BVRIT HYDERABAD
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Automated Steel Surface Defect Detection Using Deep Learning

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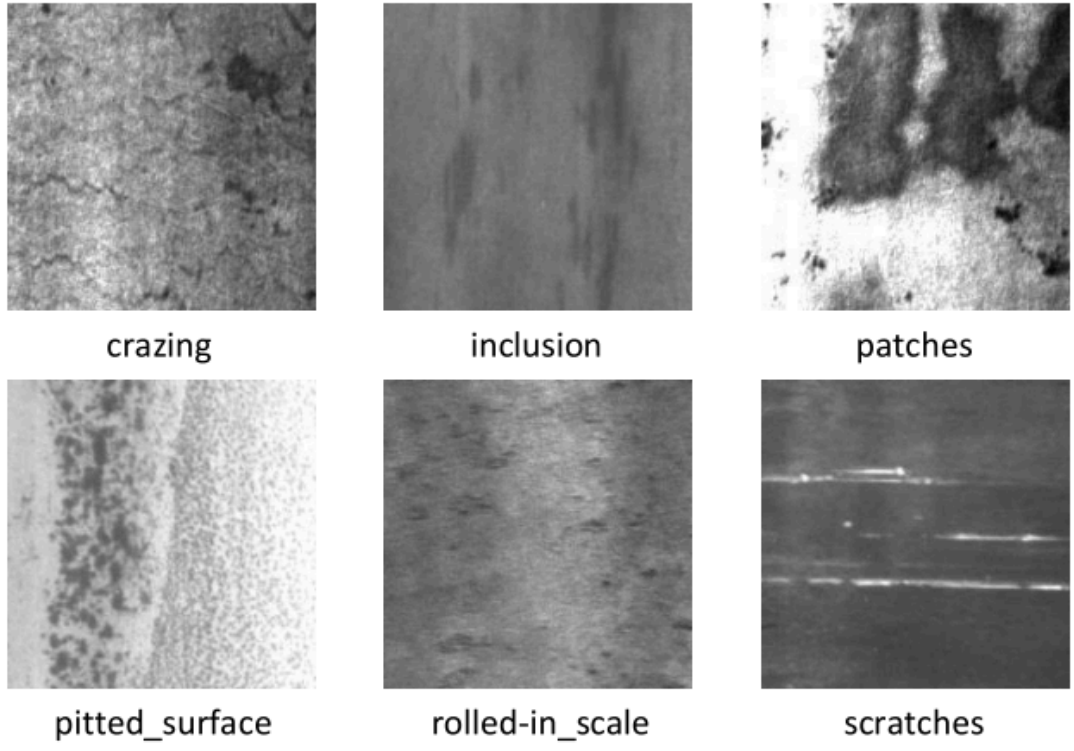
CONTENTS

- Problem Statement
- Abstract
- Motivation
- References

PROBLEM STATEMENT

Steel surface defects impact product quality, and manual inspection is inefficient. Existing automated methods lack accuracy and adaptability. A real-time, high-precision deep learning system is needed for effective defect detection in steel manufacturing.



ABSTRACT

- **Problem:** Steel surface defects affect quality and durability.
- **Challenge:** Manual inspection is slow and inaccurate; existing automated models lack real-time efficiency.
- **Objective:** Develop a real-time, high-accuracy deep learning model for defect detection.

ABSTRACT

- **Approach:**

1. Use YOLO-based models (YOLOv8, YOLOv5 variants).
2. Apply adaptive model compression (pruning, quantization) for efficiency.
3. Integrate ECA, SPDG, and SIoU loss for better feature extraction

- **Expected Outcomes:**

1. Improved detection accuracy and reduced false positives.
2. Real-time processing for industrial scalability.
3. A feedback-driven learning system for continuous improvement.

REAL WORLD APPLICATIONS

- Automotive Industry
- Aerospace & Defense
- Construction & Infrastructure
- Factory Automation & Smart Manufacturing
- Cost & Waste Reduction

REFERENCES

- Maojie Sun, Fang Dong, Zhaowu Huang, and Junzhou Luo, "Adaptive Model Compression for Steel Plate Surface Defect Detection: An Expert Knowledge and Working Condition-Based Approach," Tsinghua Science and Technology, Vol. 29, No. 6, 2024. [DOI: 10.26599/TST.2024.9010039] . Link here
- Tinglin Zhang, Huanli Pang, and Changhong Jiang, "GDM-YOLO: A Model for Steel Surface Defect Detection Based on YOLOv8s," IEEE Access, Vol. 12, 2024. [DOI: 10.1109/ACCESS.2024.3476908]. Link here
- Fei Ren, Jiajie Fei, Hongsheng Li, and Bonifacio T. Doma Jr., "Steel Surface Defect Detection Using Improved Deep Learning Algorithm: ECA-SimSPPF-SIoU-Yolov5," IEEE Access, Vol. 12, 2024. [DOI: 10.1109/ACCESS.2024.3371584]. Link here

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