



# Chest X-ray Classification

**Atleast we tried**

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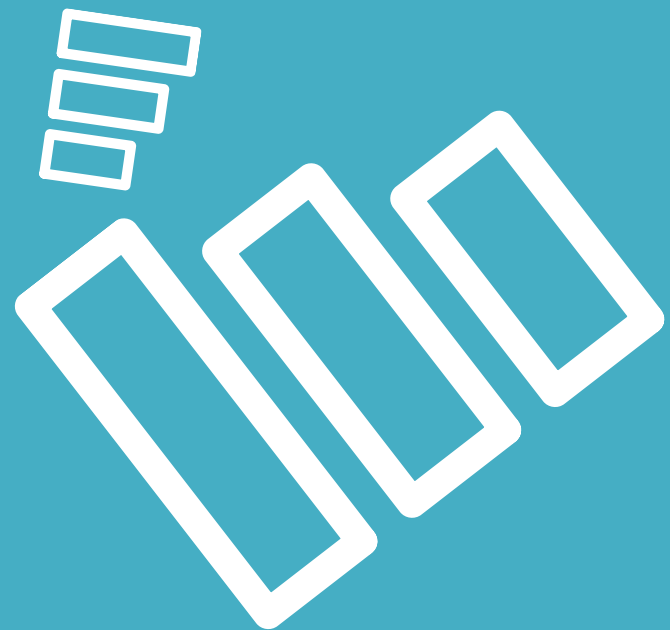
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# INTRODUCTION



# Introduction

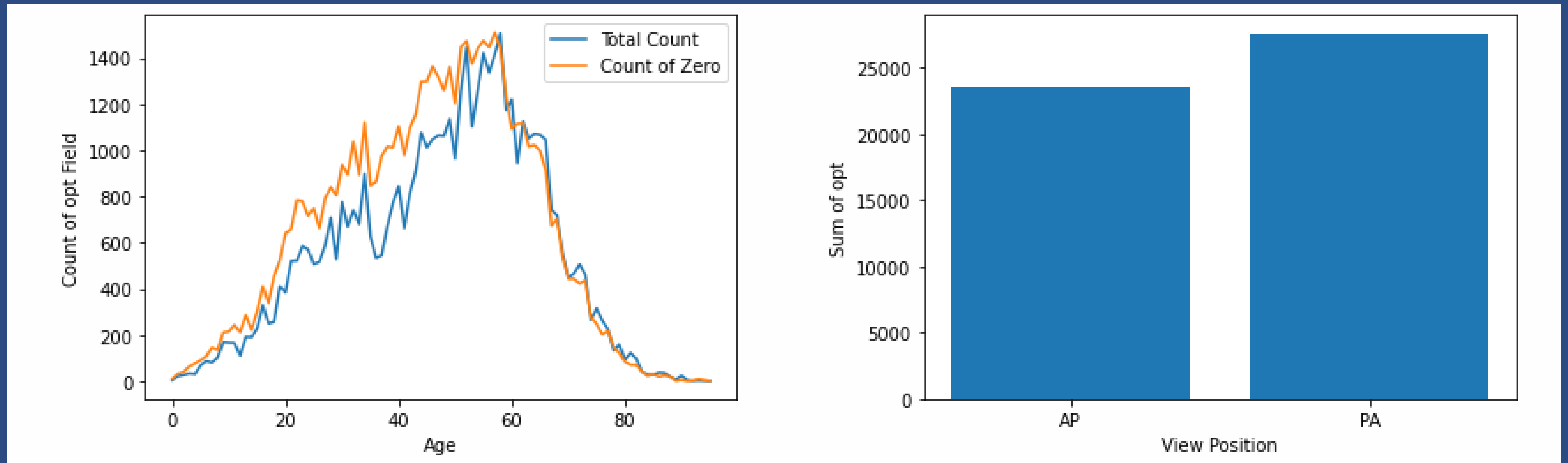


- We were given a dataset containing chest X-ray images of  $n$  patients, and the corresponding diseases diagnosed.
- Given a set of 998 test images, we were asked to classify the images on any detection.
- We have used Convolutional deep learning models and developed stacked models to accomplish the given task.

