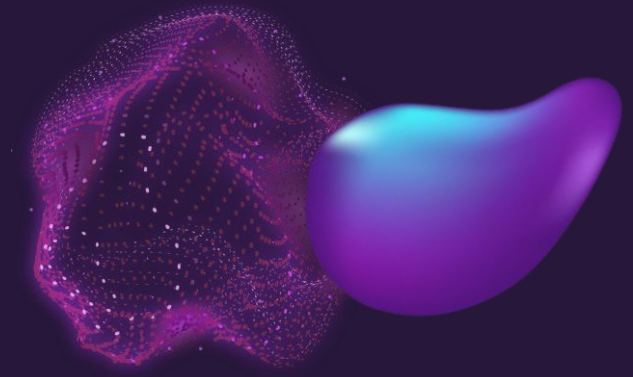

BMEG 3103 (AI)

PROJECT 1

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CHAN, Cheuk Ka (1155174356)

OUR TEAM

AU Wai Tak

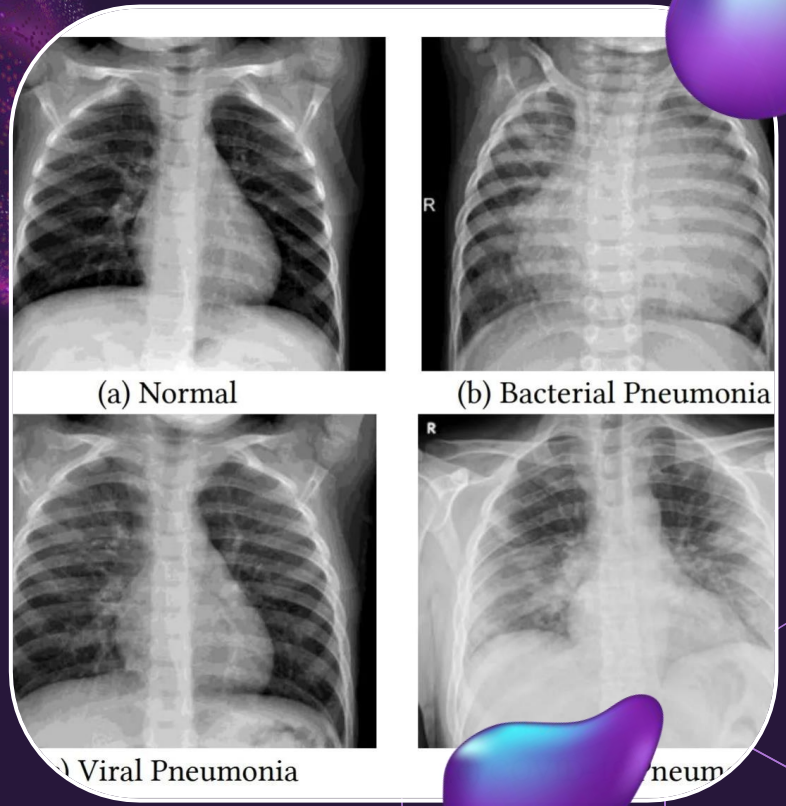
7.

CHAN Cheuk Ka

9.

INTRODUCTION

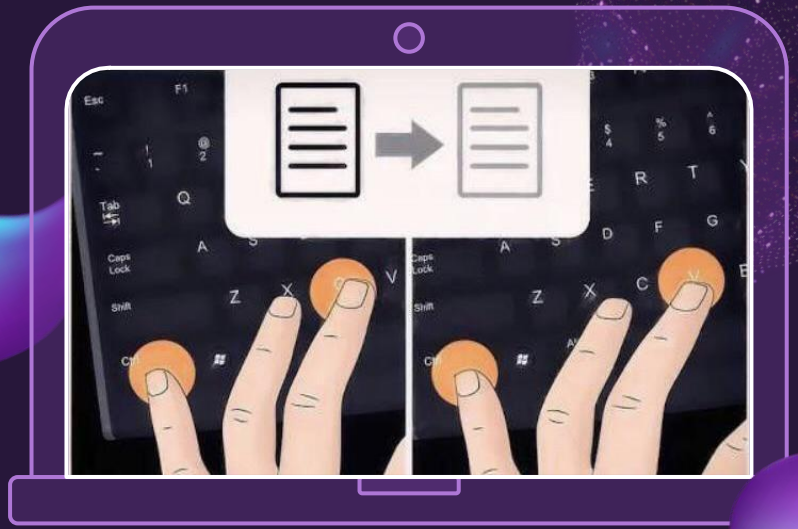
This project's task is to create a machine learning algorithm that can distinguish between normal and pneumonia chest x-ray.



