

# Steel Defect Detection

## Problem Statement

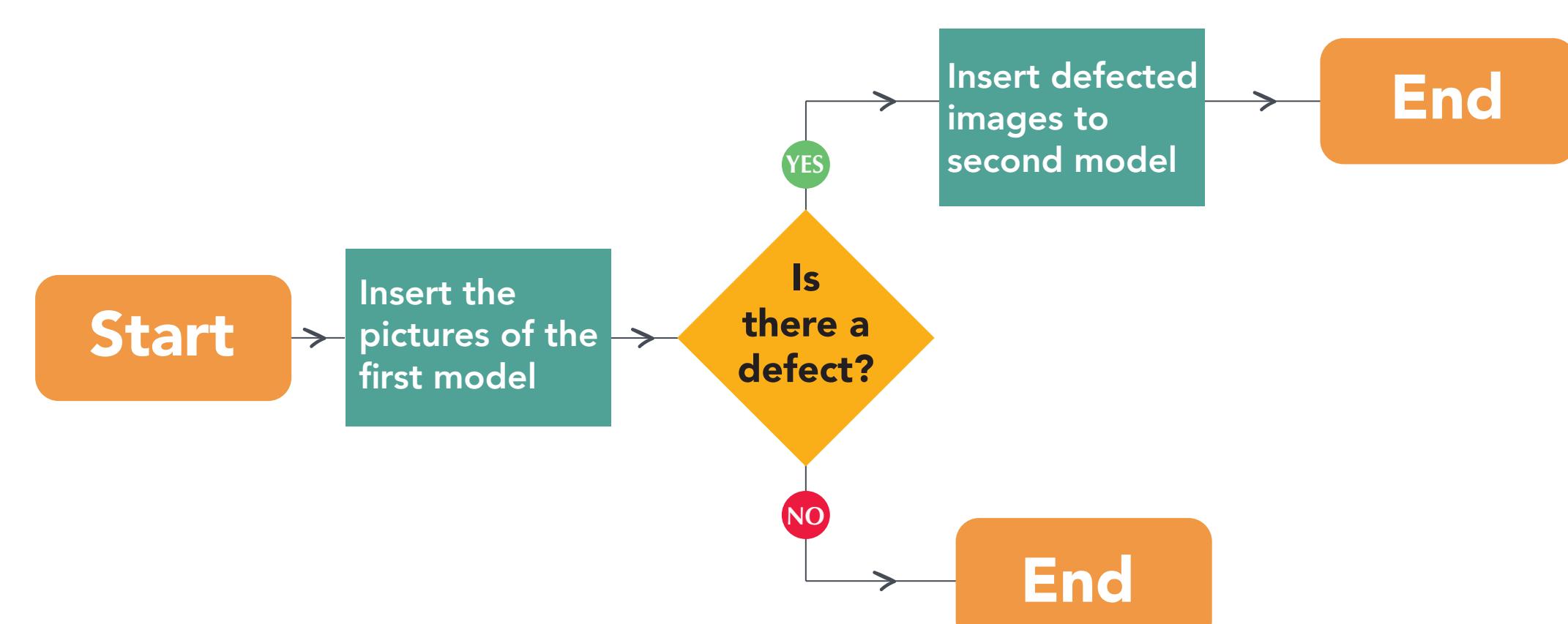
## WHAT?

This project aims to build a machine learning algorithm that can detect which steel product has a defect, in addition to the type of the defect in that product and thus, improve automation, increase efficiency and maintain high quality in the production.

