Corrosion Detection & Progression Using Computer Vision

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Problem

- **Given:** *RGB Image*
- **Predict:** *Detect and Localize Corrosion*

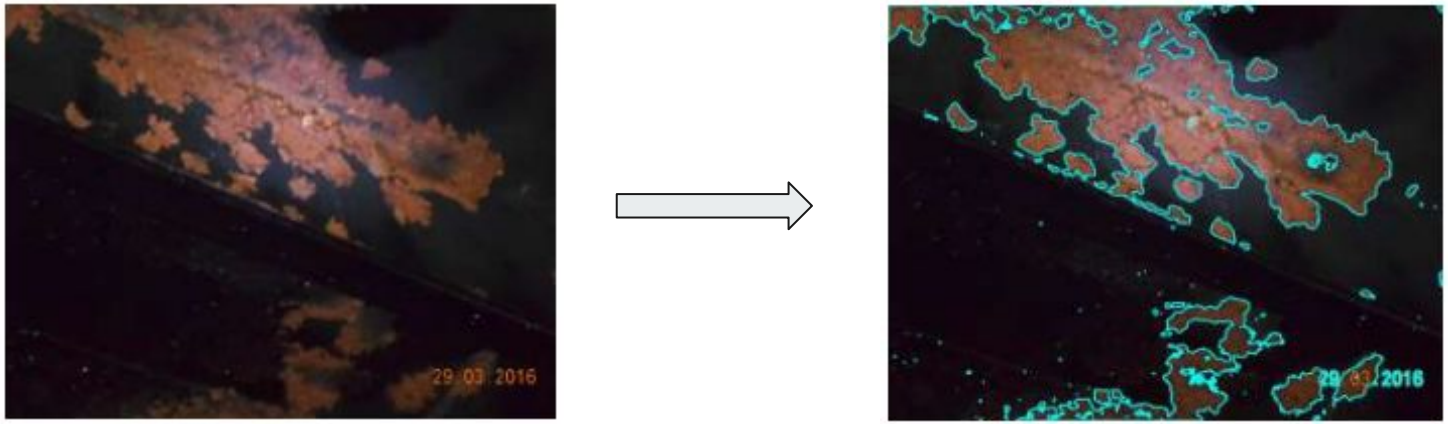
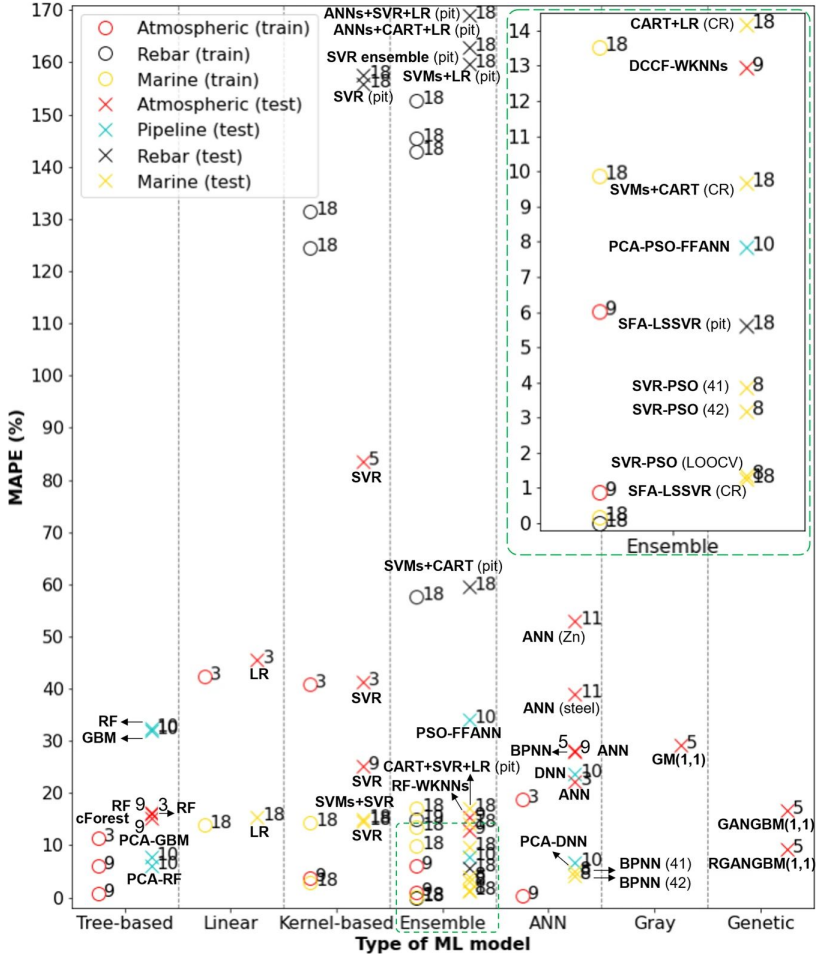