01

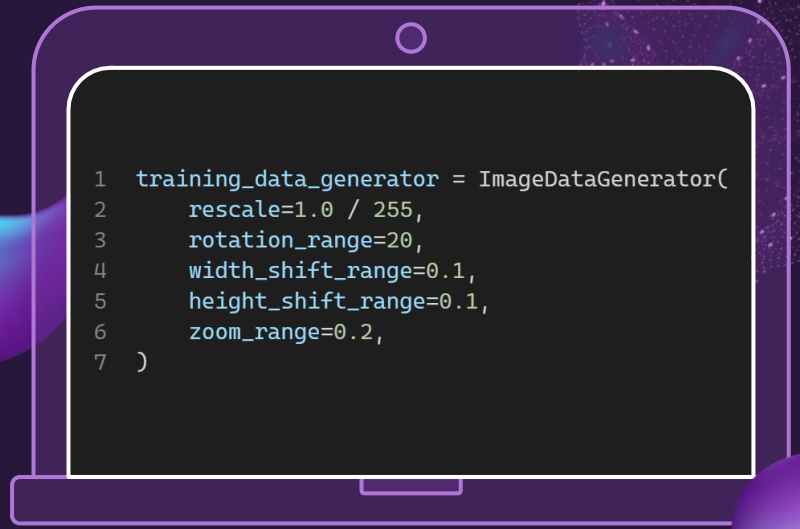
DATA PRE-PROCESSING

+ data augmentation



BIAS PADDING

We tripled the normal dataset from 1082 to 3246 to match the 3110 images in the pneumonia dataset to mitigate bias



DATA AUGMENTATION

We augmented the training data to improve accuracy.

02

TRAINING AI MODEL

+ hyperparameters

CONVOLUTIONAL NEURAL NETWORK

From tensorflow.keras

```
model = Sequential(
    [
        layers.Conv2D(32, 3, input_shape=(IMAGE_WIDTH, IMAGE_HEIGHT, 1), activation="relu"),
        layers.MaxPooling2D(),
        layers.Conv2D(64, 3, activation="relu"),
        layers.MaxPooling2D(),
        layers.Conv2D(128, 3, activation="relu"),
        layers.Conv2D(128, 5, activation="relu"),
        layers.MaxPooling2D(),
        layers.Conv2D(64, 3, activation="relu"),
        layers.Conv2D(64, 3, activation="relu"),
        layers.Dropout(0.2),
        layers.MaxPooling2D(),
        layers.Conv2D(32, 3, activation="relu"),
        layers.Conv2D(32, 3, activation="relu"),
        layers.MaxPooling2D(),
        layers.Flatten(),
        layers.Dense(128, activation="relu"),
        layers.Dense(64, activation="relu"),
        layers.Dropout(0.2),
        layers.Dense(32, activation="relu"),
        layers.Dense(16, activation="relu"),
        layers.Dense(NUM_CLASSES, activation="sigmoid"),
```

NETWORK ARCHITECTURE

EARLY STOPPING

We monitored the loss on the validation dataset and stopped the training process if it has not improved after 20 epochs.

HYPERPARAMETERS

OPTIMISER

We used *adam* with *learning_rate = 0.001* and categorical cross-entropy as the loss function

DROPOUT RATE

We chose *dropout_rate = 0.2*

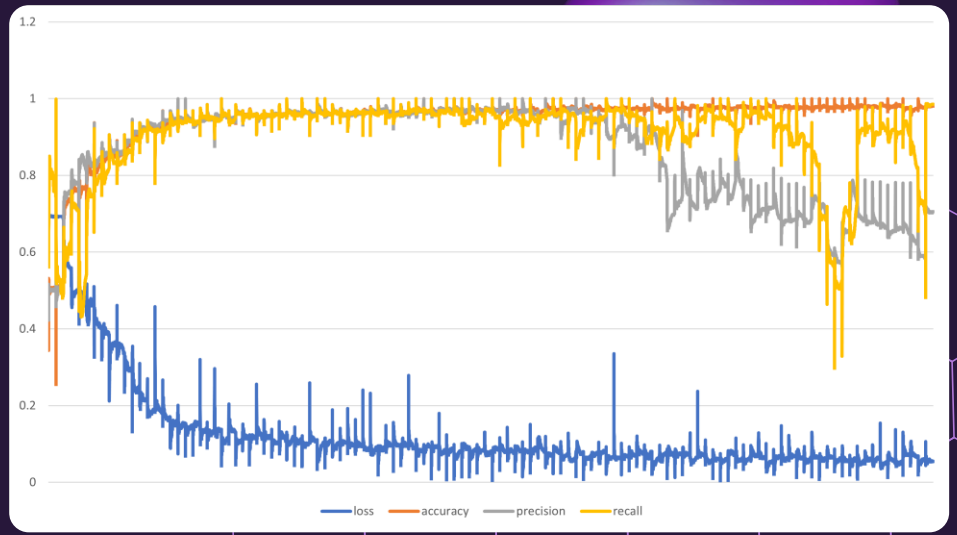
BATCH SIZE

We chose *BATCH_SIZE = 32*

METRICS

on the testing data, after hyperparameters tuning

ACCURACY	0.9526542425155640
PRECISION	0.7135249972343445
RECALL	0.9612625241279602
CONFUSION MATRIX	88 177 156 276




FIN.