

The background of the slide is a dark teal color with several large, out-of-focus images of coronavirus particles. These particles are spherical with a dark center and a lighter, spiky outer layer. They are scattered across the slide, with some appearing more prominent than others.

Deep Learning – Chest X- Rays

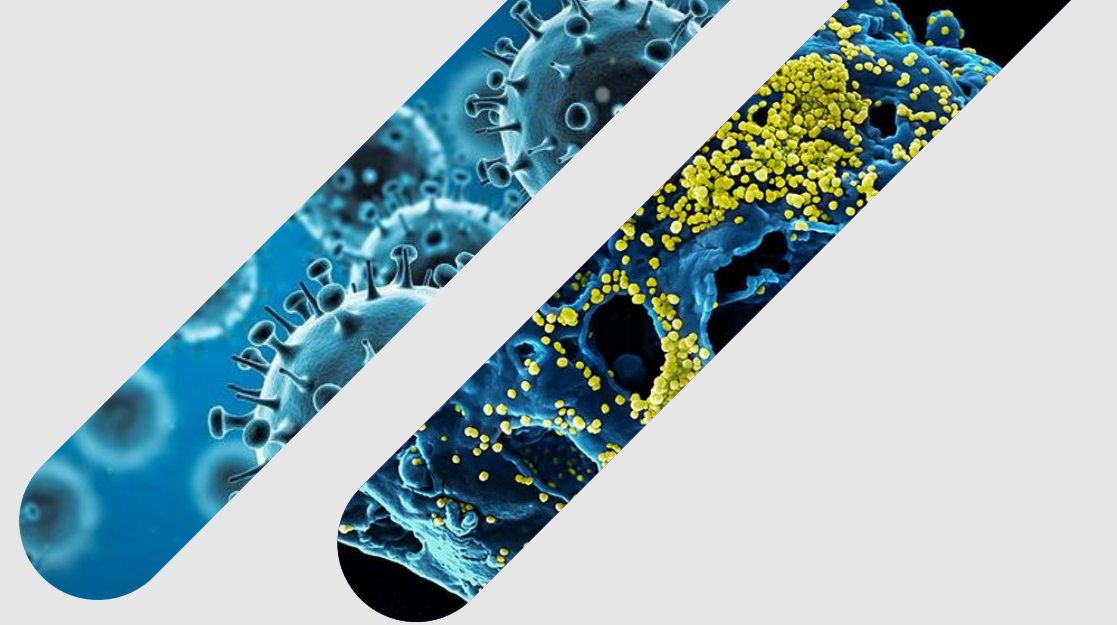
Differential Diagnosis of COVID-19, Viral Pneumonia, TB

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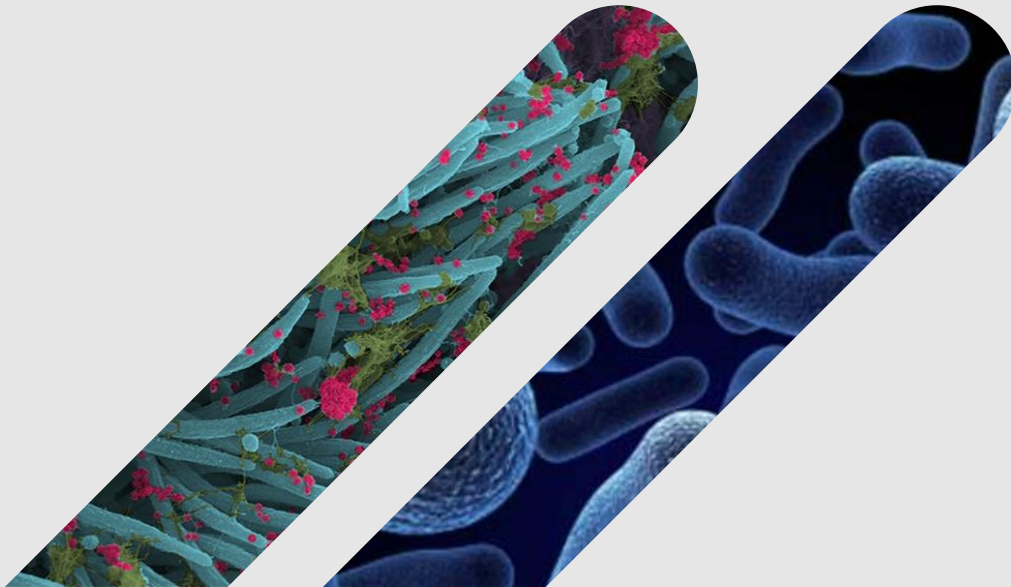
OBJECTIVES

Analyze the importance of the differences and similarities of various diseases and viral infections like COVID, Viral Pneumonia, and Tuberculosis.



