



Edwin Fung

Steel Defect Detection

Why?

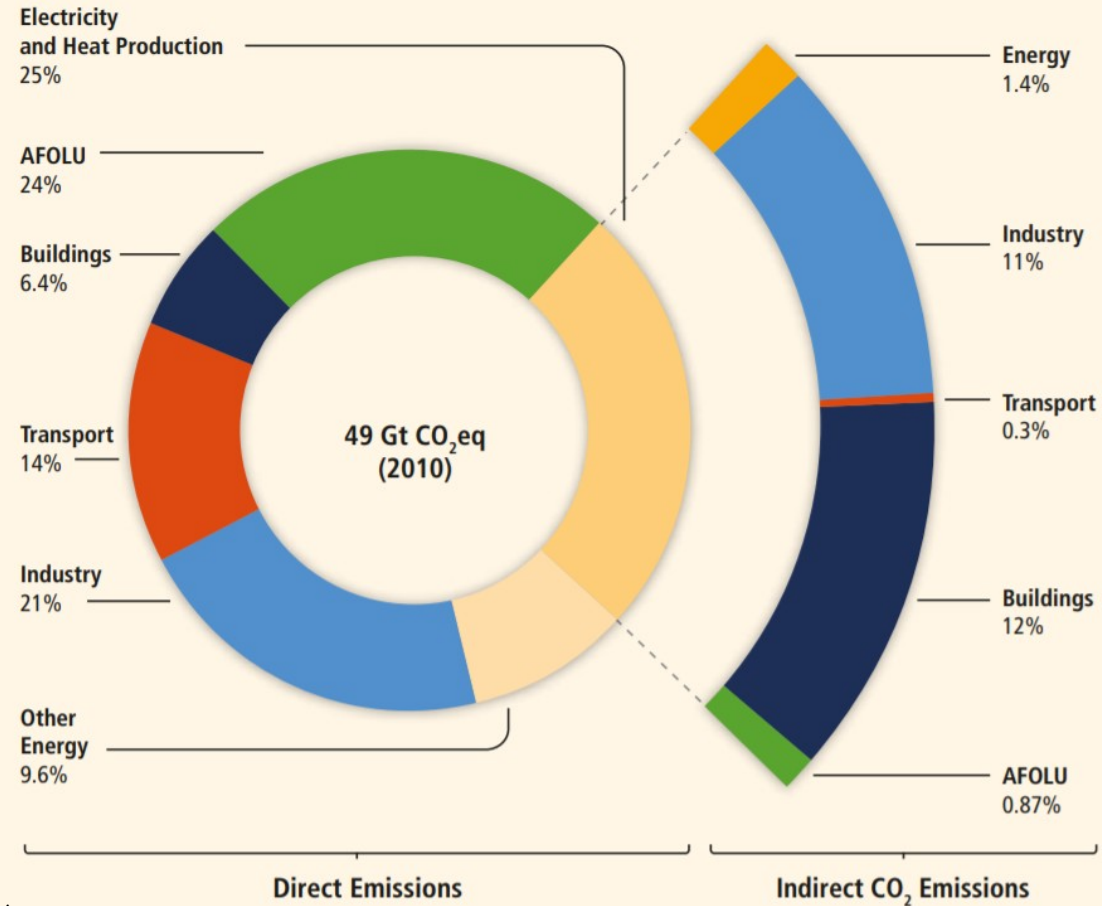


Source:
WikiCommons

Why?



Why?



Source: IPCC (2014)



Featured Code Competition

Severstal: Steel Defect Detection

Can you detect and classify defects in steel?



