UE23CS352A: Machine Learning

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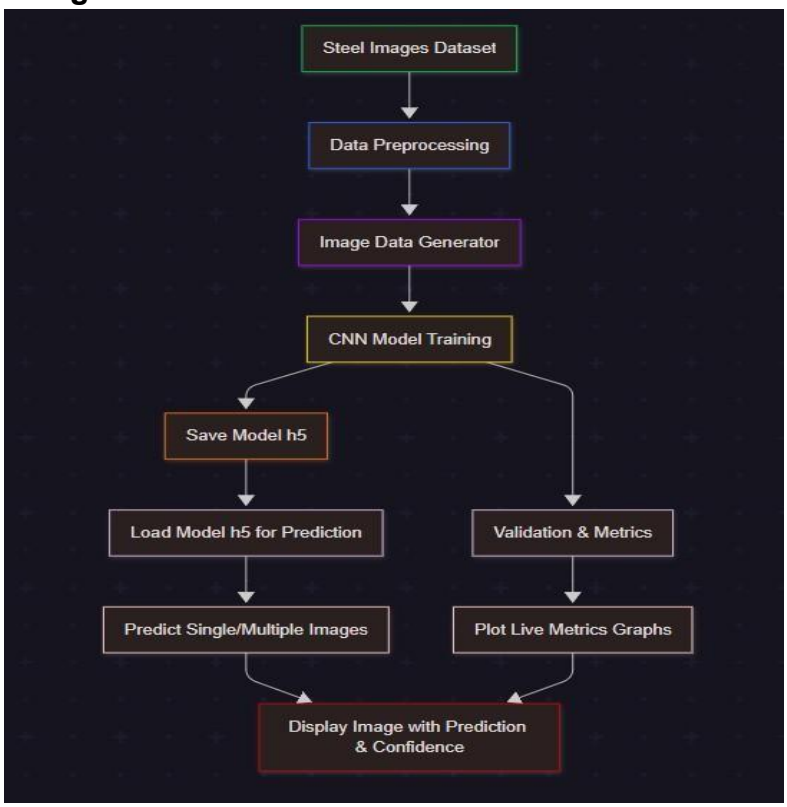
1. Project Title

Automated Steel Surface Defect Detection using Machine Learning and Computer Vision

2. Problem Statement

Defects on steel surfaces—such as scratches, inclusions, pitting, or cracks—can significantly reduce the quality, durability, and market value of steel products. Manual inspection is labor-intensive, subjective, and prone to error, especially in large-scale manufacturing environments. The challenge is to develop an automated steel defect detection system that leverages machine learning and computer vision techniques to identify and classify defects from high-resolution images of steel surfaces. Such a system would improve quality control, reduce production costs, and enable real-time monitoring of manufacturing processes, leading to higher consistency and reliability in steel production.