Present a model that would accurately diagnose whether a person is infected and if so, diagnoses the underlying condition

Discuss the positives and shortcomings of using an AI-based model and recommend the best use of and modifications to this model for appropriate diagnosis



INTRODUCTION

Outbreak of COVID-19 has taken over all our lives

Difficult to detect and differentiate from other common diseases and infections

- Share common symptoms
- Example Pneumonia

Deep Learning models in the past – about 90% Accuracy in detecting pneumonia

Pneumonia often misdiagnosed as Tuberculosis

Model trained to accurately diagnose COVID, Pneumonia, TB, and Healthy

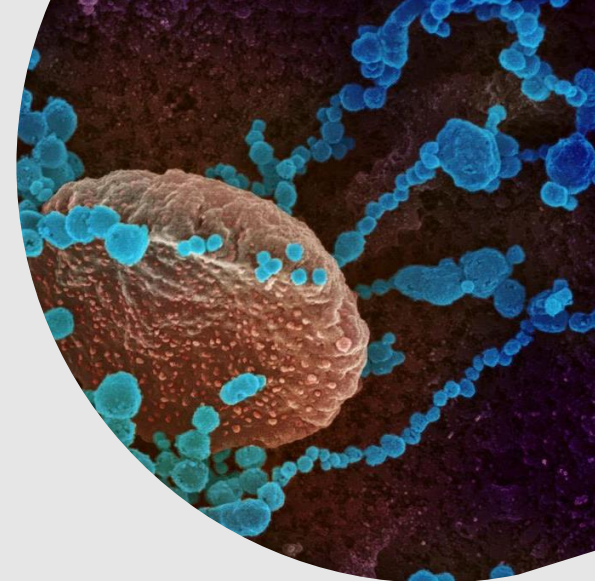
Also visualizes explanations

Important measures:

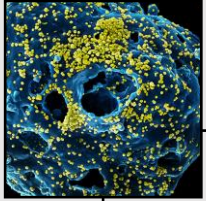
Accuracy

Precision (Important when differentiating between various diagnosis)

Recall (Important when detecting if a patient is healthy)

