INTERNSHIP REPORT

Submitted by,

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Course : B.E Computer Science and Engineering
Internship duration : 06/01/2025 to 18/01/2025

ABSTRACT

This report provides an overview of the internship experience at FLEX Pvt Ltd, focusing on the development and deployment of a Scratch and Dent detection model using a custom dataset. The internship, which lasted for 12 days, offered a valuable opportunity to apply theoretical knowledge to practical scenarios, enhancing both technical and professional skills.

The primary objective was to develop a robust object detection system capable of accurately identifying and localizing objects in real-time video streams. Key activities included data collection, annotation, model training, evaluation, optimization, and deployment.The internship at FLEX Pvt Ltd was a highly rewarding experience that bridged the gap between theoretical learning and practical application. The hands-on experience with machine learning and computer vision techniques, combined with the professional environment at FLEX Pvt Ltd, provided a solid foundation for future endeavors in the field. The project outcomes, including a fully functional real-time object detection system, reflect the successful application of learned skills and knowledge.

Acknowledgement

I would like to express my sincere gratitude to FLEX Pvt Ltd for providing me with the opportunity to undertake this internship. The experience has been invaluable and has significantly contributed to my professional and personal growth.I deeply grateful to my supervisor, Balasubramaniyan Ponnuswami, for their guidance, support, and encouragement throughout the internship. Their expertise and insights have been instrumental in helping me understand the intricacies of the industry and in completing my tasks effectively.

I would also like to extend my appreciation to the entire team at FLEX Pvt Ltd for their warm welcome and for creating a conducive learning environment. Their willingness to share knowledge and provide assistance whenever needed has made my internship experience both enjoyable and enriching.

Special thanks to the Human Resources department for their efficient handling of all administrative matters and for ensuring a smooth onboarding process.

Sukesh S T(reg:113022104150)

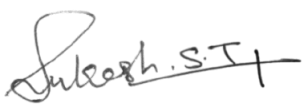


Table of Content

I.Duration/ No. of Days: 2 weeks (6 JAN 2025 – 18 JAN 2025)

II.Place: Sriperumbudur,Chennai,India

III.Introduction: As part of curriculum for the accomplishment of Bachelor of Engineering the students have to do one month internship in an agency. The purpose of the internship is to use the classroom learning in to the practical world, it is helping the trainee to adjust with the practical environment. This report provides an overview of the internship experience at FLEX Pvt Ltd, focusing on the machine learning project undertaken during the internship. The project involved developing and deploying a YOLO-based object detection model using a custom dataset.

At the beginning of the internship I formulated several learning goals, which I wanted to achieve:

- To see what is like to work in a professional environment;
- To see if this kind of work is a possibility for my future career;
- To put into practise my gained skills and knowledge;
- To see what skills and knowledge I still need to work in a professional environment;
- To get fieldwork experience in an environment unknown for me;
- To enhance my communication skills;
- To build a network.
- To learn and develop thought the internship period.

IV.Profile of the Organization:

Name of the organization: FLEX .Ltd

Address : Sriperumbudur,Chennai,India

Mission And Objectives :

Flex (formerly known as Flextronics) delivers innovative design, engineering, manufacturing, real-time supply chain insight and logistics services to companies of all sizes in various industries and end-markets. With unrivalled expertise across every major industry, Flex empowers leading companies to flawlessly develop and launch their next innovation at scale, from ideation, through design and development, to market—and beyond.

V: Problem Statement: Development of Scratch and dent detection ML model that will enhance the Testing process.

Expected Outcomes:

Increased Efficiency
Enhanced Accuracy
Scalability
Real-Time Monitoring

VI.Tools and Technique:

Tools used: Python , Pytorch, CV, YOLO version 11

Data Preprocessing Techniques

Data Augmentation: Techniques such as rotation, flipping, scaling, and color adjustments were applied to increase dataset diversity and improve model robustness.

Normalization: Image normalization scaled pixel values to a suitable range for the YOLO model, ensuring consistent input data.

Image Resizing: Images were resized to match the input dimensions required by the YOLO model for efficient processing.

Model Training Tools and Techniques

Ultralytics YOLO Library: A popular implementation of the YOLO model, providing a user-friendly interface for training, evaluating, and deploying models.

Transfer Learning: Leveraged pre-trained YOLO models and fine-tuned them on the custom dataset to accelerate training and enhance performance.

Early Stopping and Checkpointing: Implemented to halt training when performance plateaued and to save the best-performing model weights.

Model Deployment Tools and Techniques

OpenCV: An open-source computer vision library used for real-time image and video processing, capturing video streams from webcams and processing frames for object detection.

Python: The primary programming language used for developing the project, leveraging its extensive libraries and frameworks for machine learning and computer vision.