Severstal · 2,431 teams · 4 months ago

\$120,000

Prize Money



Data Source

sample_submission... 3 columns

train.csv 3 columns

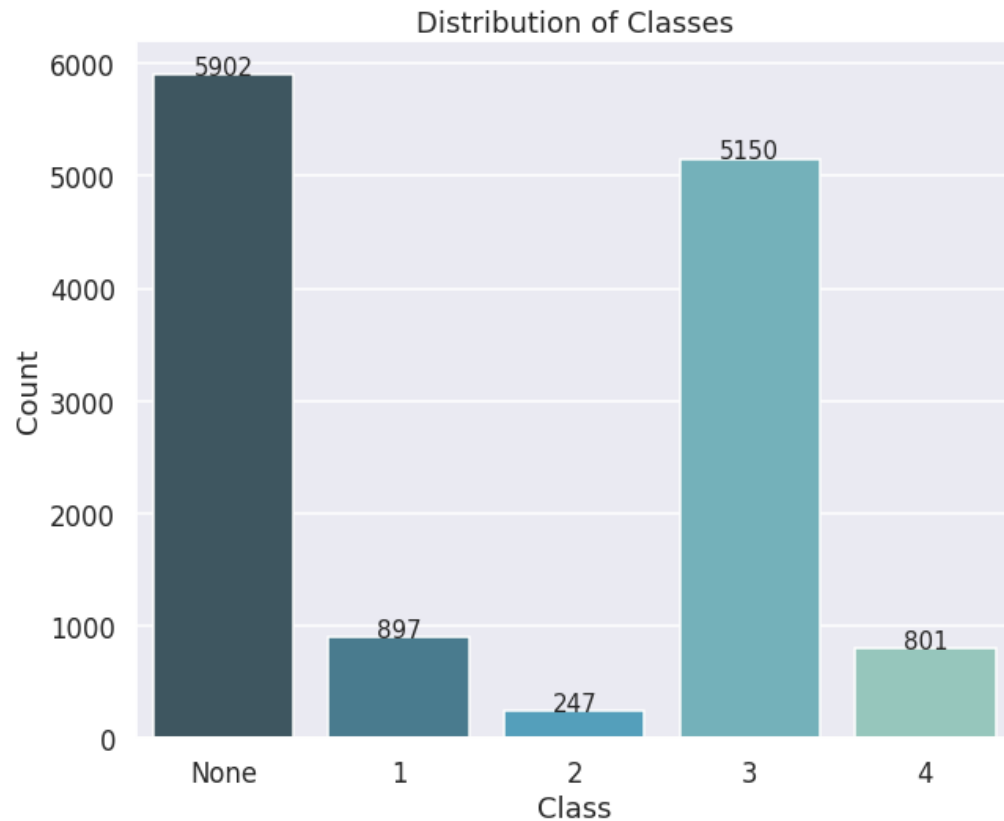
> test_images

> train_images

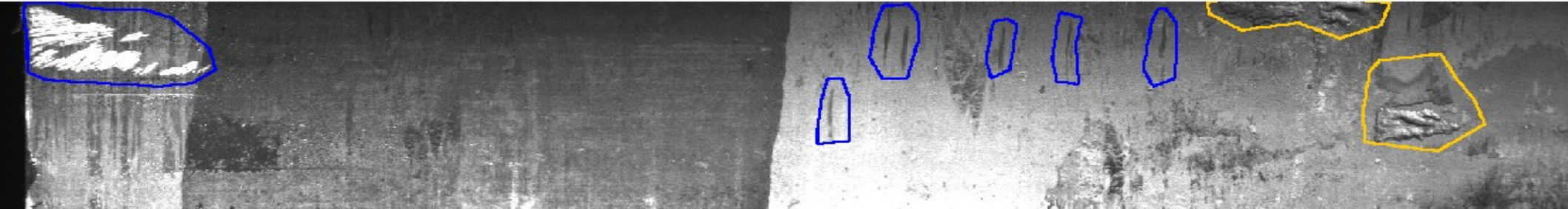
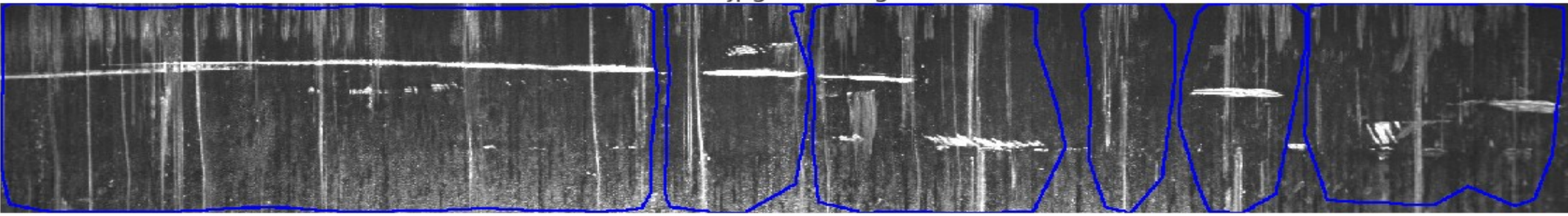
ImageId	ClassId	EncodedPixels
0002cc93b.jpg	1	29102 12 29346 24 29602 24 29858 24 3011
0007a71bf.jpg	3	18661 28 18863 82 19091 110 19347 110 19
000a4bcdd.jpg	1	37607 3 37858 8 38108 14 38359 20 38610