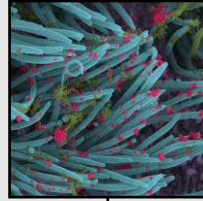


DATA



Dataset 1

- COVID-19
- Viral Pneumonia
- Normal



Dataset 2

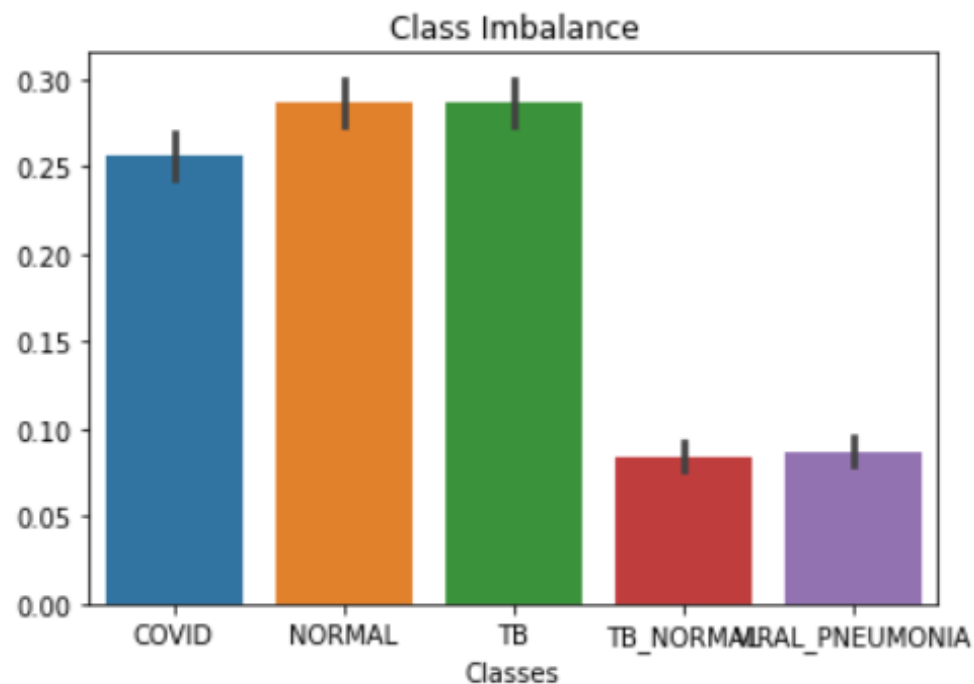
- Tuberculosis, China
- Normal, China



Dataset 3