Fig 1: Corrosion Detection

Motivation

- Labor Intensive and Expensive
- Time Consuming
- Wear and Tear at rapid rate
- Limitations of Certified Inspectors
- Standardizing the Results

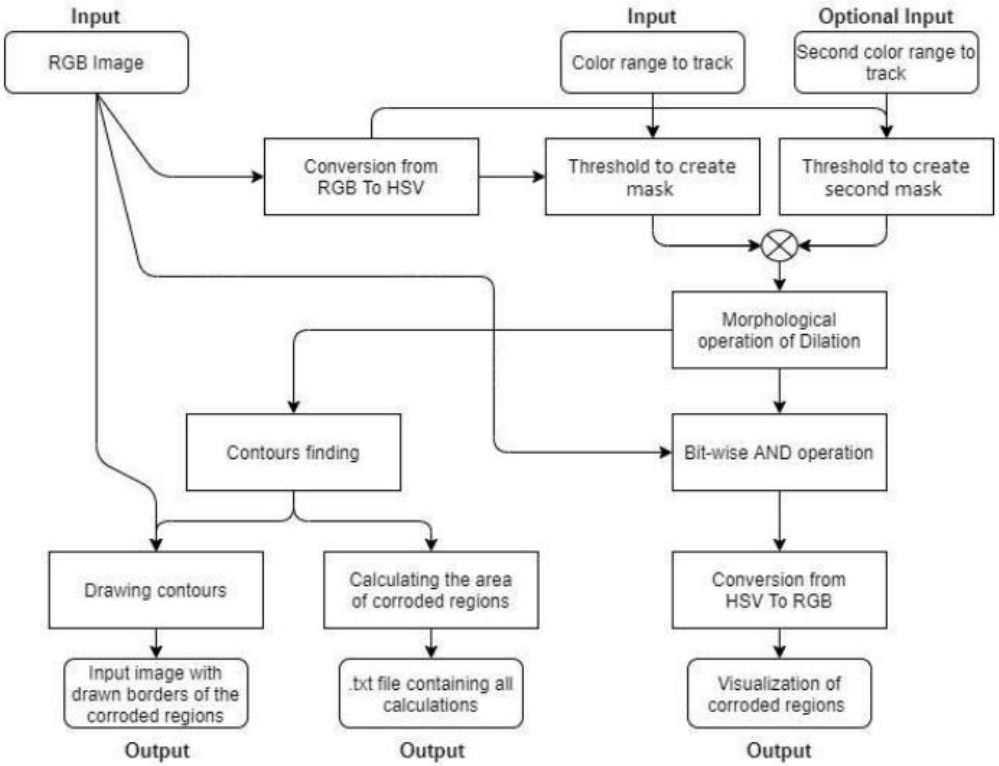
Proposed Solutions



- From classical ML (Machine Learning) to Deep Learning (DL) techniques

Fig 2: Performance of Different ML models

Color Tracking for Corrosion Detection



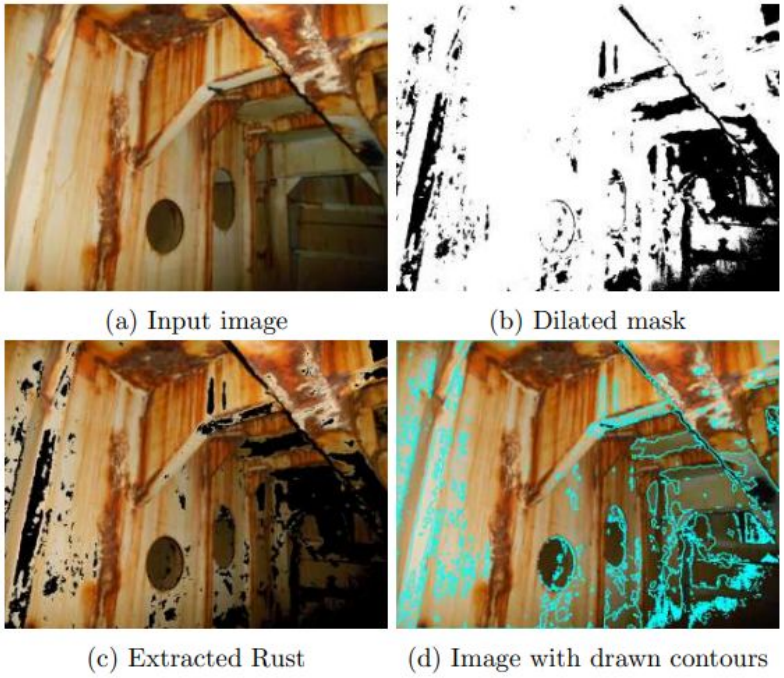