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# **EXPLORATORY ANALYSIS**

# Exploratory Analysis

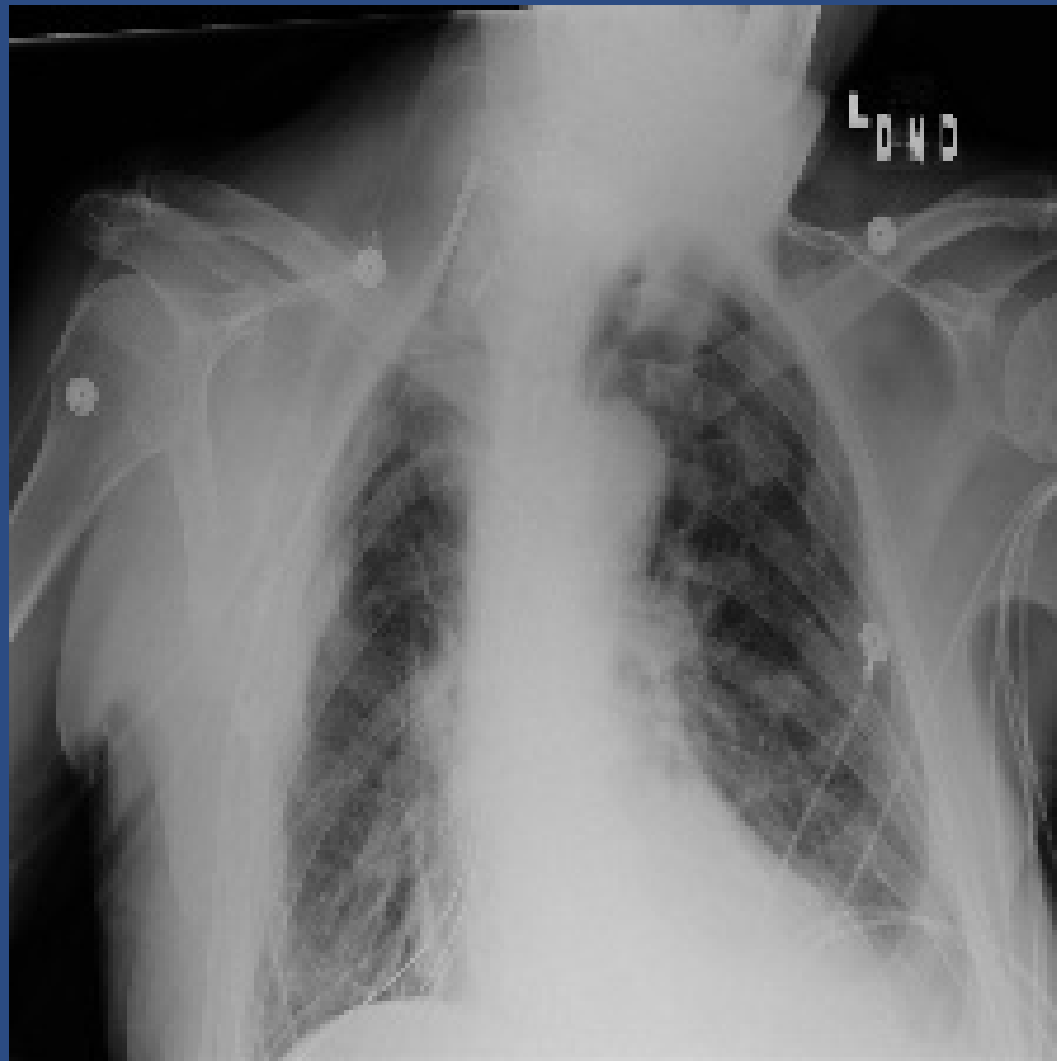


- The graph on the left, shows that the difference between the number of images corresponding to the 2 classes is negligible.
- The graph on the right, shows that  $P(y=1/AP)$  is almost equal to  $P(y=1/PA)$ . negligible.