- Tuberculosis, Montgomery
- Normal, Montgomery

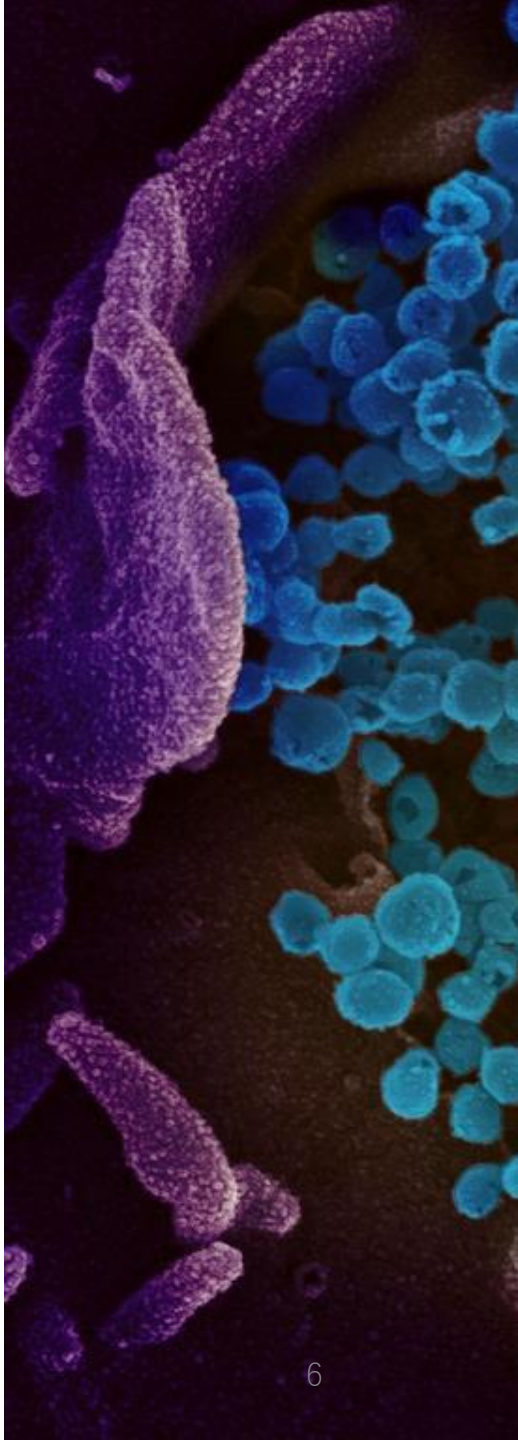
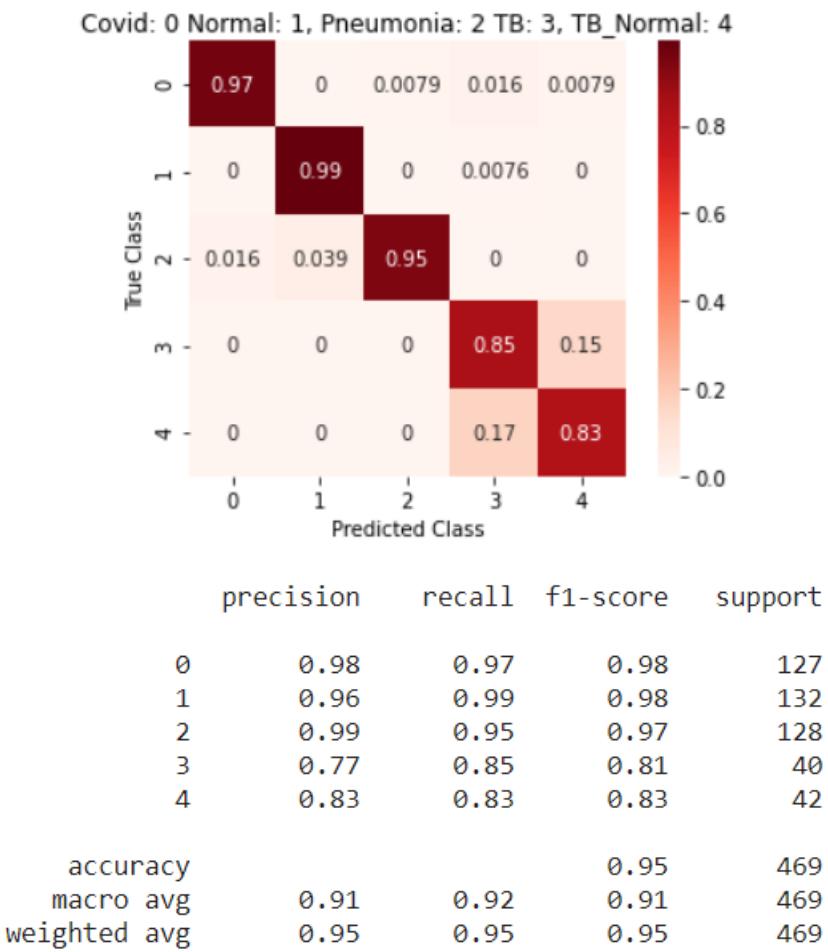
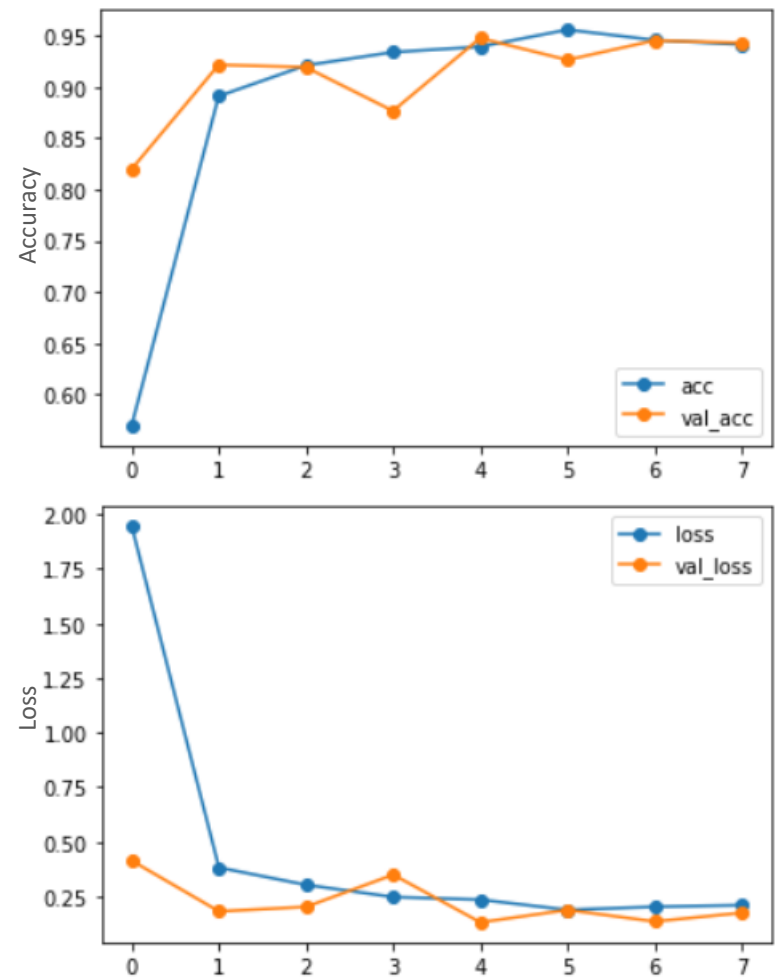
CLASS IMBALANCE | METHODOLOGY



