

Safety Equipment Detection System Using **YOLOv8**

Hackathon 2025 — Computer Vision Challenge

Team name: Caffeinated Coders

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Gauri Singh, Disha Chaudhary

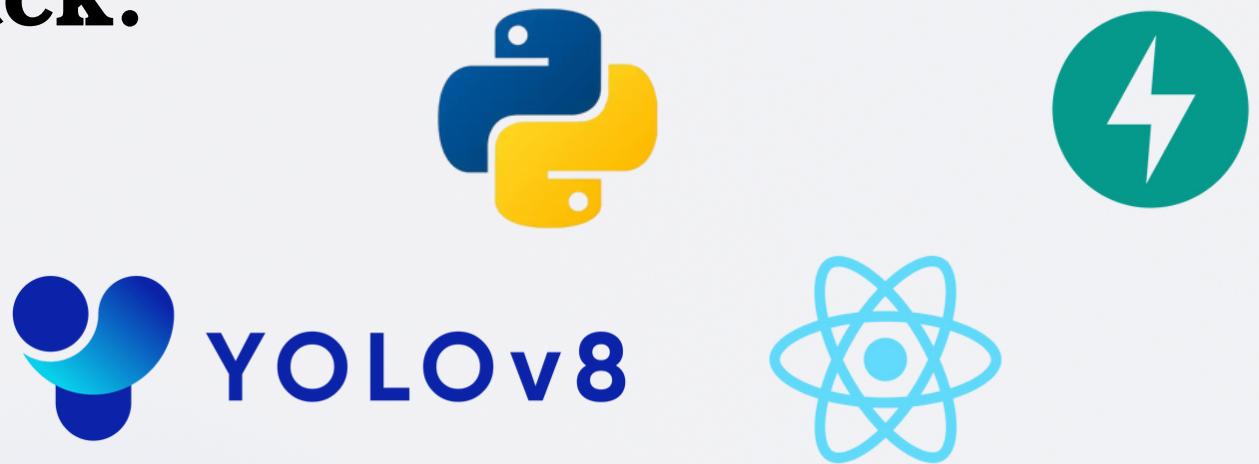
Tech stack:

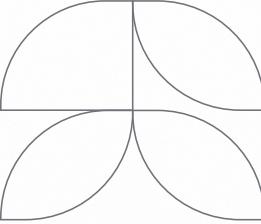
Python

YOLOv8

FastAPI

React





Problem Statement

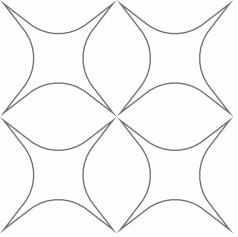
01 Build an AI system to detect safety equipment

02 Target classes: OxygenTank, NitrogenTank,
FirstAidBox, FireAlarm, SafetySwitchPanel,
EmergencyPhone, FireExtinguisher

03 Requirements: train custom model, high accuracy,
web demo

04 Challenges: limited data, imbalance, lighting
variations





Dataset Overview

Dataset:

hackathon2_train_1.zip



Val:

336 images



Preprocessing:

Label verification



Train:

1767 images



YOLO

Format Labels



Preprocessing:

Corruption Check



Solution Approach

Model: YOLOv8s

Training: 50 epochs
+ fine-tuning

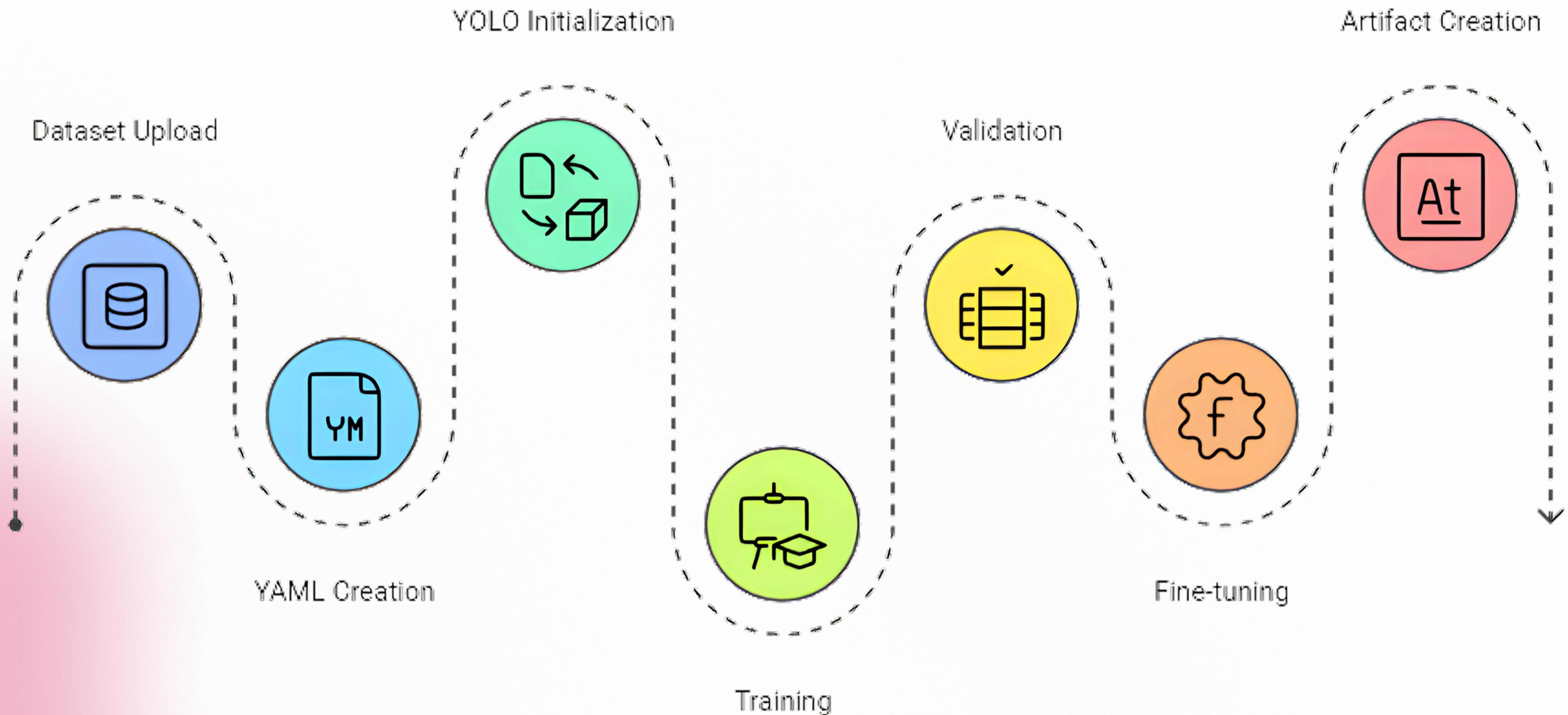
Trained on Colab
(T4 GPU)