## WHY?

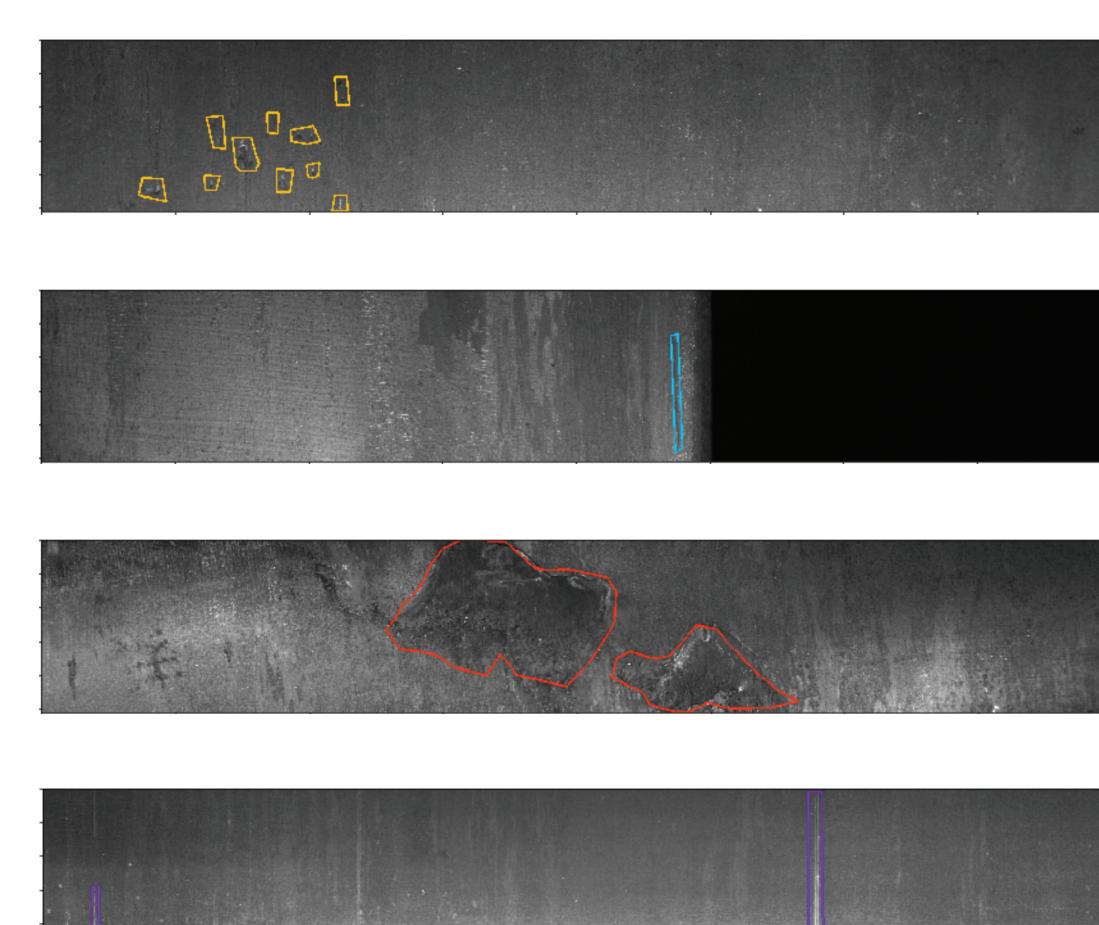
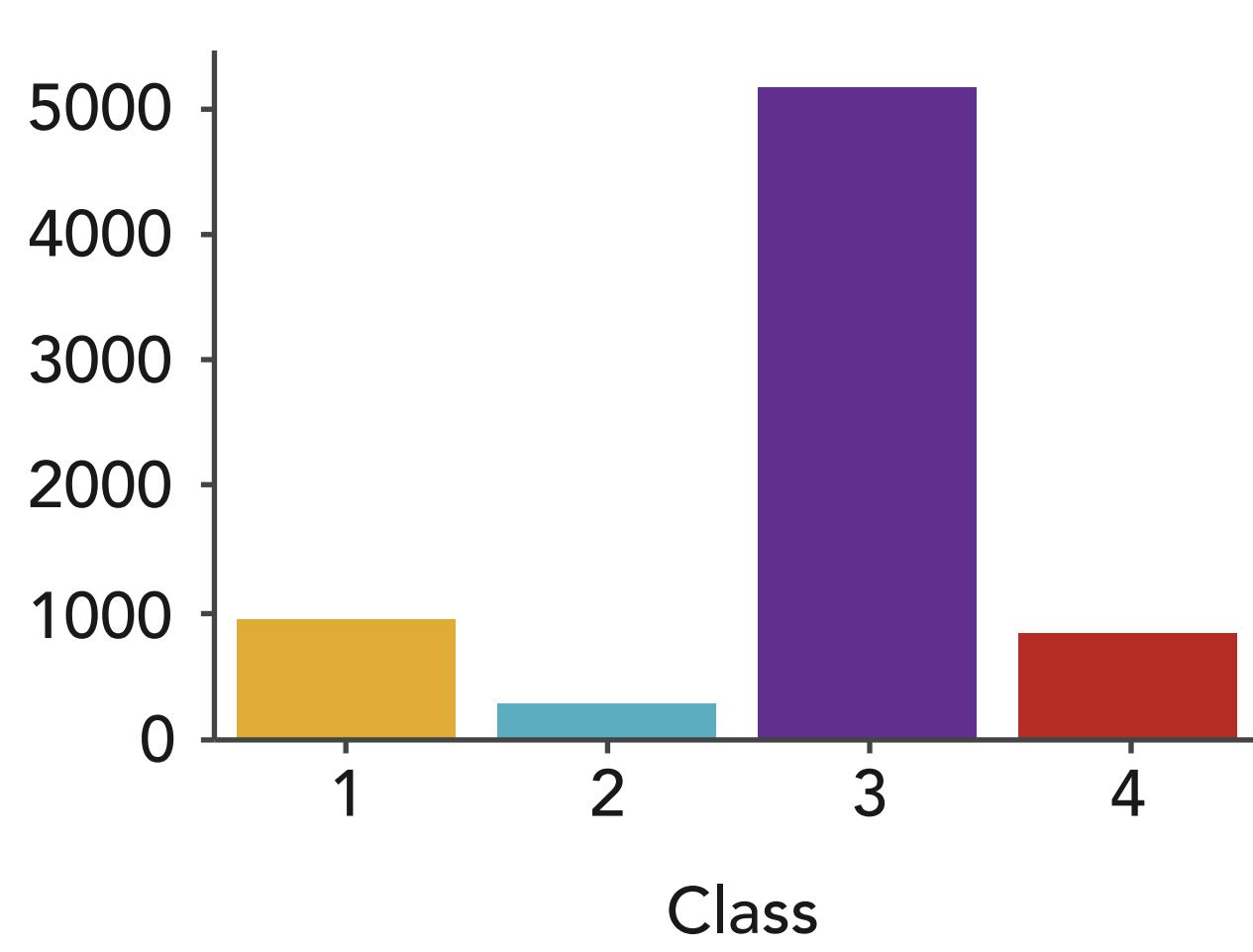
In recent years, there is an increased need for quality control in the manufacturing sector. The aerospace and automotive industries reject any materials with defects in manufacturing processes. Because a minor defect in a manufactured part might result in a disaster at a later stage. Without automatic machine vision technology, steel rolling operations is not able to perform real-time inline surface defect inspection. The failure to identify some defects can lead to factory down time and significant economic losses.

