The background is a textured, light brown surface. It is decorated with stylized mechanical elements: large grey gears in the top-left and bottom-right corners, and a network of brown and orange pipes with various sized gears (black, orange, and grey) integrated into the system on the left and right sides.

# DEEP LEARNING FOR AUTOMATED CORROSION DETECTION

Pengju sun  
06/14/2021

The background is a textured, light brown surface. In the top-left corner, there is a dark brown pipe that curves downwards and then to the right. In the top-right corner, there is a grey gear. In the middle-right area, there is an orange gear. In the bottom-left corner, there is a yellow gear and a smaller orange gear. In the bottom-right corner, there is a yellow pipe that curves upwards and then to the right.

**01**

**INTRODUCTION**

**02**

**PROBLEM STATEMENT**

**03**

**METHODOLOGY**

**04**

**RESULTS**

**05**

**CONCLUSION**

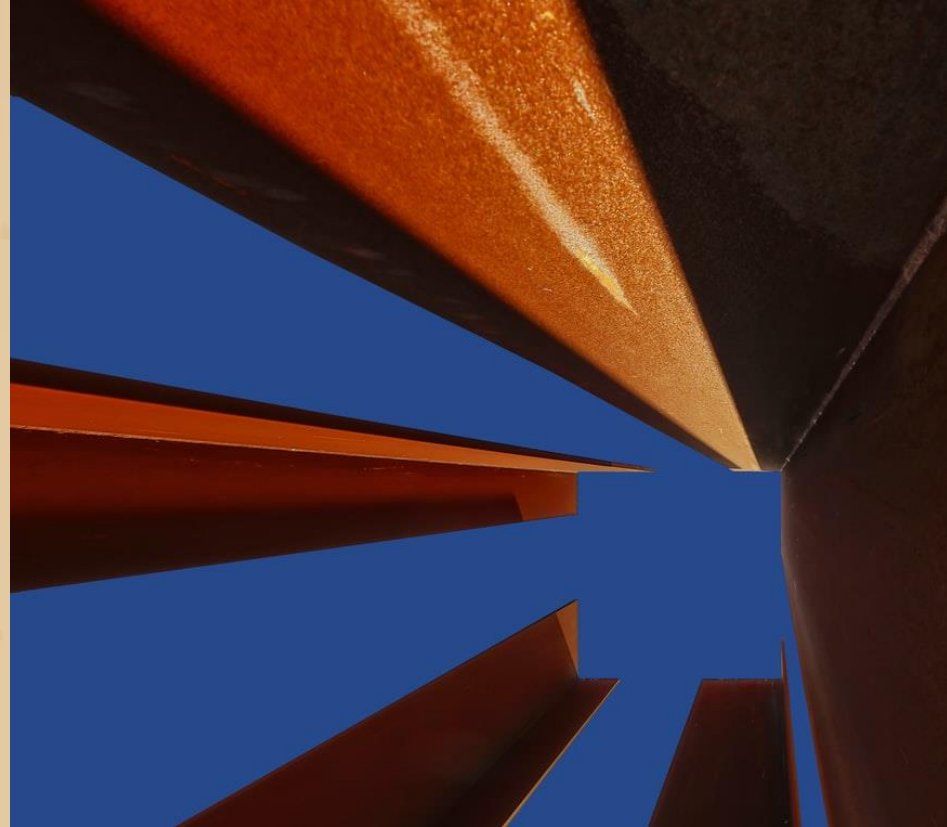
**06**

**FUTURE WORK**

# WHAT IS CORROSION?

“Corrosion is defined as the deterioration of a material, usually a metal, because of reaction with its environment.”

Chilingarian, 1989; Popoola, Grema, Latinwo, Gutti, Balogun, 2013.