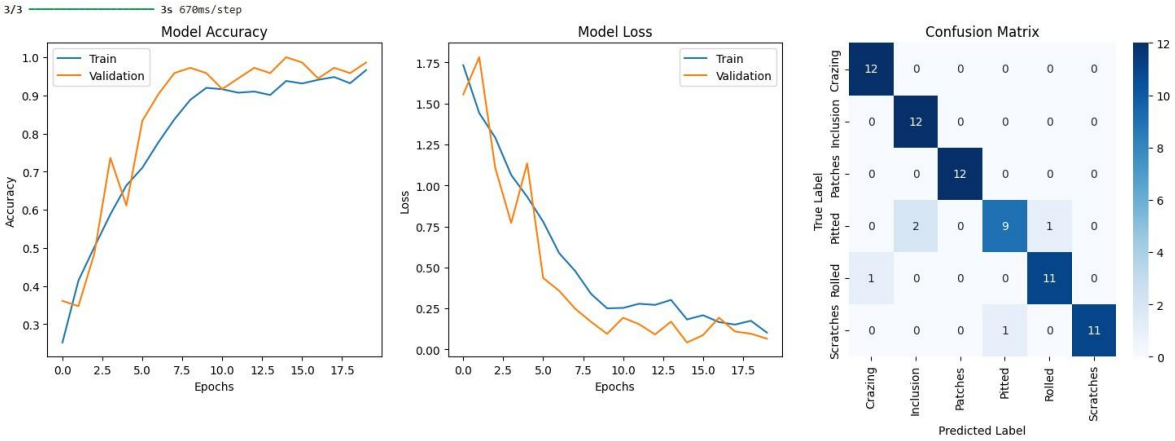
3. High Level Architecture



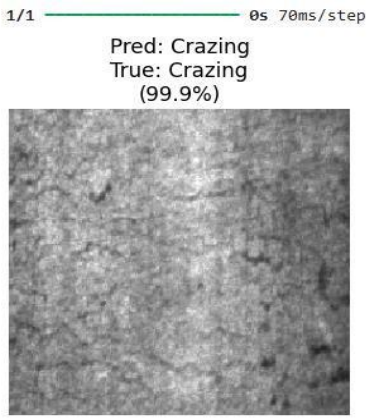
4. Results

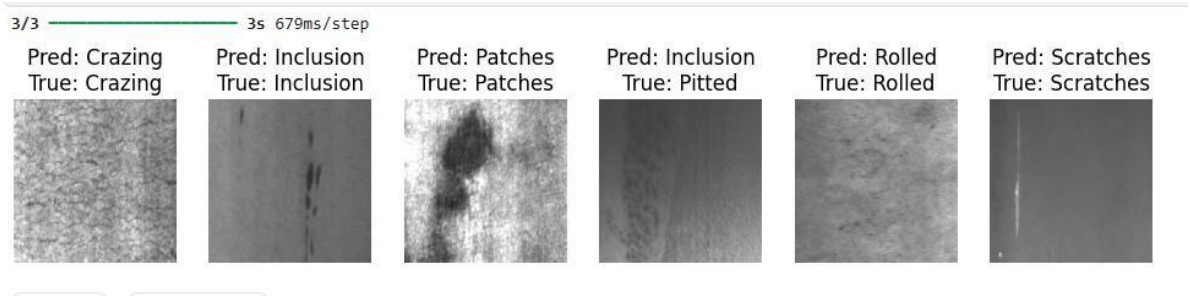
→KAGGLE RESULTS

→ Accuracy v/s Epochs and Loss v/s Epochs graphs with Confusion matrix

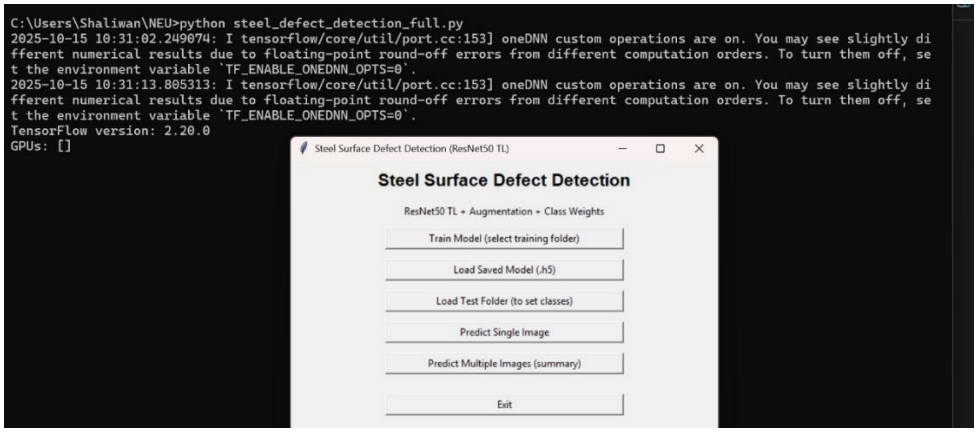


→Prediction of Single image and Multiple images

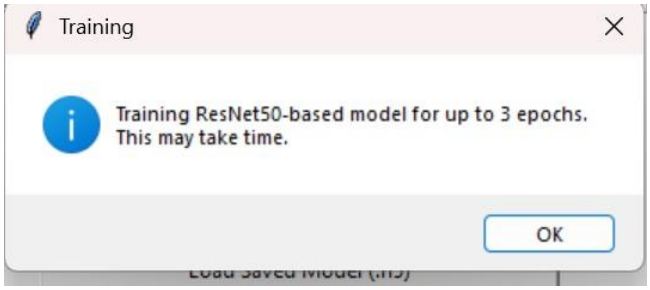




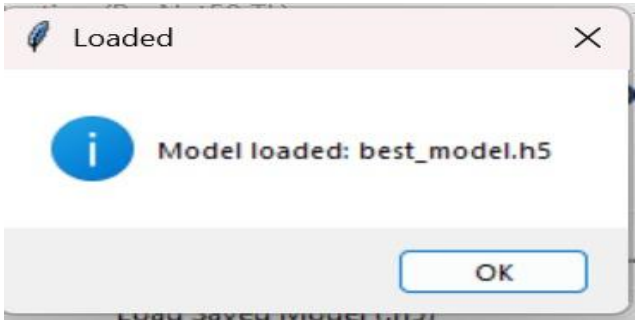
→CMD RESULTS WITH PRESENTABLE UI



→Train Model

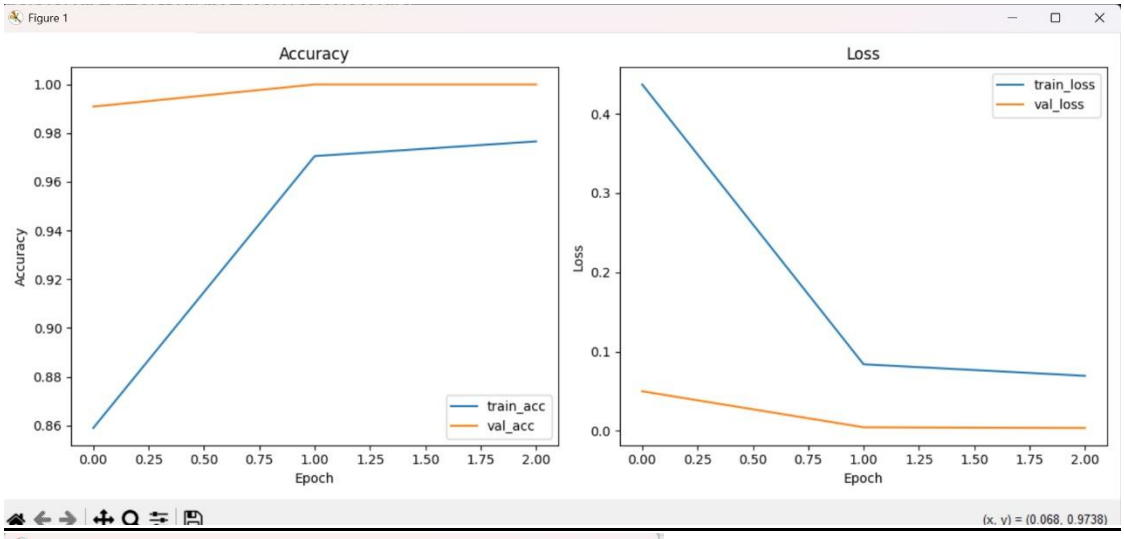


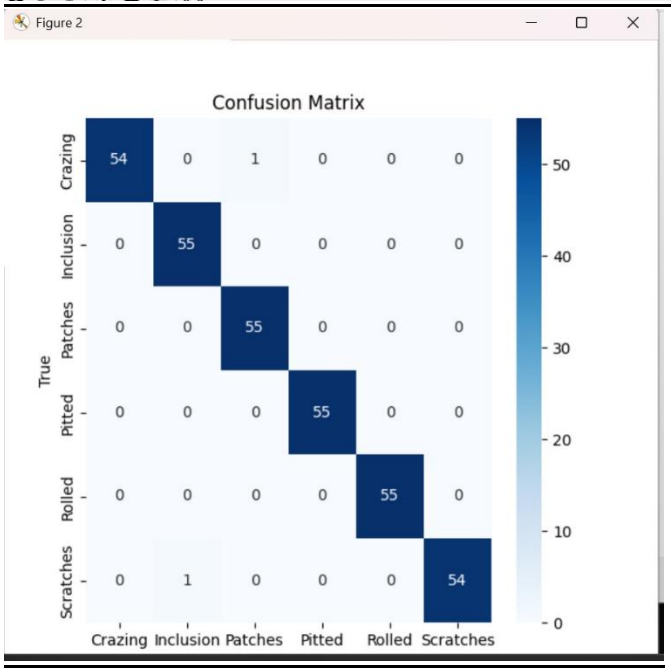
→Loading the Model



→Detecting Test classes

→ Accuracy v/s Epochs and Loss v/s Epochs graphs with Confusion matrix





→Classification report

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u train or evaluate the model.
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Classification report:
              precision    recall  f1-score   support

     Crazing       1.00      0.98      0.99        55
   Inclusion       0.98      1.00      0.99        55
     Patches       0.98      1.00      0.99        55
      Pitted       1.00      1.00      1.00        55
      Rolled       1.00      1.00      1.00        55
   Scratches       1.00      0.98      0.99        55

    accuracy                           0.99       330
   macro avg       0.99      0.99      0.99       330
weighted avg       0.99      0.99      0.99       330
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→ Prediction of Single image and Multiple images