classification Report

| | precision | recall | f1-score | support |
|--------------|-----------|--------|----------|---------|
| 0 | 0.88 | 0.99 | 0.93 | 87 |
| 1 | 0.99 | 0.88 | 0.93 | 101 |
| accuracy | | | 0.93 | 188 |
| macro avg | 0.93 | 0.93 | 0.93 | 188 |
| weighted avg | 0.94 | 0.93 | 0.93 | 188 |

VGG Prediction Result

98.61% NonCOVID

What is the use of this App?

- Given the highly growing number of cases of covid, Radiologists are dealing with cases far more than they were used to.
- In order to make the testing process faster, automated applications can be created to help support the radiologists.

Conclusion

In conclusion, I would like to throw light on the fact that the analysis has been done on a limited dataset and that the results are preliminary.

Medical validations have not been done on the approach and hence the results might differ from those observed in practical use cases.

Future Work

- I plan to improve the performance of the models by training them on more images and possibly including other factors like age, nationality, gender, etc.
- Use the DarkNet-19 Model for transfer learning.



THANK YOU