Batch: 16,
Image size: 640

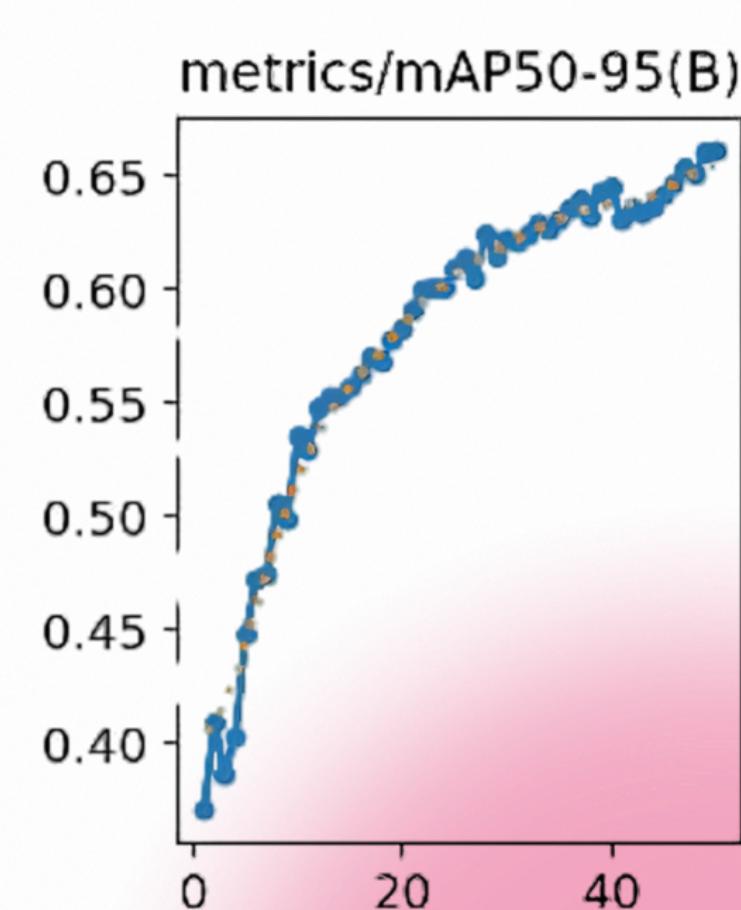
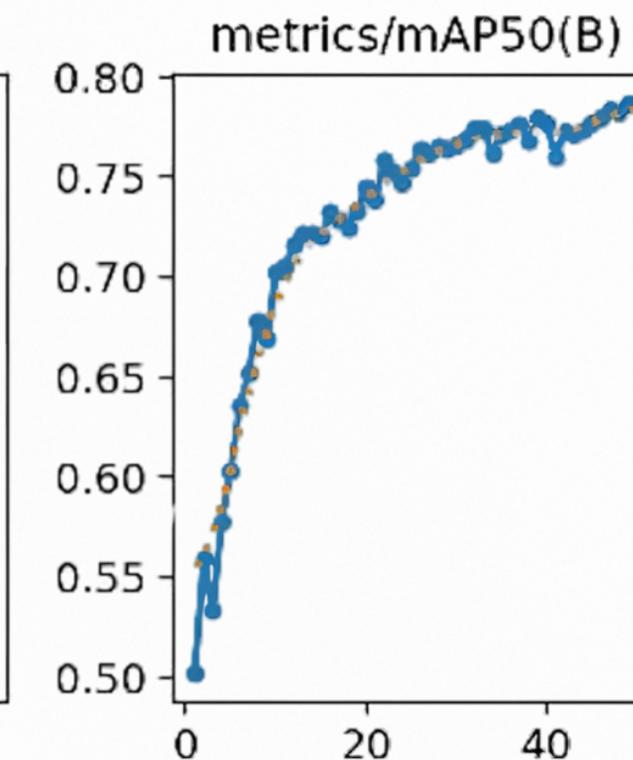