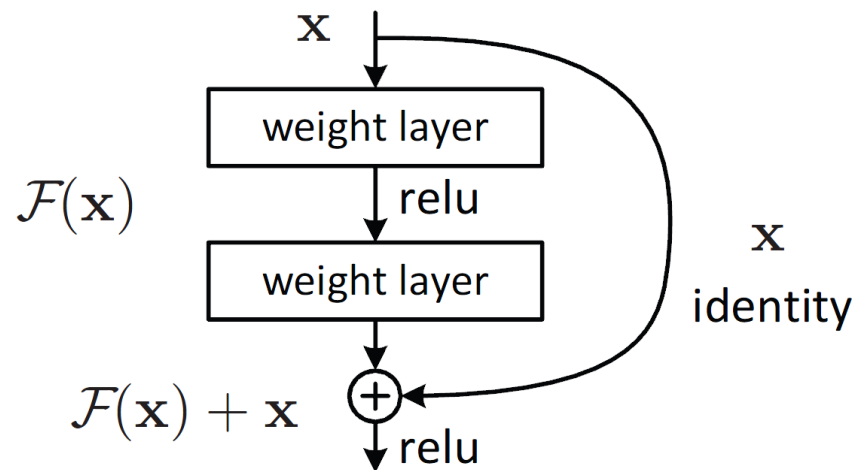
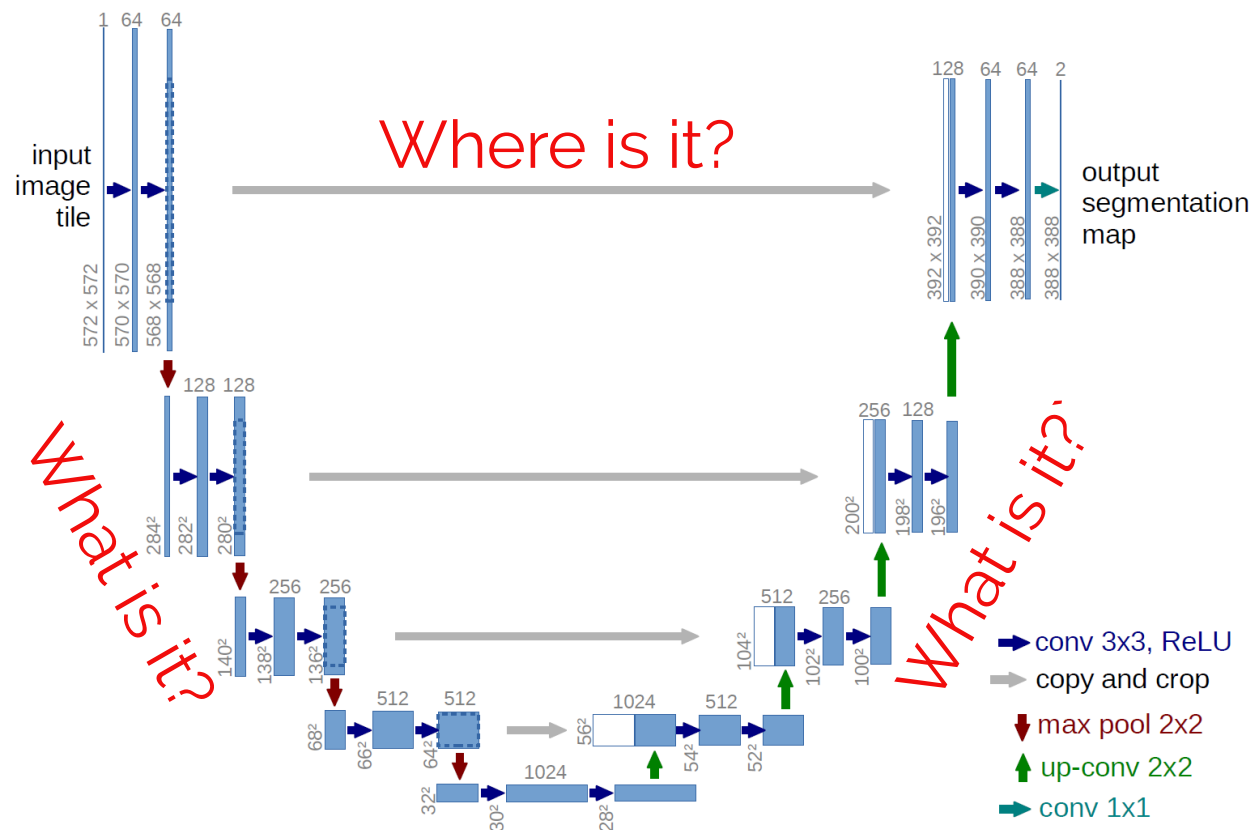
EDA | Defect & Class Distribution