VII.Observation: I as an intern will be sharing my observation in next paragraph.

1.Data Quality: High-quality, well-annotated data is crucial for effective model training, significantly impacting the YOLO model's accuracy and robustness.

2.Iterative Development:Model development is an iterative process requiring continuous evaluation and refinement to achieve optimal performance.

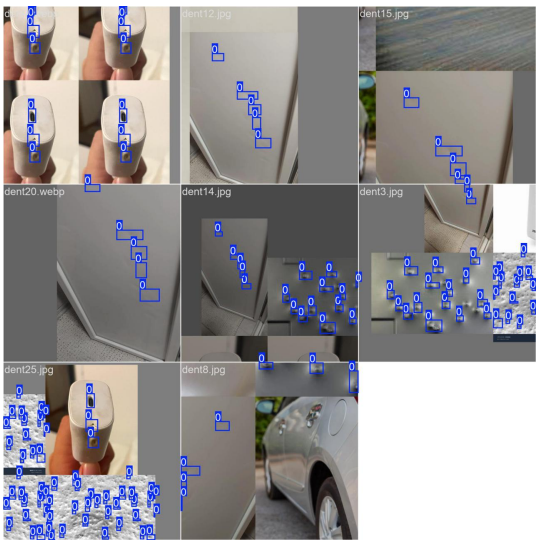
3.Data Augmentation: Techniques like rotation, flipping, and scaling enhance model robustness by increasing dataset diversity.

4.Hyperparameter Tuning: Fine-tuning parameters such as learning rate and batch size is essential for optimizing model performance and reducing overfitting.

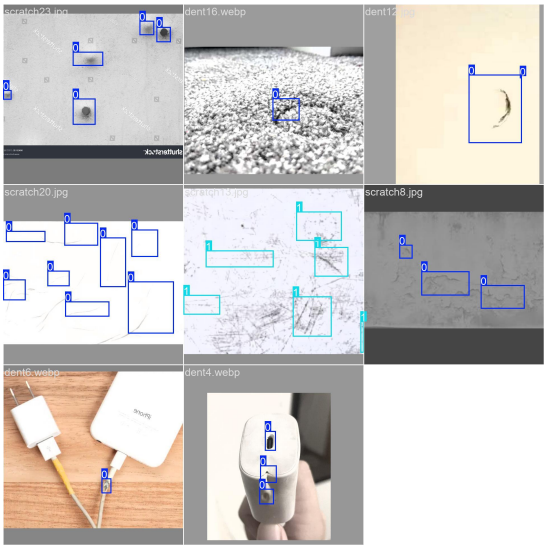
5.Team Collaboration: Effective teamwork and communication are vital for project success, contributing significantly to achieving project goals

VII.Evaluation:

The YOLO model was evaluated using metrics such as precision, recall, and mean Average Precision, Here are some predictions by the ML model

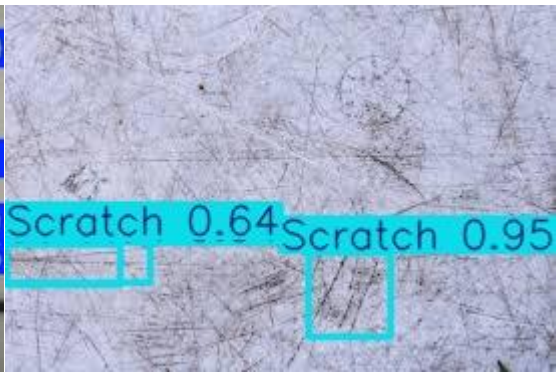


Training 1



Training 2

Prediction 1



Prediction 2

IX.Learnings :

The internship provided valuable learning experiences, including:

- Hands-on experience with machine learning and computer vision techniques.
- Understanding the end-to-end process of developing and deploying a machine learning model.Enhancing problem-solving and critical thinking skill

X.Conclusion:

The internship at FLEX Pvt Ltd provided an invaluable opportunity to bridge the gap between theoretical knowledge and practical application in the field of machine learning. Over the course of 12 days, the project focused on developing and deploying a Dent and Scratch detection model using a custom dataset. This comprehensive experience encompassed various stages, including data collection, annotation, preprocessing, model training, evaluation, optimization, and deployment. Each stage presented unique challenges and learning opportunities, contributing significantly to both personal and professional growth.

The hands-on experience gained during the internship reinforced theoretical concepts and provided a deeper understanding of machine learning techniques. The exposure to industry practices and the opportunity to work on a real-world project significantly enhanced problem-solving and critical thinking skills. The internship at FLEX Pvt Ltd has laid a solid foundation for future endeavors in the field of machine learning and computer vision. Overall, the internship was a highly rewarding experience, marked by successful project outcomes and substantial personal and professional development.