## HOW?

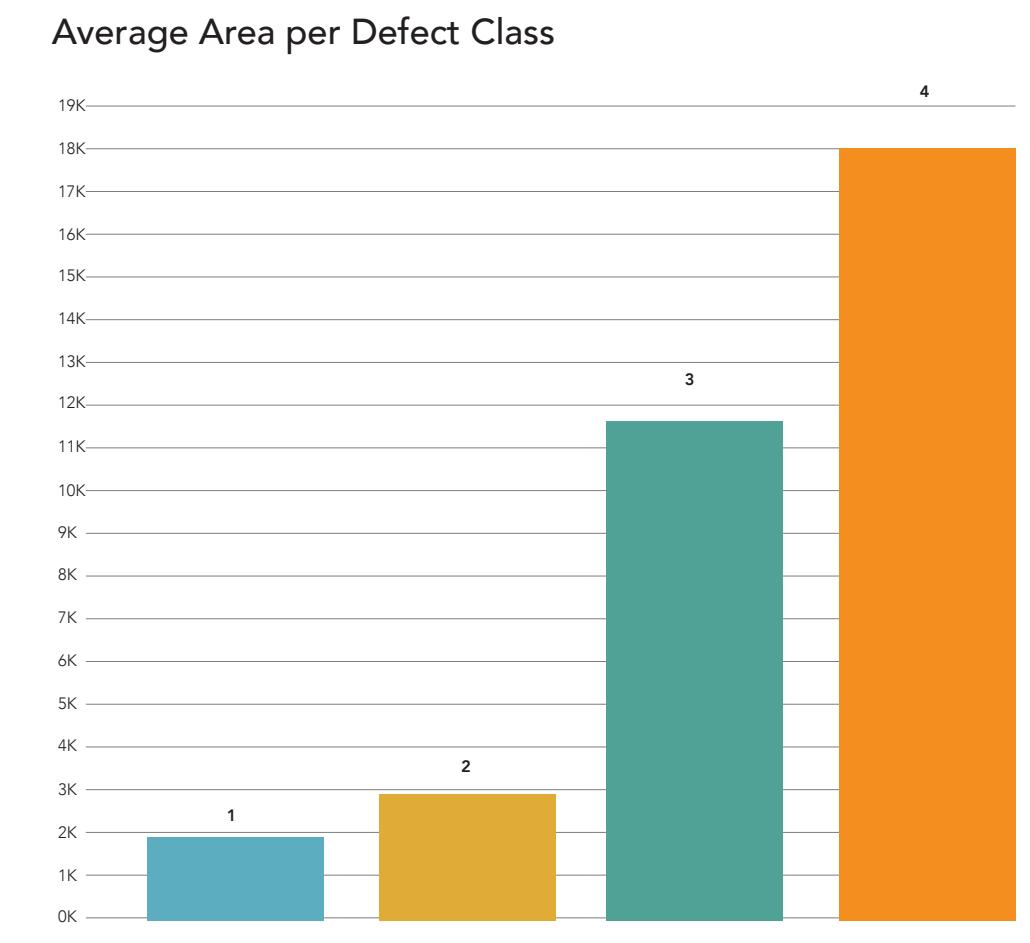


## EDA & Feature Engineering

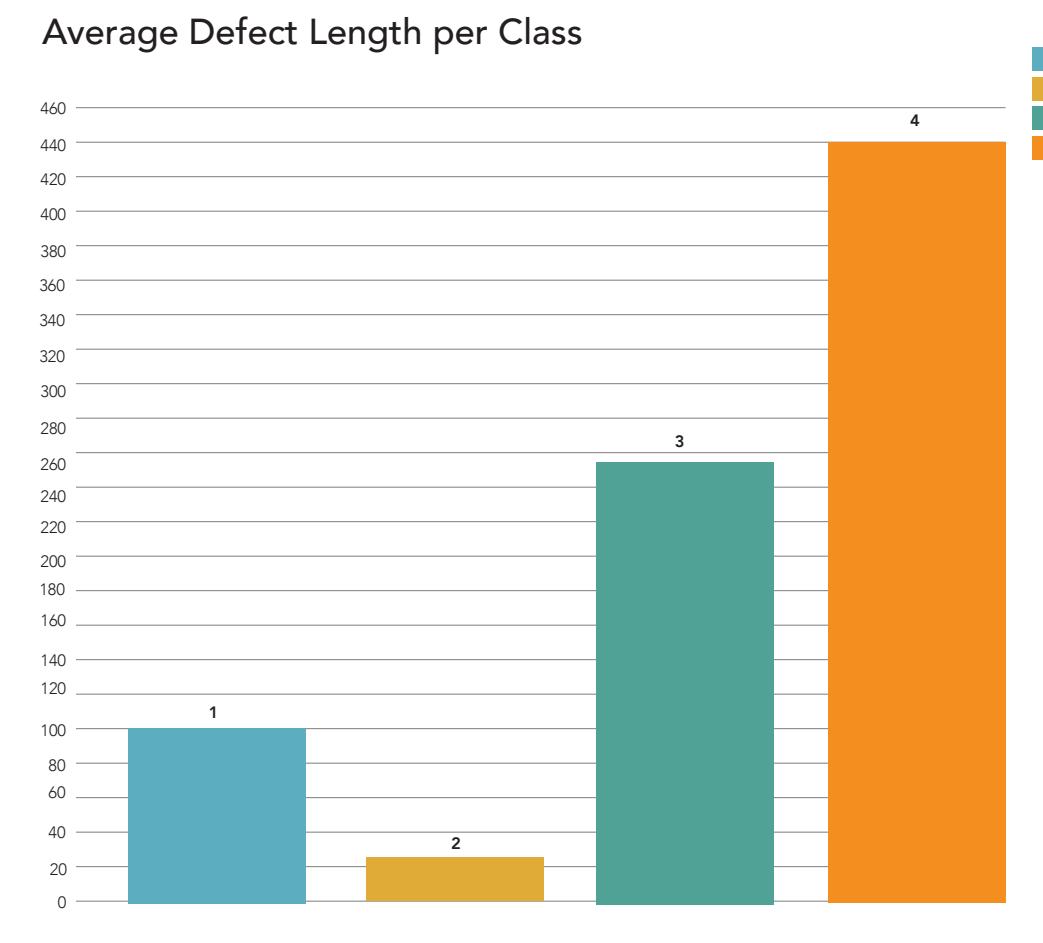
The number of images for each class



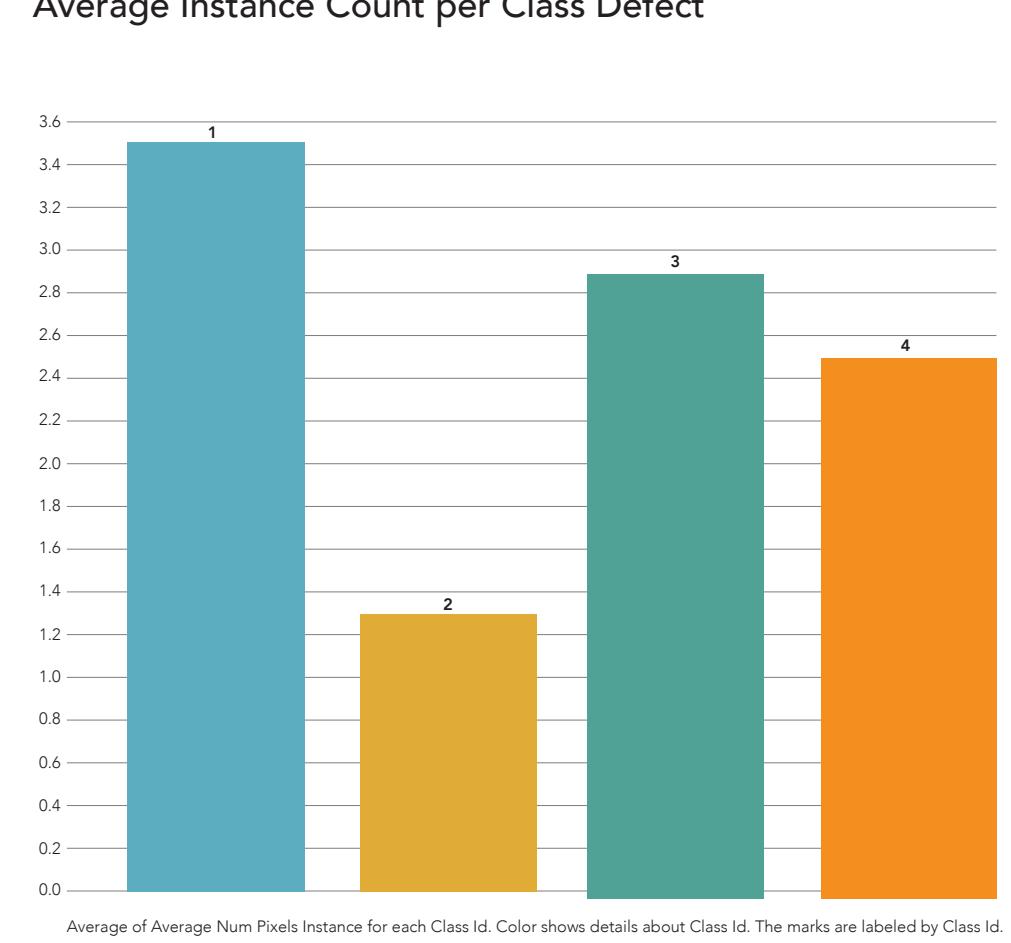
Average Area per Defect Class



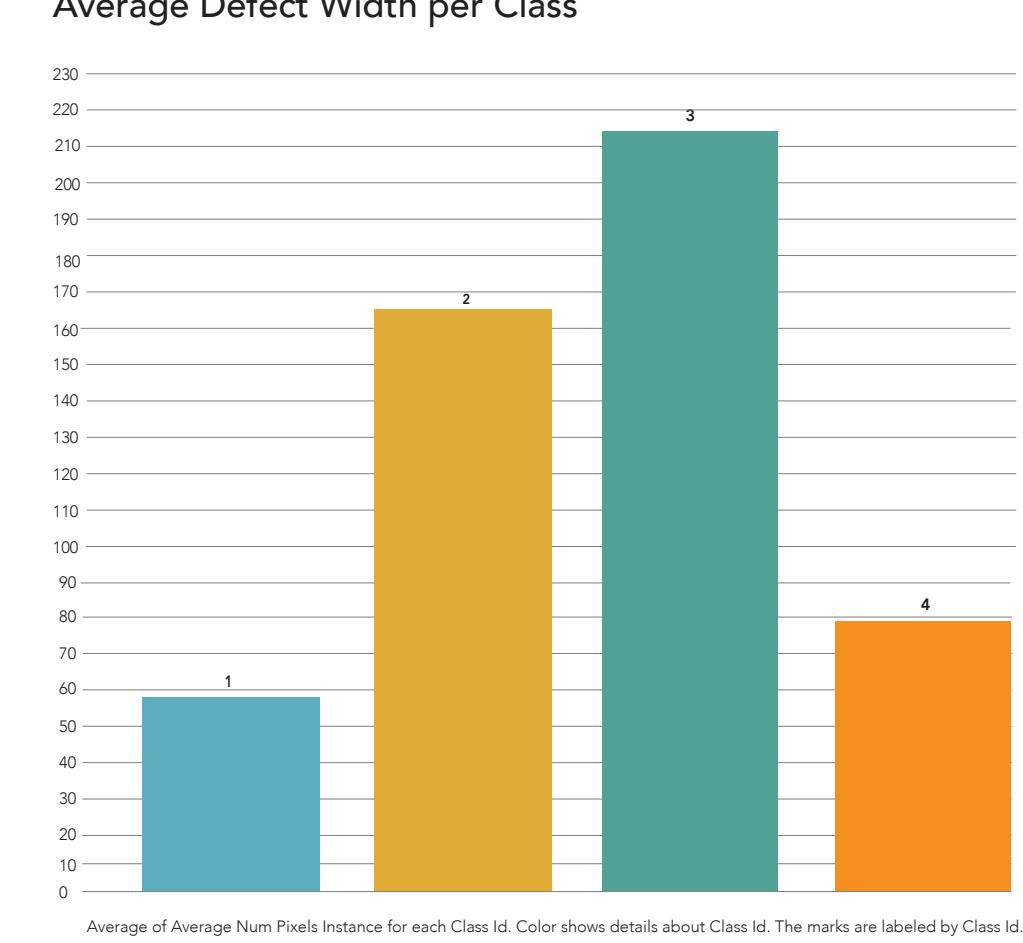