EDA | Training Images with Masks

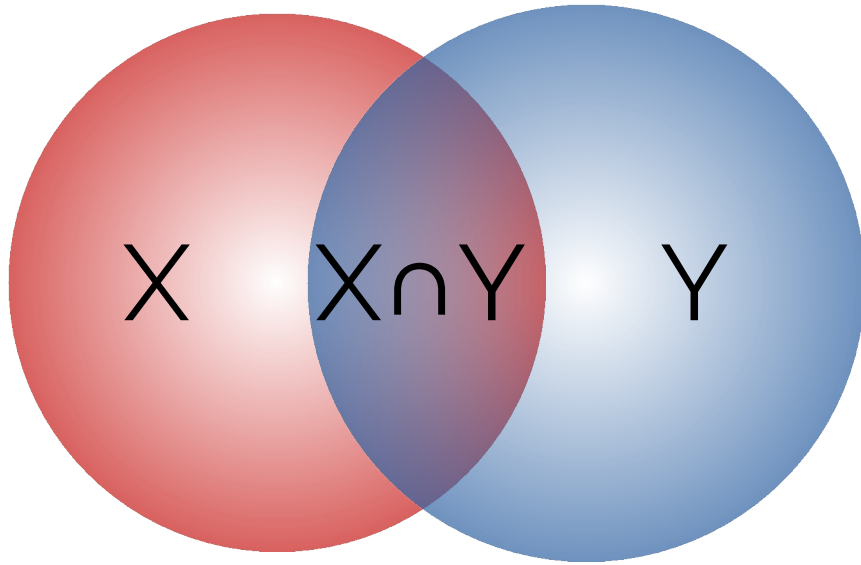


Model | U-Net + ResNet

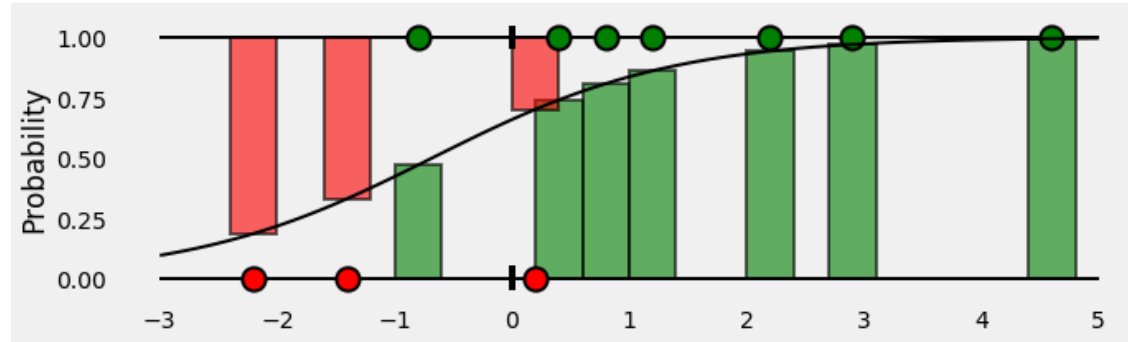


Does it help?