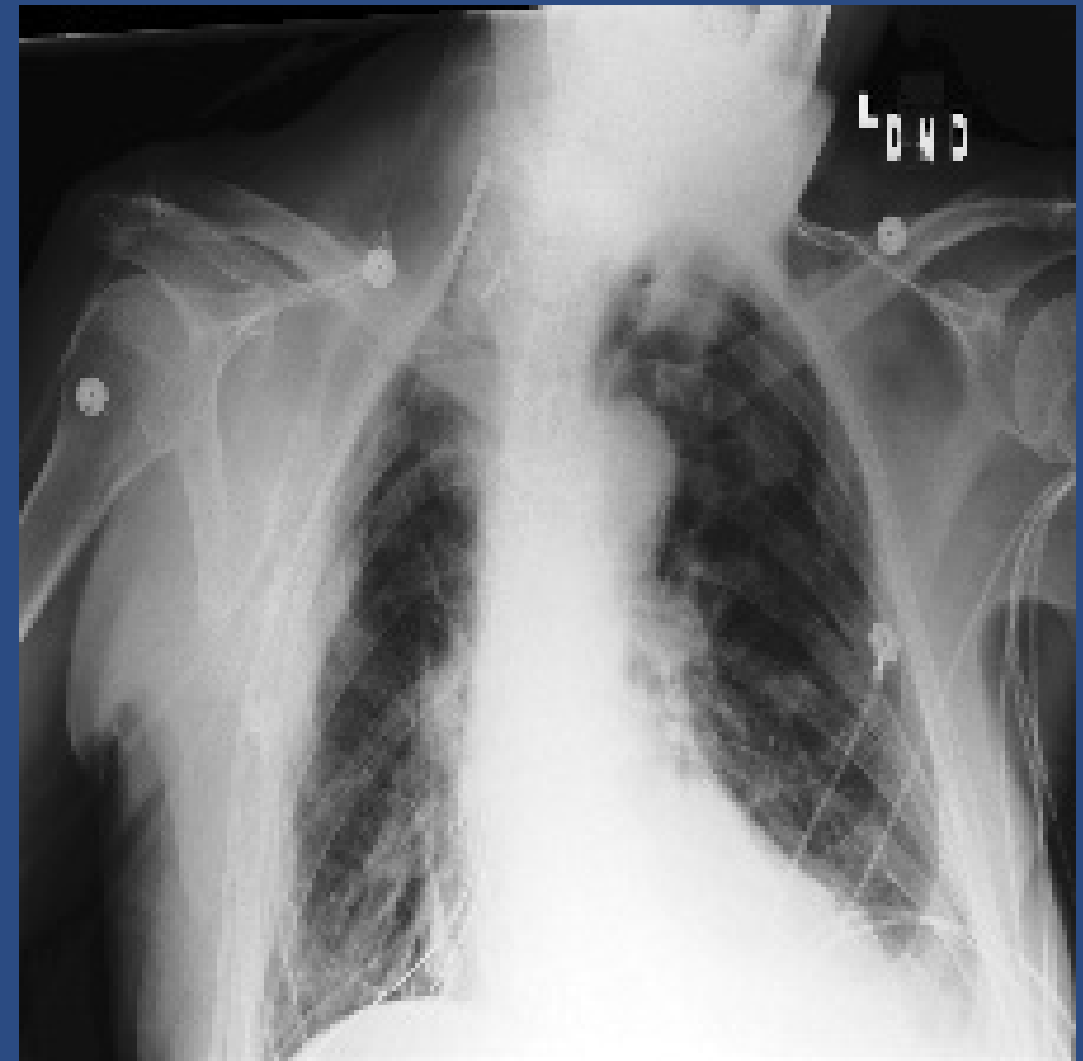
# Image preprocessing Techniques

- We started with a simple resize function that resizes the images to size 224x224 from 1024x1024, retaining the 3 channels, to ease the training process and to reduce the training time.
- We then used the resize function with cubic interpolation, which downsizes the image by taking the pixel values from interpolation of the nearest pixels WRT a cubic function.
- We finally found that the information loss is minimum when using a equalizer function which normalizes the R,G,B histograms of the resized images.