Fig 3: Color Tracking for Corrosion Detection

Multiclass Classification

Fig 4: Coating loss classification grades

Corrosion Detection as Semantic Segmentation

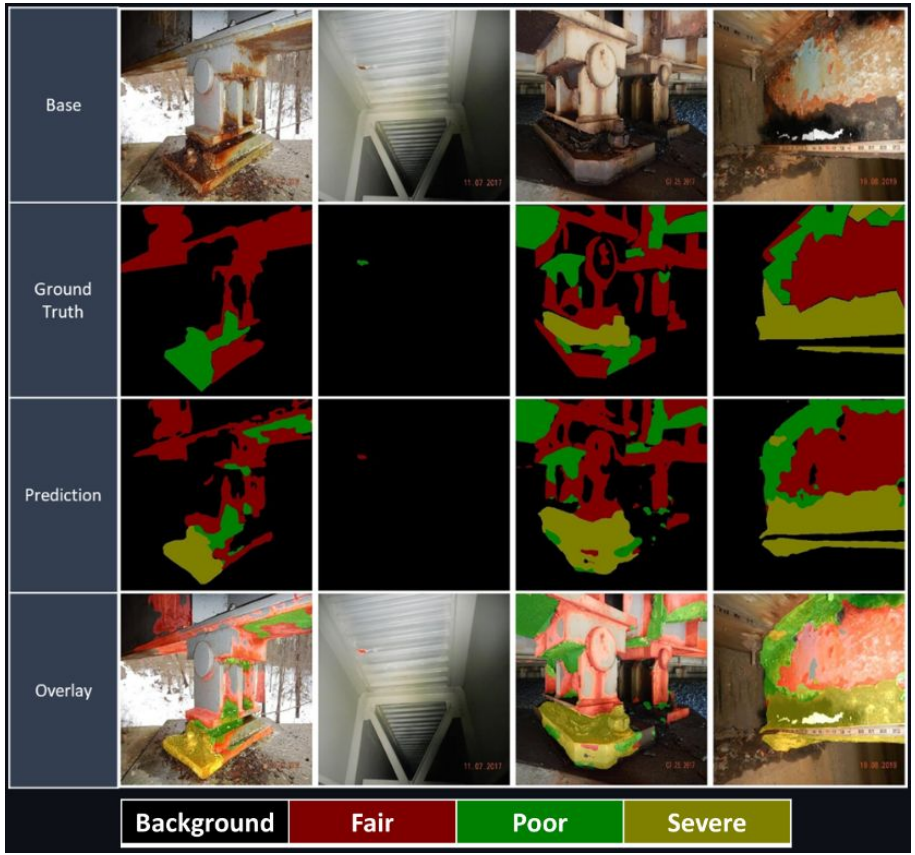


Fig 5: Detection and Localization of structural damage

- Importance of Dataset
- Utilizing CNNs like RCNN, Fast RCNN, Mask R-CNN, YOLO, UNet, DeepLab
- Generalized Solution
- Different stages of corrosion