# \$2,500,000,000,000



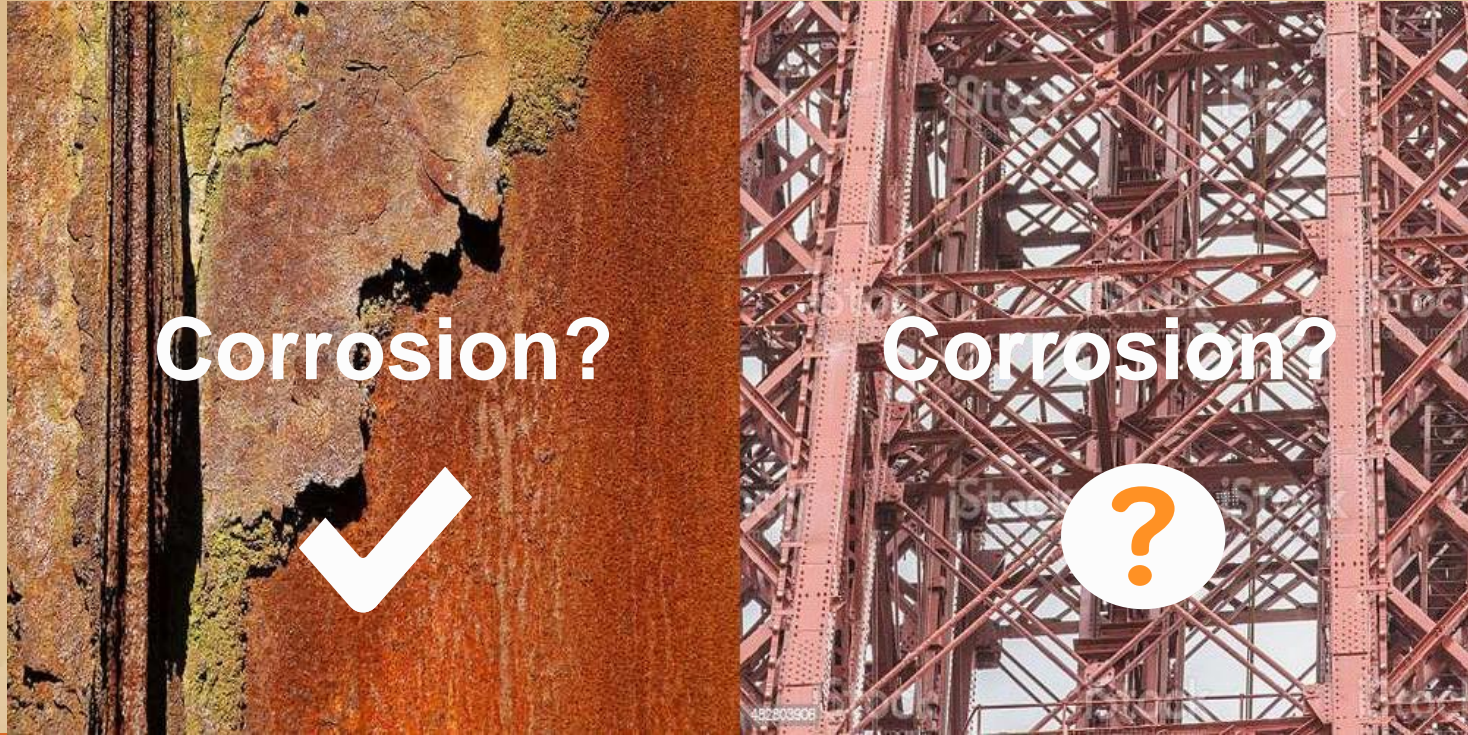
Bye Bye ! ! See  
you never again!