Average Defect Length per Class



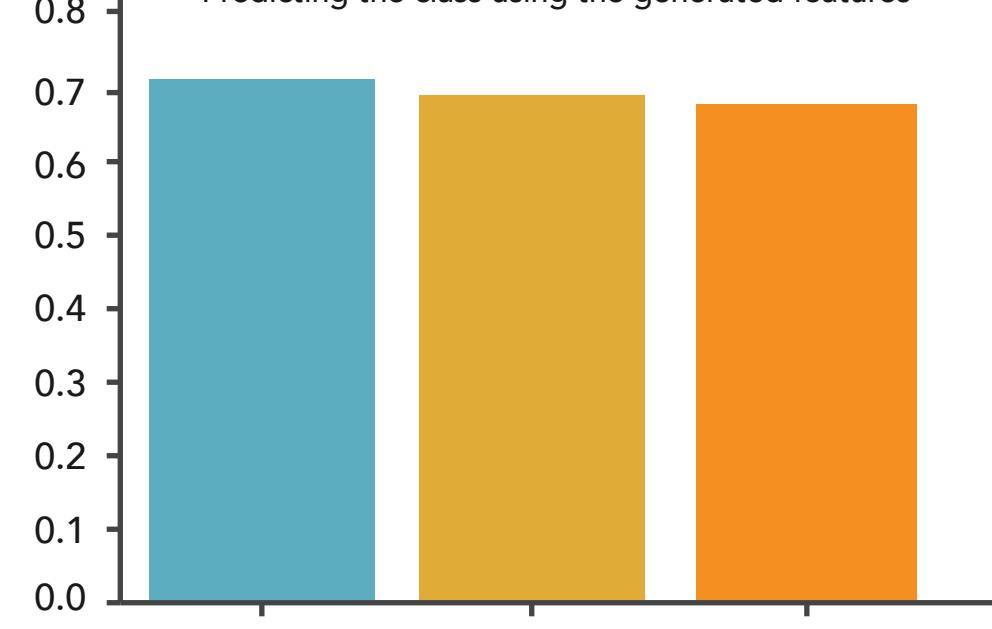
Average Instance Count per Class Defect



Average Defect Width per Class

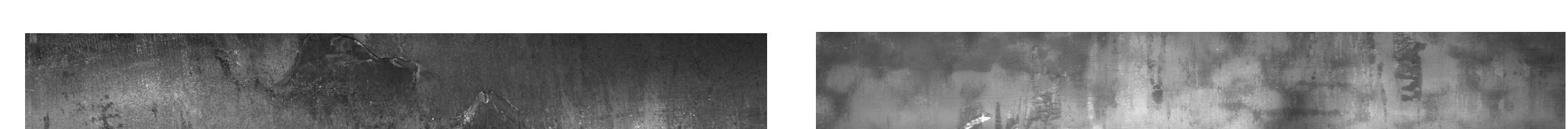


Predicting the class using the generated features



