COVID-19

TEAM A

INTRODUCTION TO BIG DATA AND ANALYTICS

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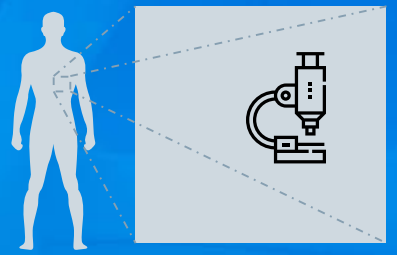
Azure Custom Vision

Introduction

As the spread of COVID-19 accelerates, there has been an unprecedented focus on the power of big data solutions to assist in managing this crisis. In our project we're utilising Computer Vision to train a model to assist clinicians in speedy diagnosis of COVID by X-Ray Images.



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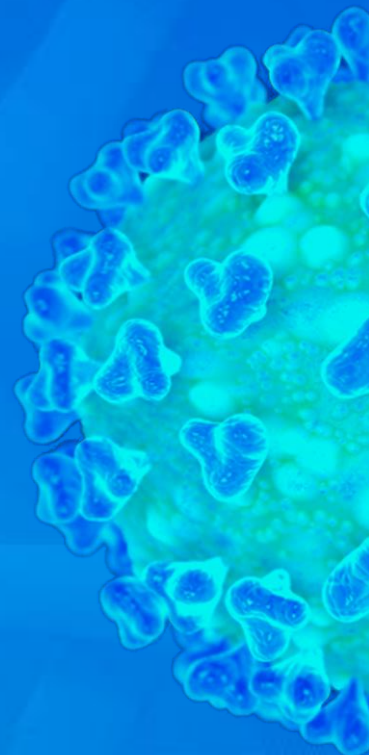
Business Case

Executive Summary
A high proportion of COVID deaths are associated with respiratory complication. Everyone is working against the clock to find treatment and management solutions to maintain and treat the virus.

Finance
Goverment level funding has been available to manage the spread of the virus.

Objective
The main objective is to optimize and speed up the diagnosis of COVID patients by utilizing x-ray images.

Benefits
-Faster and improved precision of COVID diagnosis.
-More patients treated
-Reduction in spread of the virus
-Reduction in COVID related deaths.



Data Collection

We have utilised Kaggle, GitHub repository and Google search to collect the required images for this project.

kaggle

COVID-19 X-Ray Images: 477

NOT COVID-19 X-Ray Images: 578

Negative Images: 560

COVID-19 and NON COVID-19 x-ray images have been collected by a team of international researchers and medical doctors. The research team contributed to the data science community by uploading the datasets into Kaggle and GitHub repository. Allowing others to use it to help in tackling this global pandemic.

Custom Vision Modeling

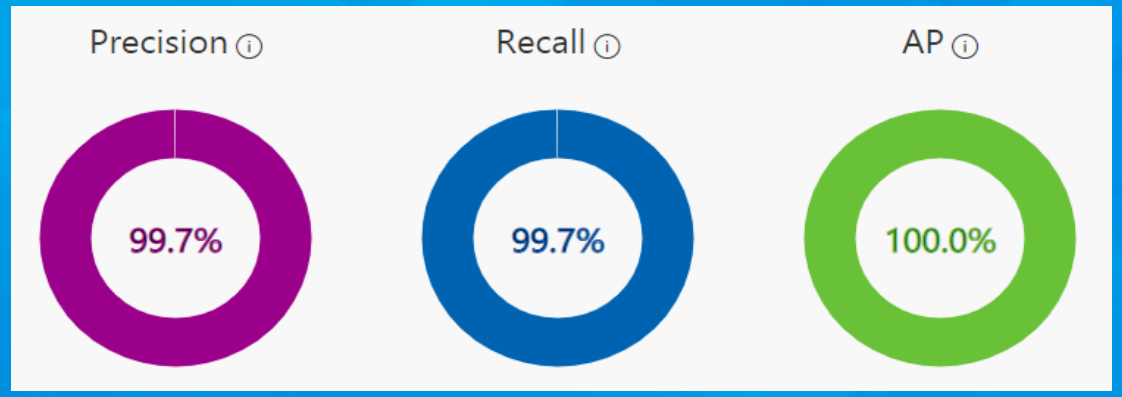
Custom Vision Service from Microsoft Azure combines cutting-edge neural network technology with an **easy-to-use interface** to create a tool that opens up machine vision to **more widespread use**.

1. Upload a set of images and label them.
2. Train and generate the model using neural networks.
3. Use the Web Interface to evaluate the model's performance.

Custom Vision is optimized to recognize major differences between images, so the user can start prototyping the model with a small amount of data (50 images per class)

Model Evaluation

We decided to train **roughly 500** images from each class (COVID-19, NON-COVID and Negative) with **Advanced Training** option where it took roughly 12 hours to complete.
The model achieved the following results on the training set:



Tag	Precision	Recall	A.P.	Image count
Negative	100.0%	100.0%	100.0%	560
COVID19	100.0%	99.0%	100.0%	477
Not COVID19	99.1%	100.0%	100.0%	578

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SWOT ANALYSIS

STRENGTHS

- High metric performance
- Easy-to-use interface, no coding required

WEAKNESSES

- The algorithm’s outcomes can not be explained with complete transparency.

OPPORTUNITIES

- Enable more customization
- Detect minor changes

THREATS

- Easy to overfit the model.

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Conclusions

Business related

- Allow prioritization of the patients that need immediate medical attention.
- Savings in false positives treatments.
- Relieve of medical staff’s time.
- Equalize the effectiveness in the diagnosis of COVID-19 between hospitals with different financial and specialized staff capabilities.
- Enabling x-ray COVID-19 datasets to be shared between medical centres which will allow the accomplishment of more accurate models.

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Thank You!

Team A, GMBD 20 – 21

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