Model | Loss Functions

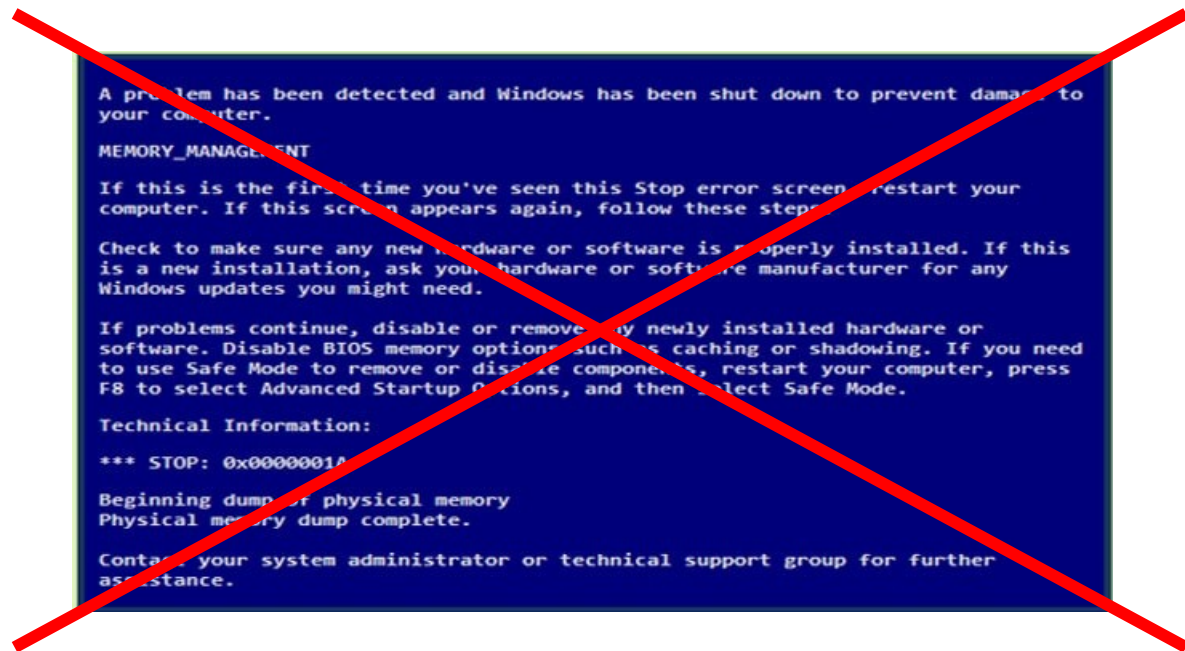


Dice Coeffi. \rightarrow Scalar



Binary Cross Entropy \rightarrow Matrix

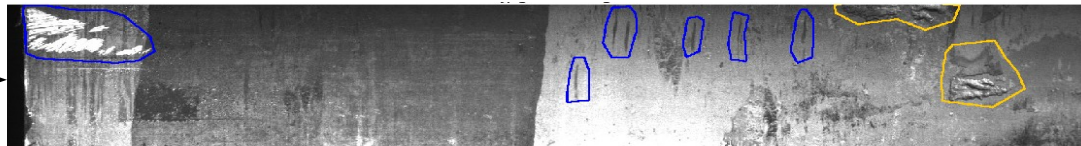
Model | Custom Data Generator



Avoids memory problems

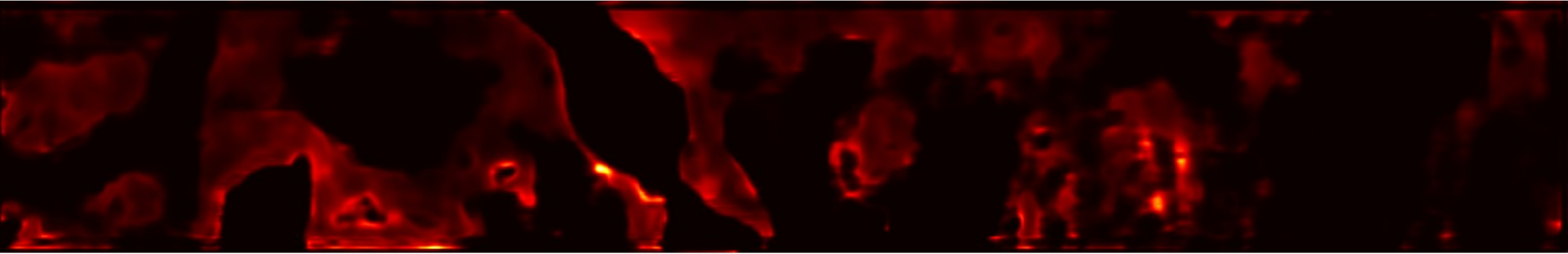
Flexible data transformation

ImageId	ClassId	EncodedPixels
0002cc93b.jpg	1	29102 12 29346 24 29602 24 29858 24 3011
0007a71bf.jpg	3	18661 28 18863 82 19091 110 19347 110 19
000a4bcdd.jpg	1	137607 3 37858 8 38108 14 38359 20 38610