# CORROSION CONTROL METHODS





# CHALLENGES



# CHALLENGES



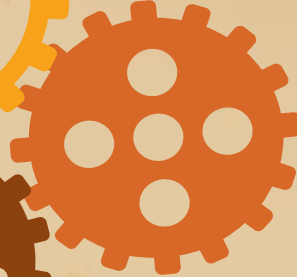


# GOALS

ACCURACY



EFFICIENCY



SAFETY





# METHODOLOGY



# DATA

**STEEL: CORROSION**



**STEEL: NO CORROSION**



# DATA

**SHIP HULL: CORROSION**



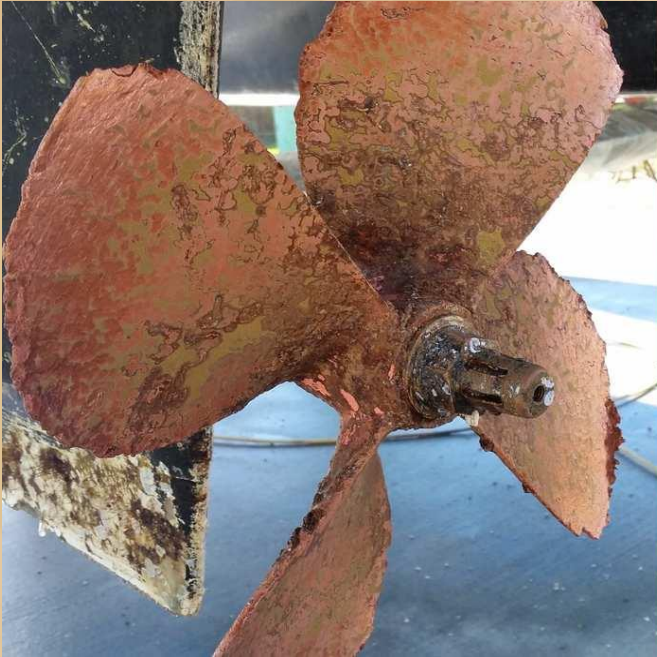
**SHIP HULL: NO CORROSION**





# DATA

**SHIP PROPELLERS: CORROSION**



**SHIP PROPELLERS: NO CORROSION**





# DATA

**CARS: CORROSION**



**CARS: NO CORROSION**

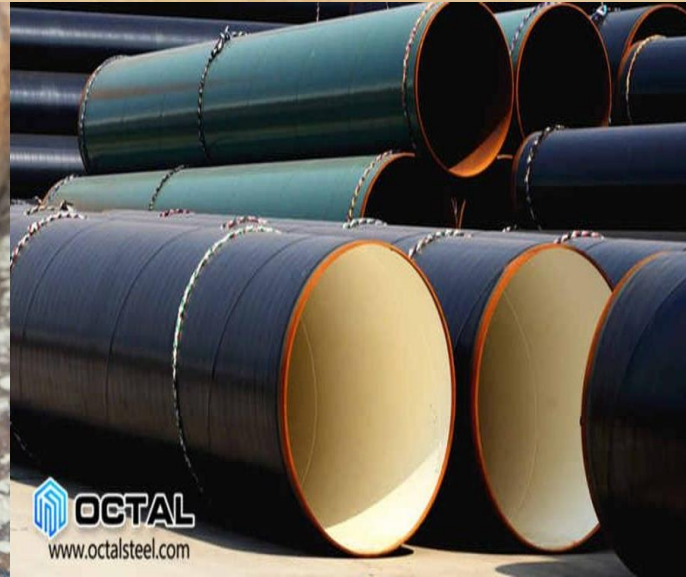