Class weights included in the model to incorporate the class imbalance

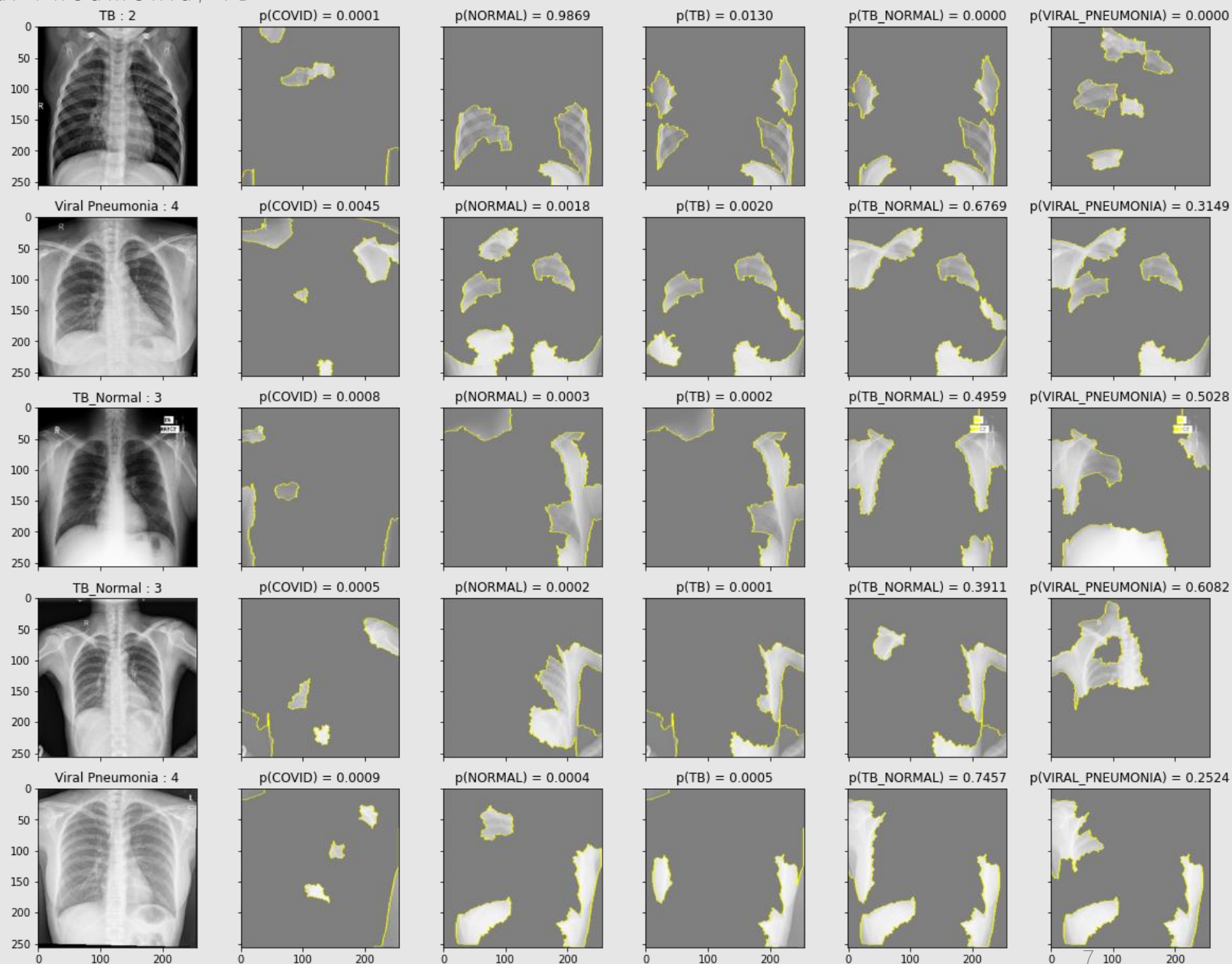
- Data Pre-processing
- Explore and optimize various pre-trained models to use as base model to build on.
- Finalize the best model based on performance measures (Accuracy, Precision, Recall) and model explanation