# Image preprocessing Techniques



cubic\_interpolation

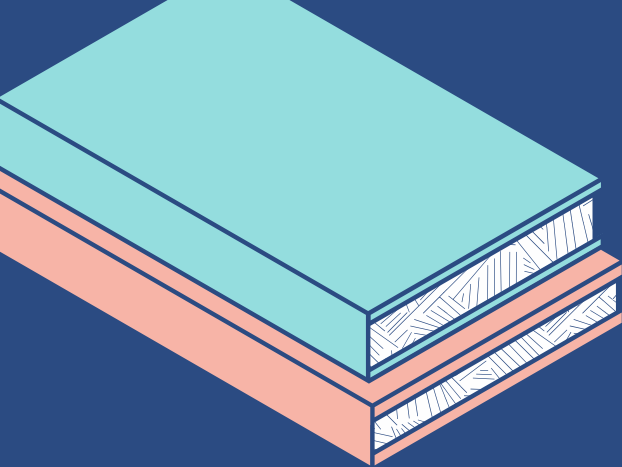


Equilized image



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# **APPROACH & MODEL**



# Approach and Models

Models	Pretrained weights	Validation accuracy
InceptionV3	Imagenet	68.45
ResNet50V2	Imagenet	64.37
MobilNetV2	Imagenet	67.43
VGG16	Imagenet	66.89
DenseNet169	Imagenet	64.21
DenseNet169+VGG16+MobNetV2	Imagenet	68.38
DenseNet121+InceptionV3+ResNet	Imagenet	64.74
Shallow CNN	None	41.13
Densenet121+ResNet224	cheXnet	72.79

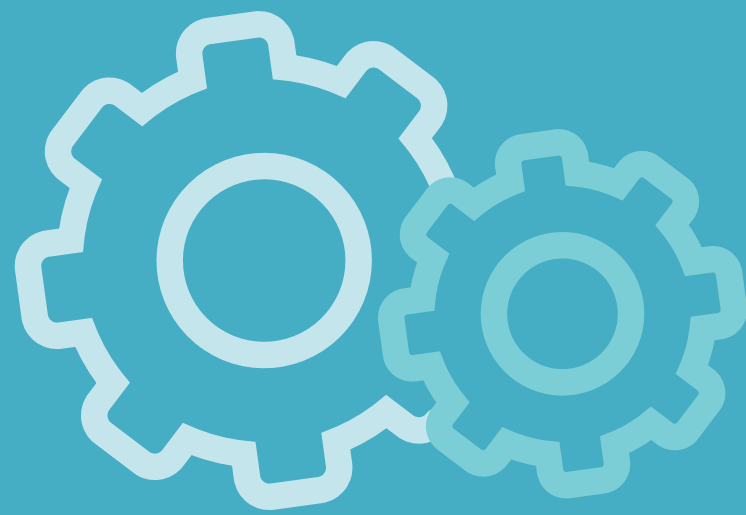
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# **FINAL APPROACH**

The top of the slide features a teal background with four white-outlined triangles. Each triangle contains a small icon: a circle, a rectangle, and a dot. The triangles are arranged in a scattered pattern, with two on the left and two on the right.

# Problem

- In our initial approach, we made use of Resnet, Densenet, VGGnet, Mobilenet, inceptionNet, initialized with pretrained weights over imagenet and added a few dense layers with variable weights.
- They turned out to be very similar in terms of prediction since there was no updation of weights in the principal architectures.



# Solution



- We used the cheXnet weights obtained from pre-trained models trained over chest X-ray dataset over Resnet and densenet which predicts 14 classes of diseases.
- We then applied a Dense stack over the outputs from the last but one layer with trainable weights and trained the model on 5 fold cross validation.
- And then applied suitable thresholding (threshold = 0.467), to convert the output probability to 0/1 predictions.