# DATA

**OIL AND GAS PIPELINE: CORROSION**



**OIL AND GAS PIPELINE: NO CORROSION**





# DATA

**CONCRETE REBAR: CORROSION**



**CONCRETE REBAR : NO CORROSION**



# DATA

**STAINLESS STEEL: CORROSION**



**STAINLESS STEEL: NO CORROSION**



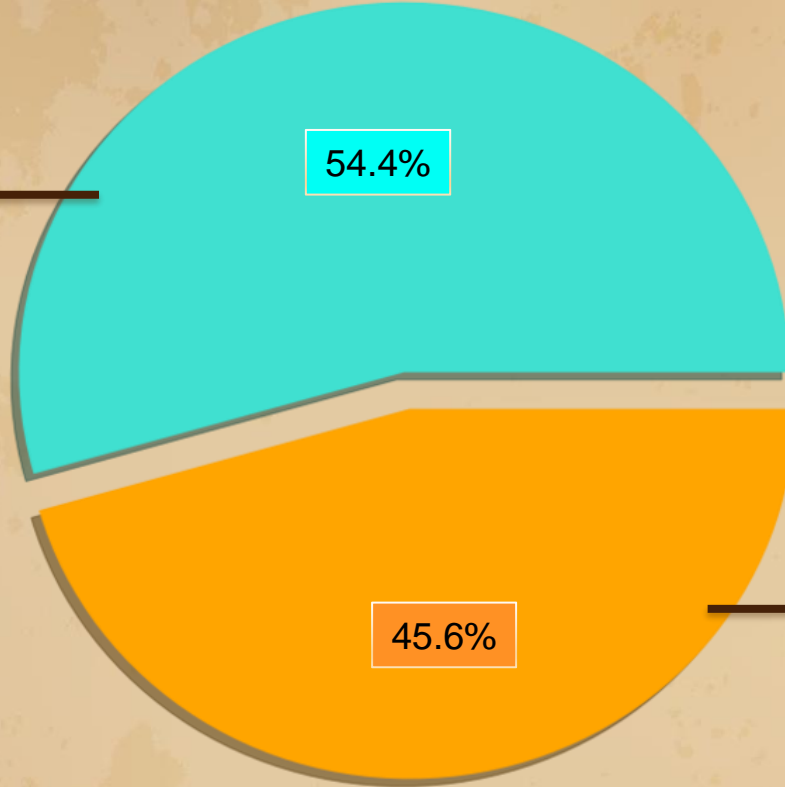


# TRAINING DATA

**CORROSION**



54.4%

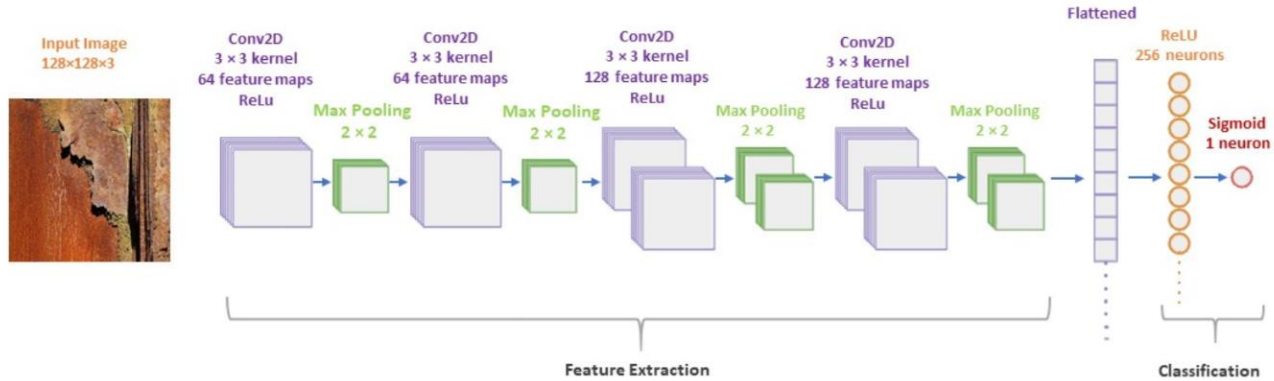


45.6%

**NO CORROSION**



# CNN MODEL

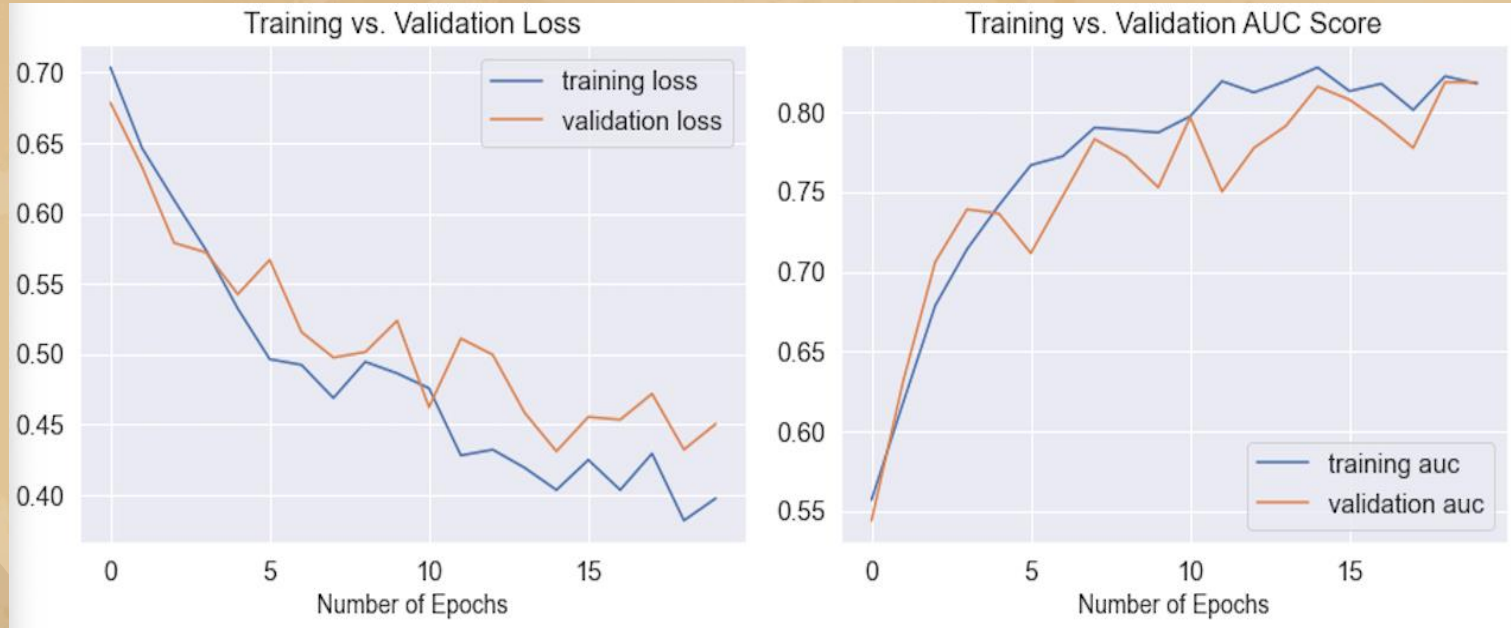