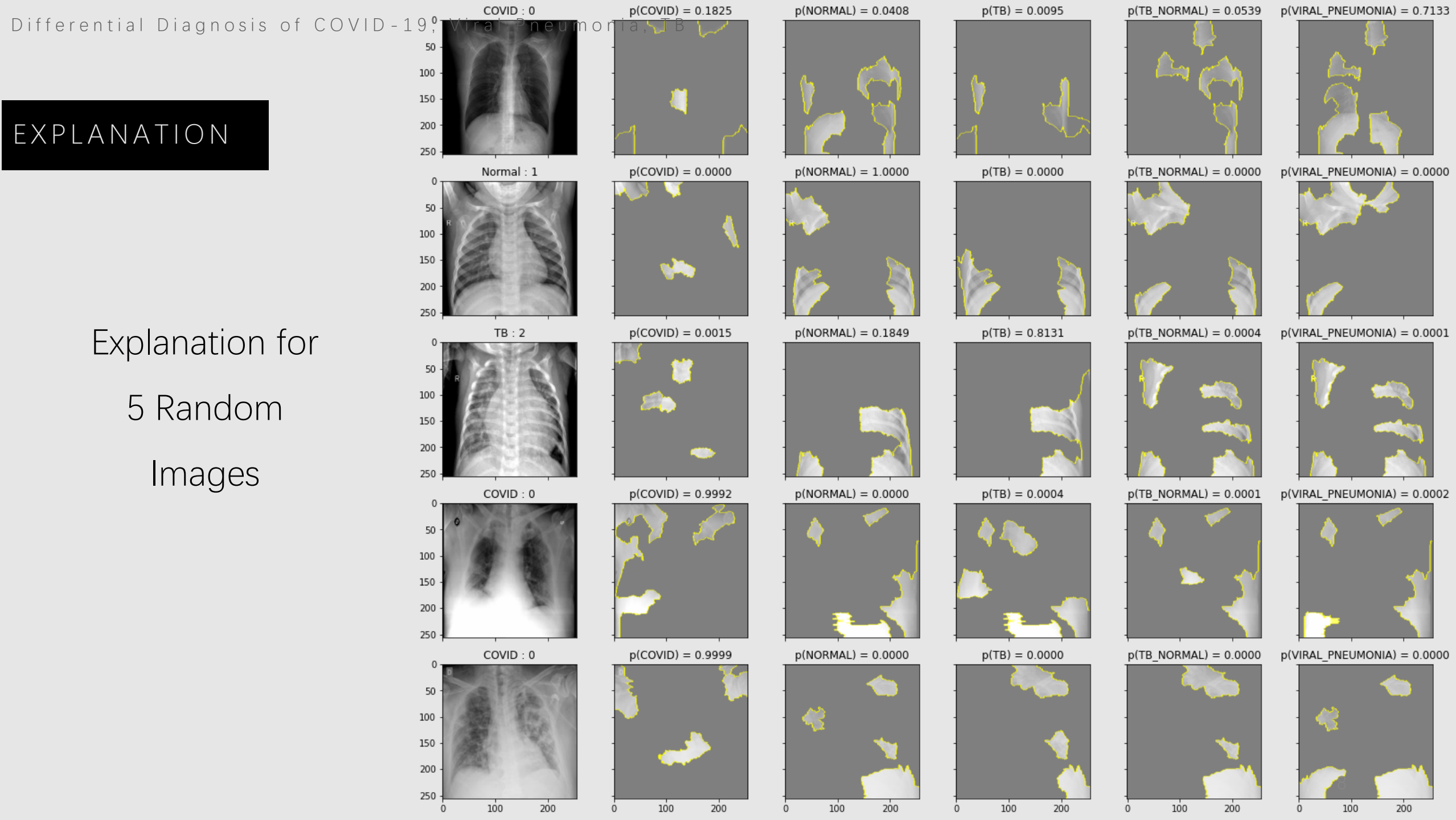
BEST MODEL



EXPLANATION

Total Bad
Predictions:
25/422





RECOMMENDATIONS



Recommended to use AI based model to distinguish COVID-19 from Viral Pneumonia and Normal: **95% ACCURACY, HIGH PRECISION and RECALL**

Recommended to invest in research in gathering more data and building on the model to be able to use it to detect TB

Use a **COMBINATION OF SYMPTOMS** either by knowledge or integrating with the model for better and reliable diagnosis

FUTURE WORK

Building a Dashboard/Application that would accept any Xray, preprocess and use the model for diagnosis, and explanation

Explore other models by building by scratch, and including image augmentation, and adding masks to improve the predictability of the model

Include other symptoms in the model to aid in better diagnosis.



The background of the slide is a dark teal color with several large, out-of-focus, spherical particles that resemble viruses or bacteria. These particles have a dark center and a lighter, textured outer layer with small protrusions. The text "THANK YOU!" is centered in a large, white, sans-serif font. Below it is a thin white horizontal line.

THANK YOU!

QUESTIONS?