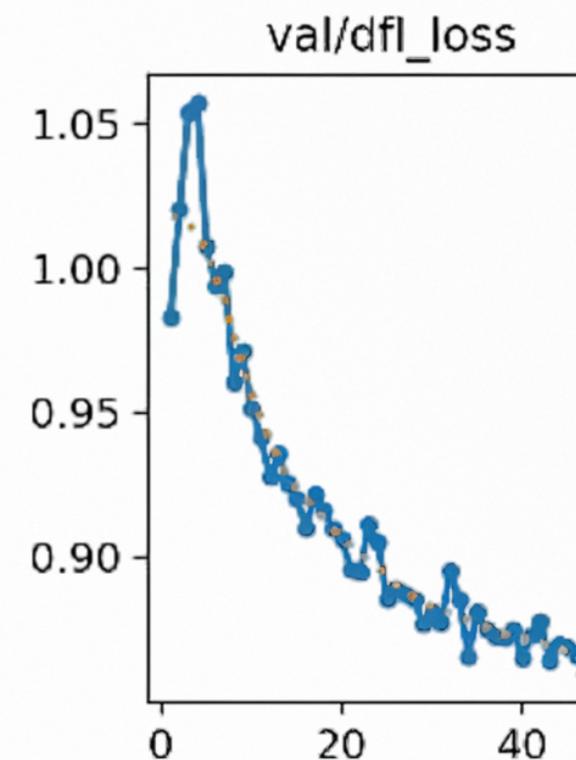
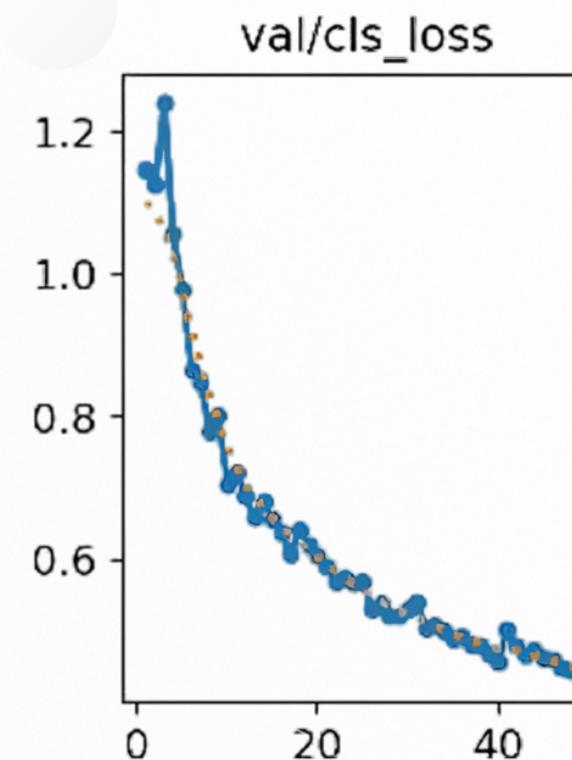
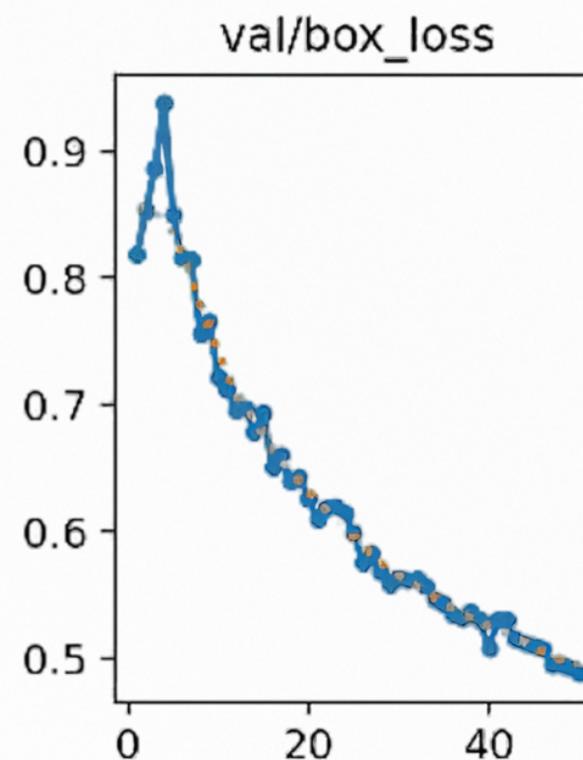
