Solution Approach and steps taken to solve the assignment

It is an image classification task of classifying images of fenders into cracked or healthy categories. The provided **dataset was too smal**l to train a Convolution Neural Network from scratch, as it will lead to overfitting of the model.

To solve the issue of less data I used a pre-trained ResNet 50 Model (all the layers of model were set to trainable to improve model accuracy) and performed Transfer Learning with the available dataset. The code is written in Python and TensorFlow (Keras), as it is easy to deploy and experiment with the TensorFlow framework.

The pre-trained network was trained to the dataset and training is performed on Google Colab Notebook. While training some **Data Augmentation Techniques are used to increase the size of the dataset** (rotation, hue, random cropping, flipping etc.).

The dataset is divided into train and val in 80%, 20% respectively so that we can validate the model while training only. **Adam Optimizer, Input Image size = (128, 128,3)** is used to train the model and the weights file is stored into web deployment format, and by using TensorFlow Lite it will be converted into Mobile format. Confusion matrix is drawn for the model to check Precision and Recall rate of the model. Model gave 52% accuracy after training (which is pretty low)

Issues with dataset:
1. **Dataset is too small to be used for training purpose**
2. **Images of Clean and Cracked are SAME, it is a very less variant dataset to train a classifier and hence results are poor.**

Ideal Solution Approach:

I suggest the ideal approach to solve this problem is the Object Detection Model, we need to do manual annotation of all the cracks in the dataset and then train an object detection model, it will detect the crack in the image and will give the position of crack to us.