# Our Model

Densenet

Resnet

Concatenate

Dense+reg+norm+drop

Dense+reg+norm+drop

Dense+reg+norm+drop

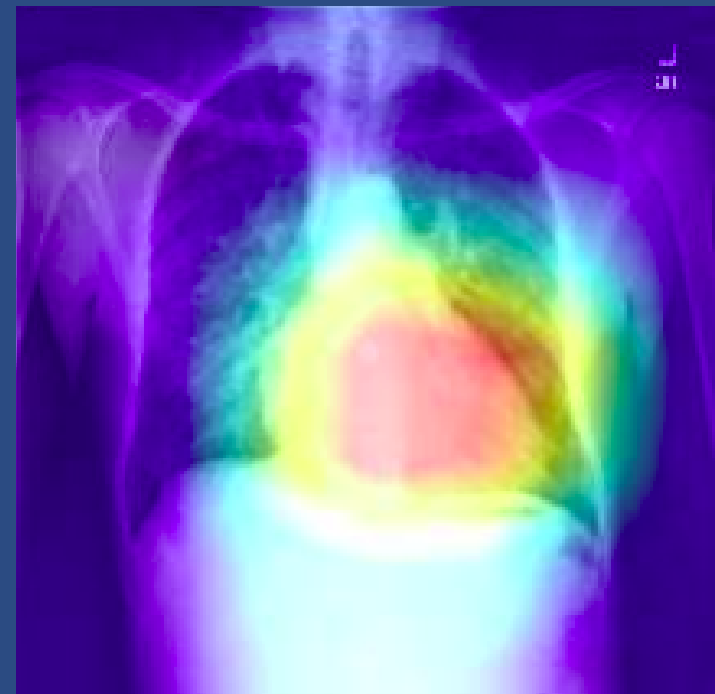
$y$

iif  $y > 0.467$  then class 1  
else class 0

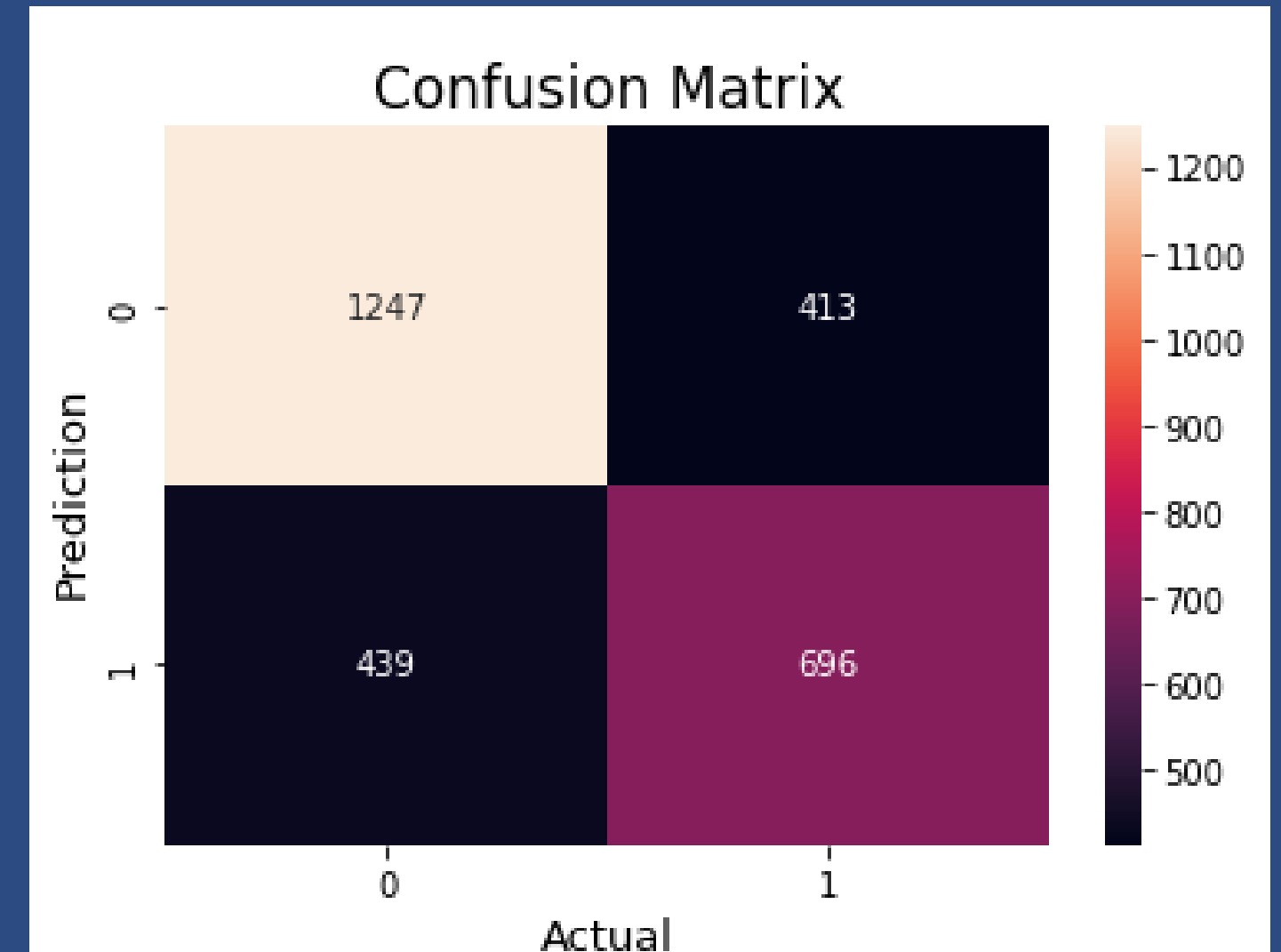
# Heatmap of predictions and confusion matrix over $y_{val}$



image



GradCAM heatmap



**Thank**

**You!**