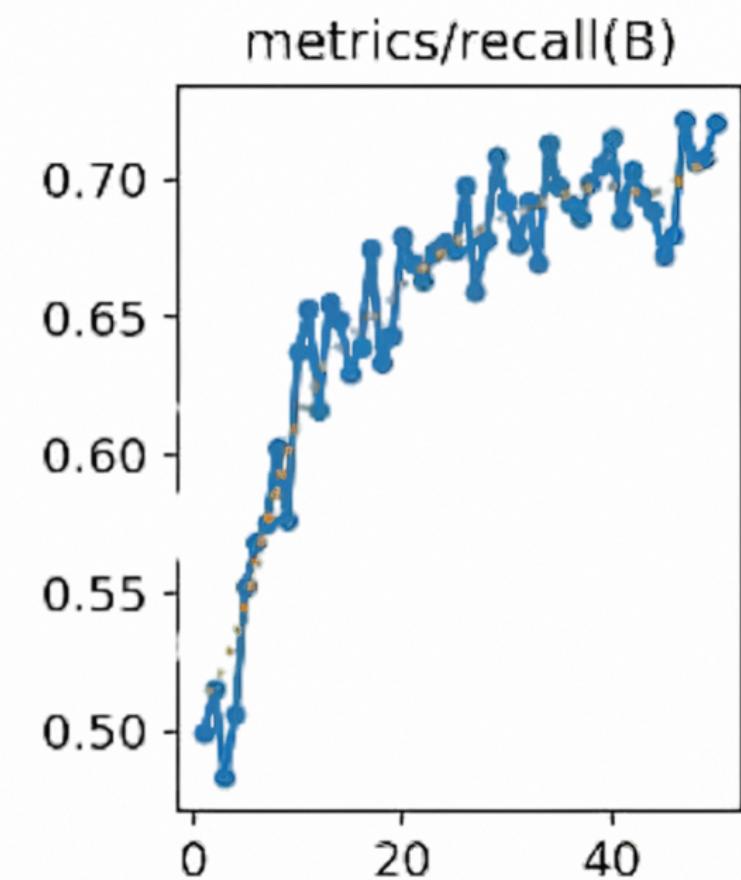
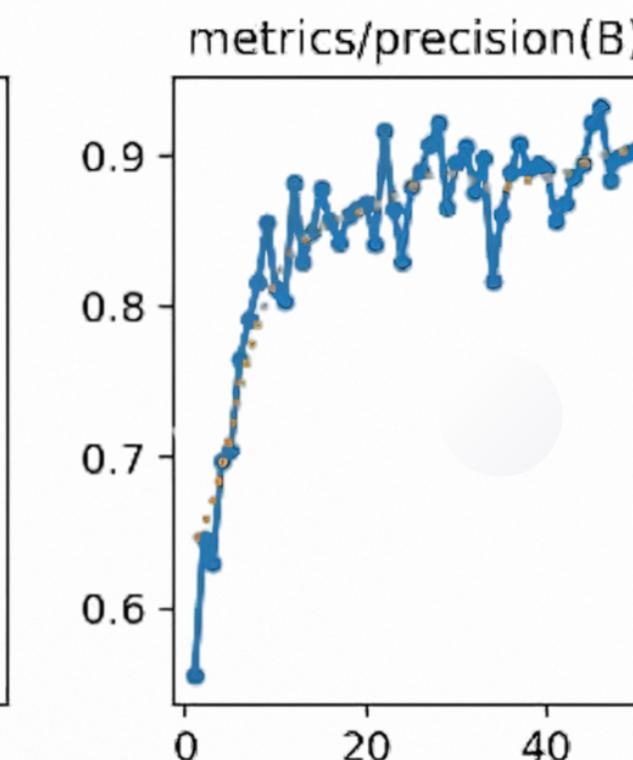
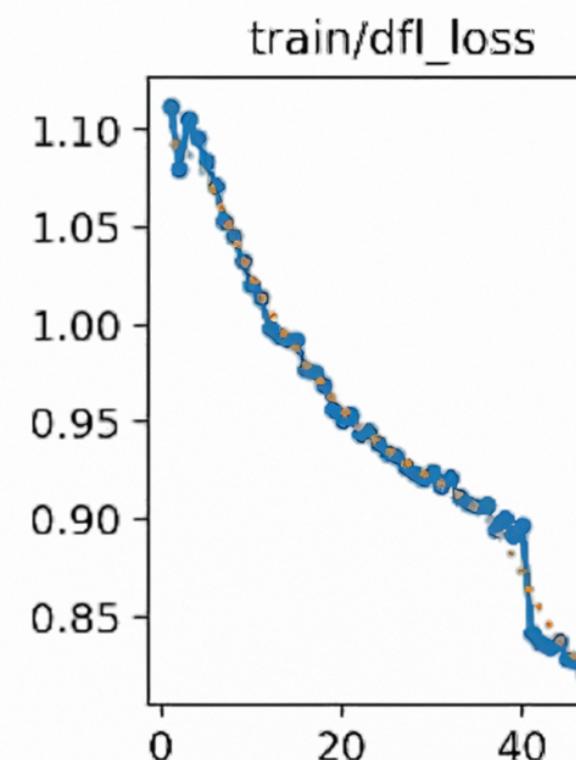