Results – Predicted Probabilities

Predicted Class 2:

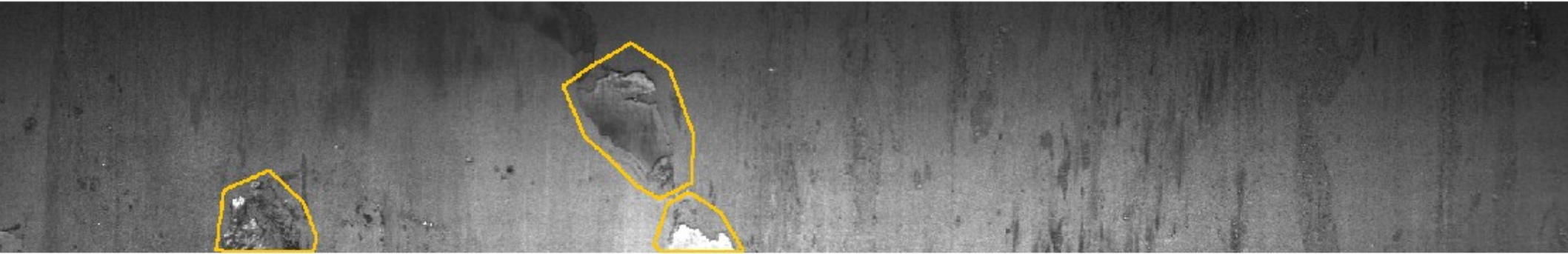


Predicted Class 4:

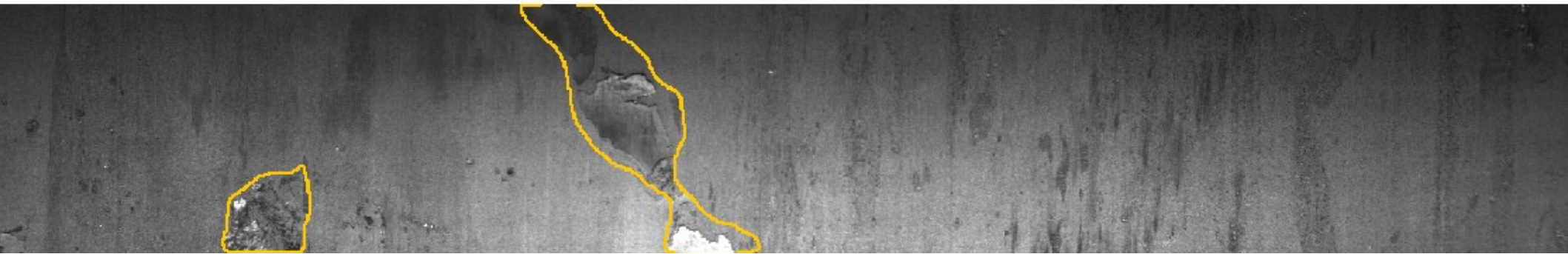


Results – Single Class Defect

Target:

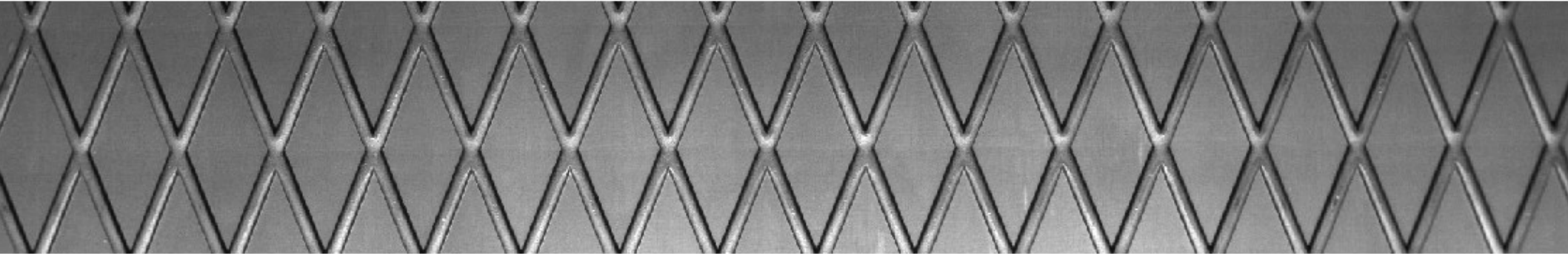


Predicted:

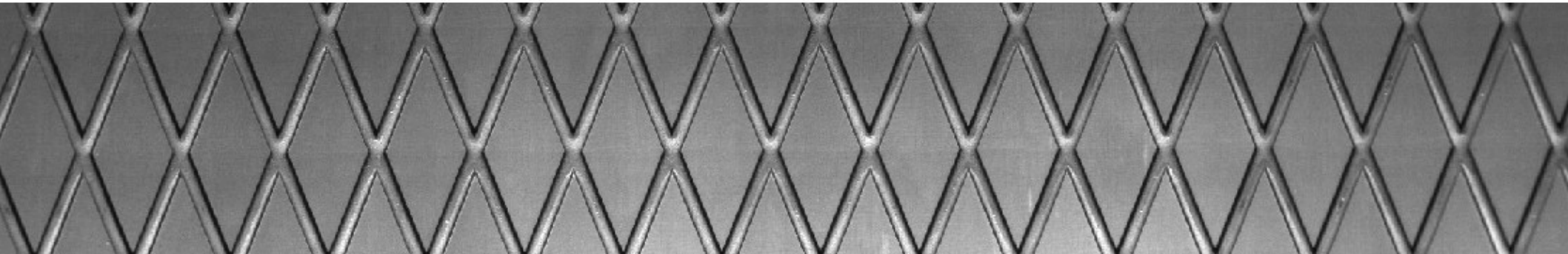


Results – No Defect

Target:



Predicted:



Results – Multiclass Defect

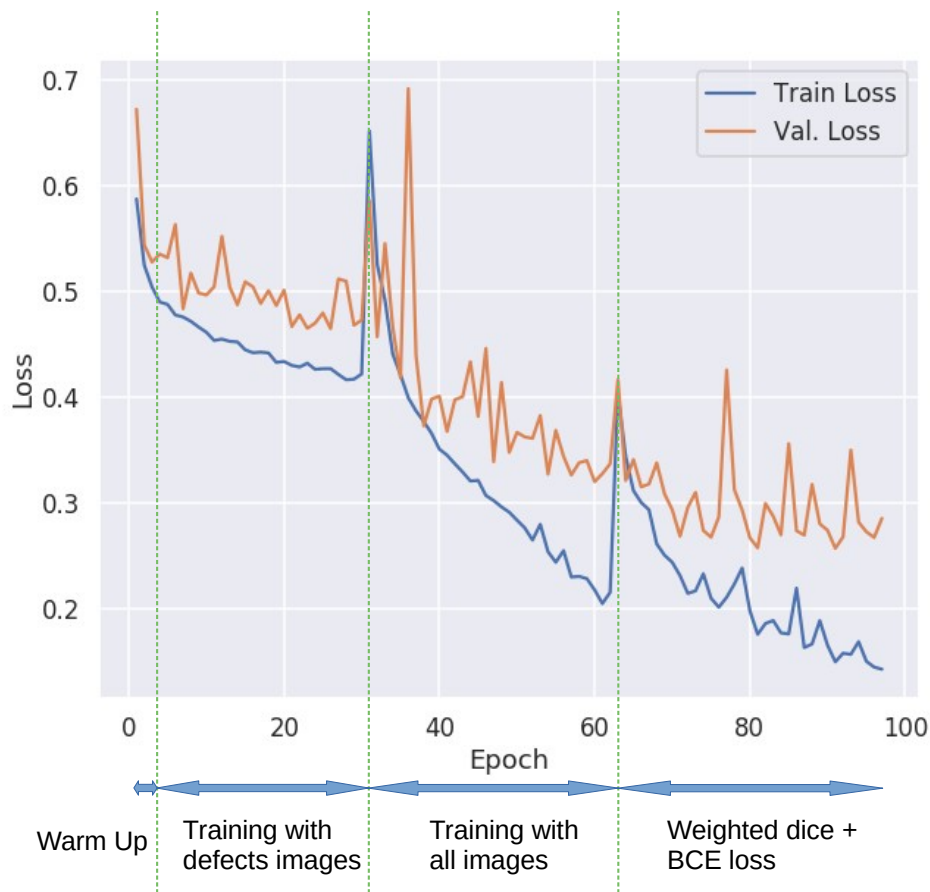
Target:



Predicted:



Results - Loss and Score



Ways to Improve

Image augmentation

Pipeline to reject defectless images

Improve loss functions

Regularization

Threshold