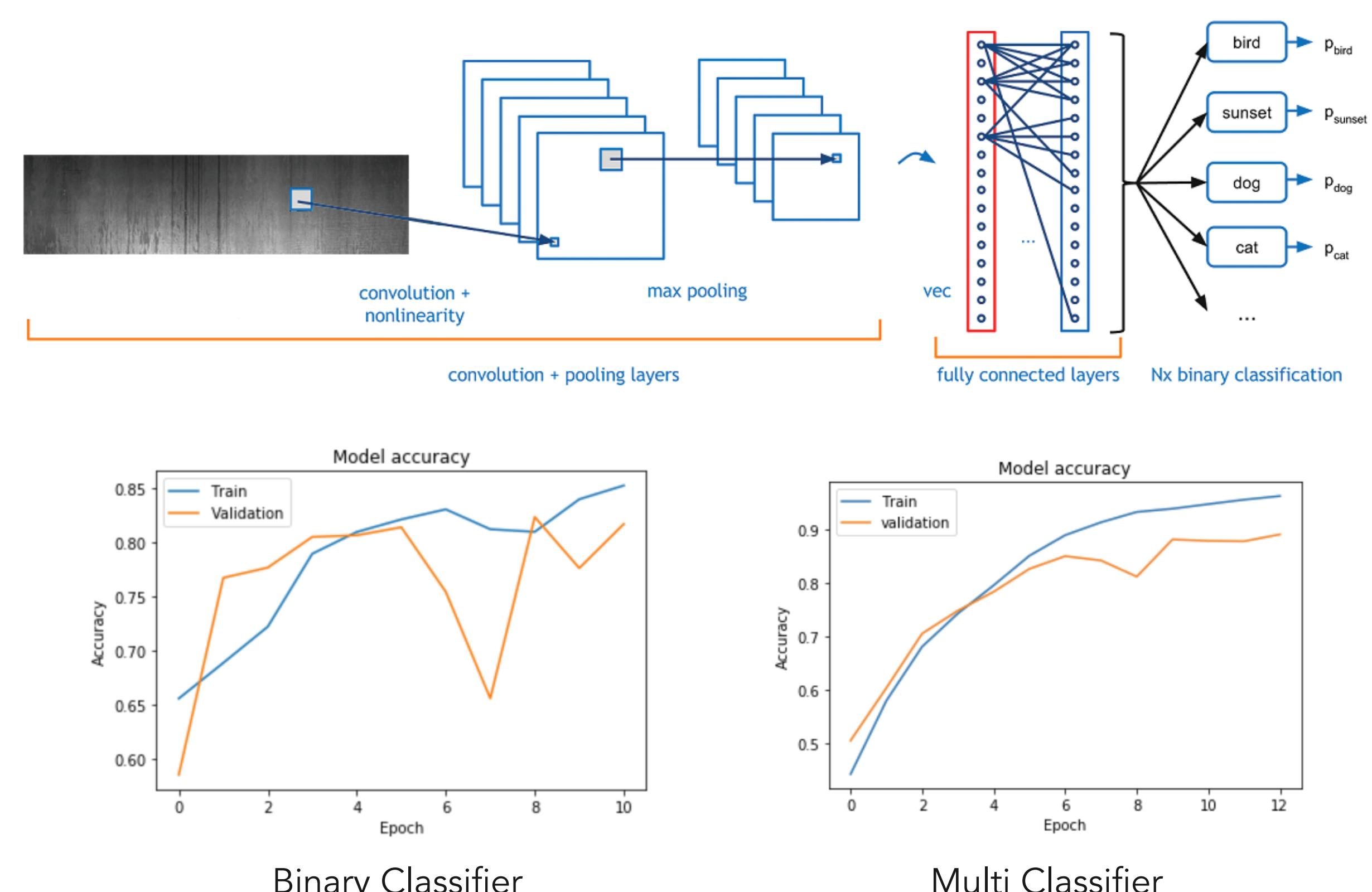
## SMOTE

Rather than replicating the minority observations (e.g., defaulters, fraudsters, churners), Synthetic Minority Oversampling (SMOTE) works by creating synthetic observations based upon the existing minority observations (Chawla et al., 2002)



## Modeling

A convolutional neural network (CNN) is a type of artificial neural network used in image recognition and processing that is specifically designed to process pixel data.



## Result and Conclusion

A 2 stages model was built, the first one will classify if the image contain any type of defect or defect-free, the second stage will take only the defected steel images as an input, and classify which type of defect each image contains.on average the model is able to detect and classify defects with an accuracy of 85.5% .