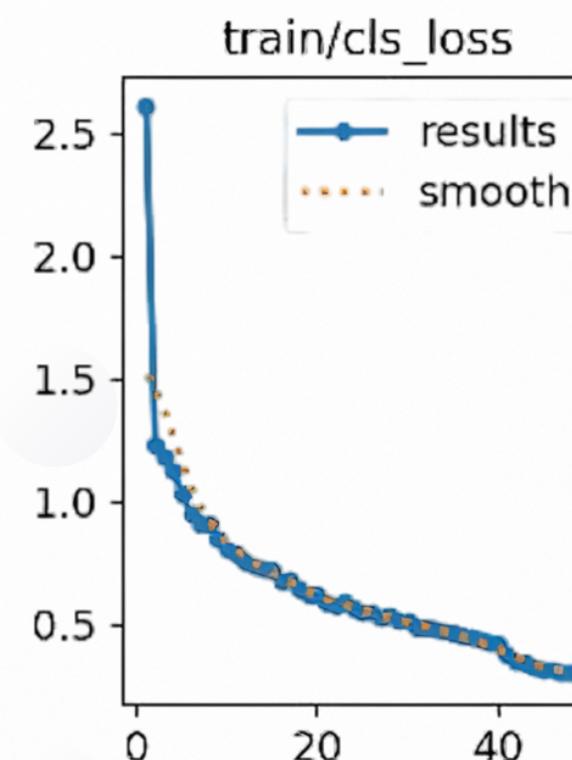
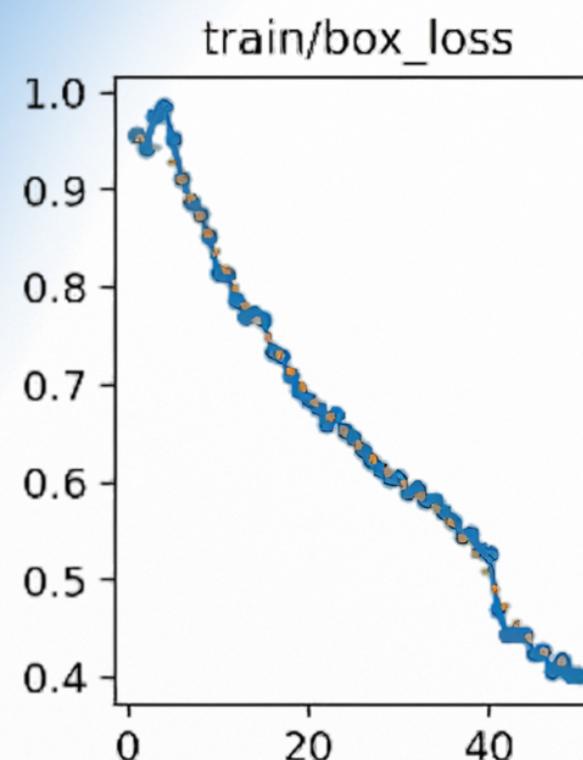
Confidence threshold:
0.25