**Optimizer:** Adam

**Loss Function:** Binary Cross-entropy

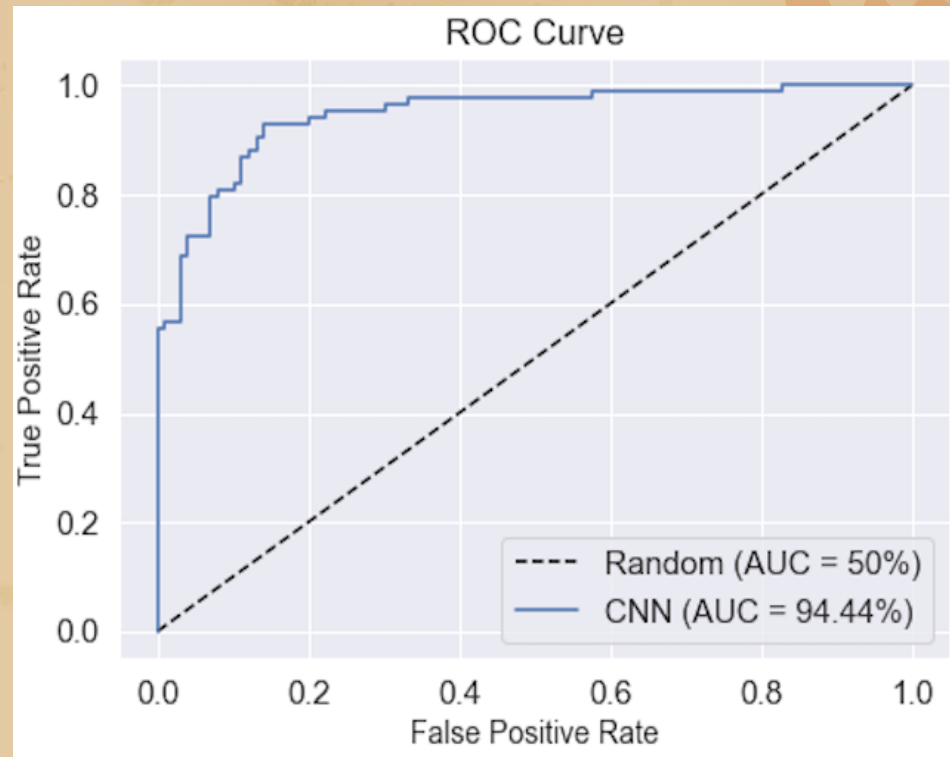
# RESULTS

## TRAINING VS. VALIDATION: LOSS & ACCURACY SCORE



# RESULTS

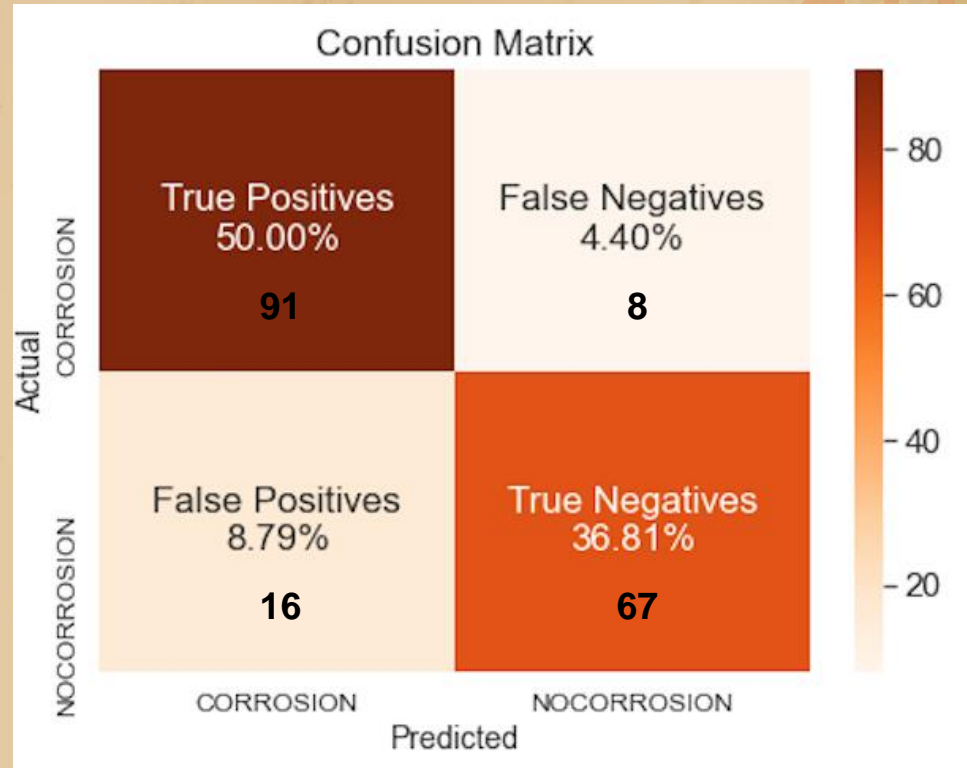
**94.44%**  
AUC





# RESULTS

**92%**  
**RECALL**



# CONCLUSION

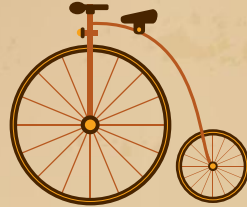
1. The results confirm that the implemented deep learning CNN algorithm is a promising tool for automated detection of corrosion.
2. By giving a wide variety of corrosion images, our model can efficiently find the corrosion issues with high accuracy.

# FUTURE WORK



## DATA QUANTITY

Increase the number  
and diversity in the  
dataset



## DATA QUALITY

Increase the quality of  
corrosion image  
labelling



## MODELLING

Include image  
segmentation and use  
U-net CNN architecture  
for modelling

# THANKS!

Do you have any questions?

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