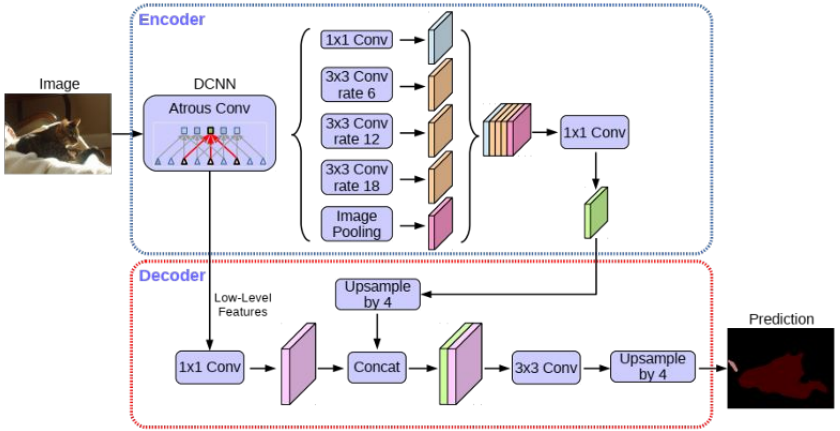


Fig 6: DeepLab V3

Beyond Corrosion Detection

Fig 7: Forecasting Corrosion

Predicting Progression of Corrosion

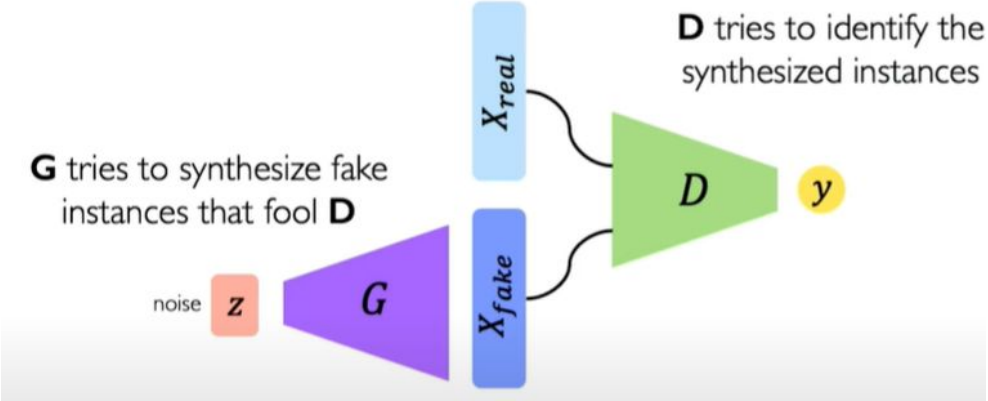


Fig 8(a): GAN

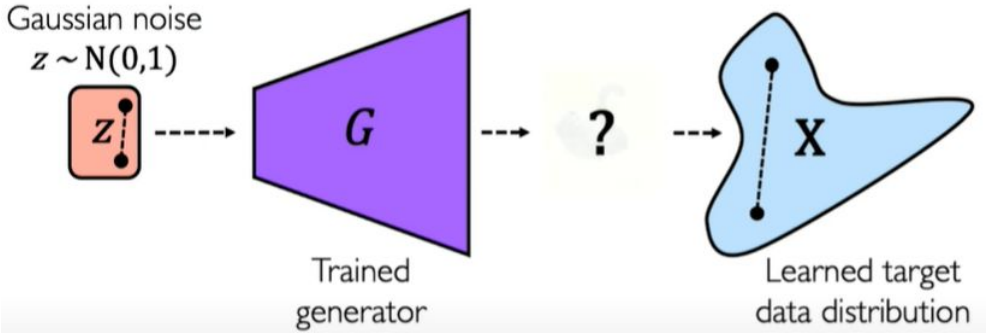


Fig 8(b): Image Manipulation

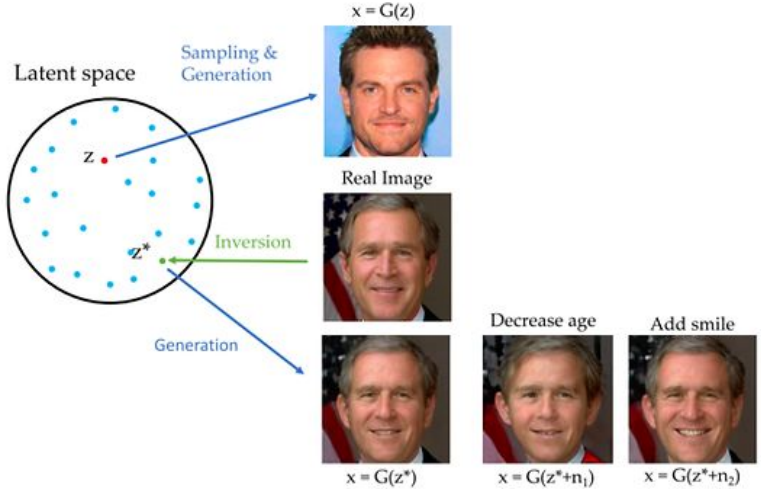


Fig 8(c): GAN-Inversion

- Manipulating image using GAN-Inversion
- Generator/Encoder (G)
- Discriminator/Decoder (D)
- Semantic Boundaries/Directions - Corrosion, Non-Corrosion, Colours
- Transforming the image's latent code into specific semantic directions

Thank You !

Questions Please !