Model Training Process

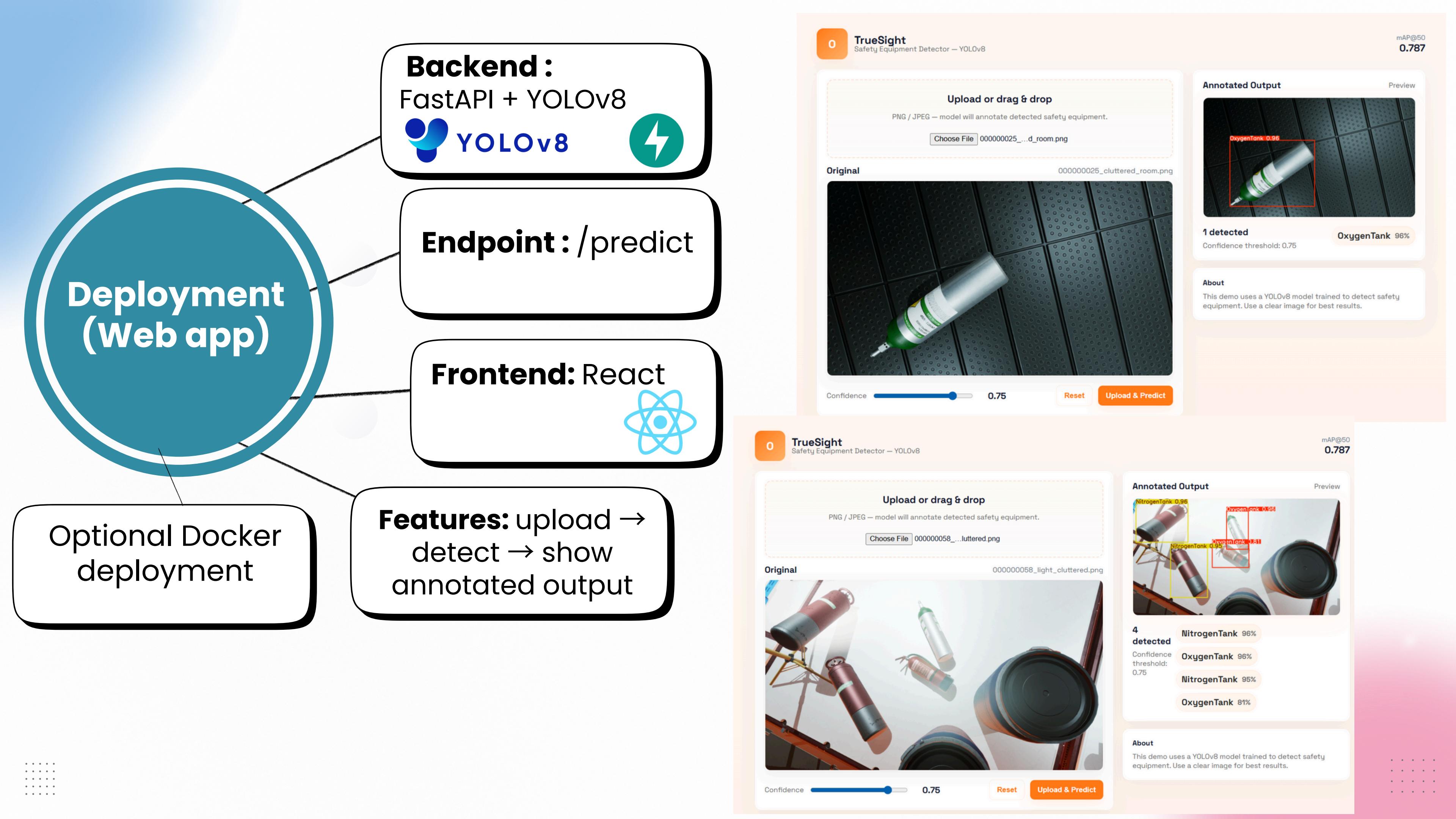


Model Performance



- Final mAP@50: 0.787
- mAP@50-95: ~0.66

- Strong accuracy across all 7 classes
- Good balance of precision & recall





CONCLUSION & FUTURE WORK

This project is just the beginning with more data, smarter models, and better deployment, we can turn this prototype into a real world solution that creates real impact.



Achieved 0.787 mAP@50

Our model achieved 0.787 mAP@50, showing strong and reliable object detection performance.



More Data Collection & Augmentation

Expanding and diversifying the dataset will improve accuracy and reduce false detections, especially in rare scenarios.



Upgrading to YOLOv9

Upgrading to YOLOv9 will deliver faster inference and improved accuracy for real-time performance.



ONNX Runtime Optimization

Converting the model to ONNX will make it lightweight and deployable across multiple platforms.