VisiCompanion

— YOUR PATH TO INDEPENDENCE. —

NEED of this Project:-

- Globally, ***2.2 billion*** people live with some form of vision impairment ***(World Health Organization).***
- India alone has ***4.95 million*** blind individuals and ***70 million*** with vision impairments, including ***0.24 million*** blind children ***(National Institutes of Health).***
- In low-income countries, nearly ***90% of people*** with disabilities lack access to necessary assistive technology ***(World Health Organization).***
- The lack of affordable solutions limits the ***independence*** and ***quality of life*** for individuals with visual impairments.

Challenges blind people face

- **Limited Independence**
- **Safety Concerns**
- **Information** Accessibility
- **Financial Constraints**
- **Technology Barriers**

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VisiCompanion is a real-time grocery detection tool designed for visually impaired users. Using advanced YOLO models, it identifies grocery items and provides audio cues, allowing users to shop independently and with confidence.

Goals and Objectives

Real-Time Grocery Detection:	Build a system to identify grocery items instantly.
Audio Feedback:	Offer audio cues to help users identify items and navigate stores.
Model Evaluation:	Evaluate YOLOv8 and YOLOv9 for accuracy, speed, and efficiency.
User-Centered Design:	Ensure the system is practical, intuitive, and cost-effective

Key Features:-

- Real-Time Product Detection
- Brand Recognition
- Voice Feedback System
- Optimized for Cluttered Environments
- Lightweight and Fast Inference
- Future-Ready Features

Alignment with UN Sustainable Development Goals (SDGs)

Goal 3	Goal 8	Goal 9	Goal 10	Goal 11
Good Health and Well-Being:- • Improves independence and well-being for the visually impaired.al	Decent Work and Economic Growth:- • Promotes inclusion, enhancing job opportunities	Industry, Innovation, and Infrastructure:- • Uses innovative tech for real-time detection and efficient solutions.	Reduced Inequality:- • Reduces inequality by improving accessibility.	Sustainable Cities and Communities:- • Supports social inclusion in urban environments.

Methodology and Approach:-

Step 1:

- **Data Collection and** Preprocessing-
  - Collect and label a dataset of diverse grocery images. Apply resizing, normalization, and augmentation to enhance model compatibility and robustness.

Step 2:

- **Model** Selection-
  - YOLOv8 is chosen for efficient, real-time performance on low-power devices. YOLOv9 offers higher accuracy for complex items but requires more processing power.

Step 3:

- **Training and** Optimization-
  - Train YOLOv8 and YOLOv9 on the preprocessed grocery dataset. Tune hyperparameters to optimize accuracy and speed.

Step 4:

- **Evaluation and** Comparison-
  - Test each model for accuracy, speed, and efficiency in grocery detection. Determine the best model based on real-world performance needs.

Step 5:

- **Deployment and User** Feedback-
  - Integrate the selected model into an accessible interface for users. Provide audio feedback for item identification, supporting independent grocery shopping.

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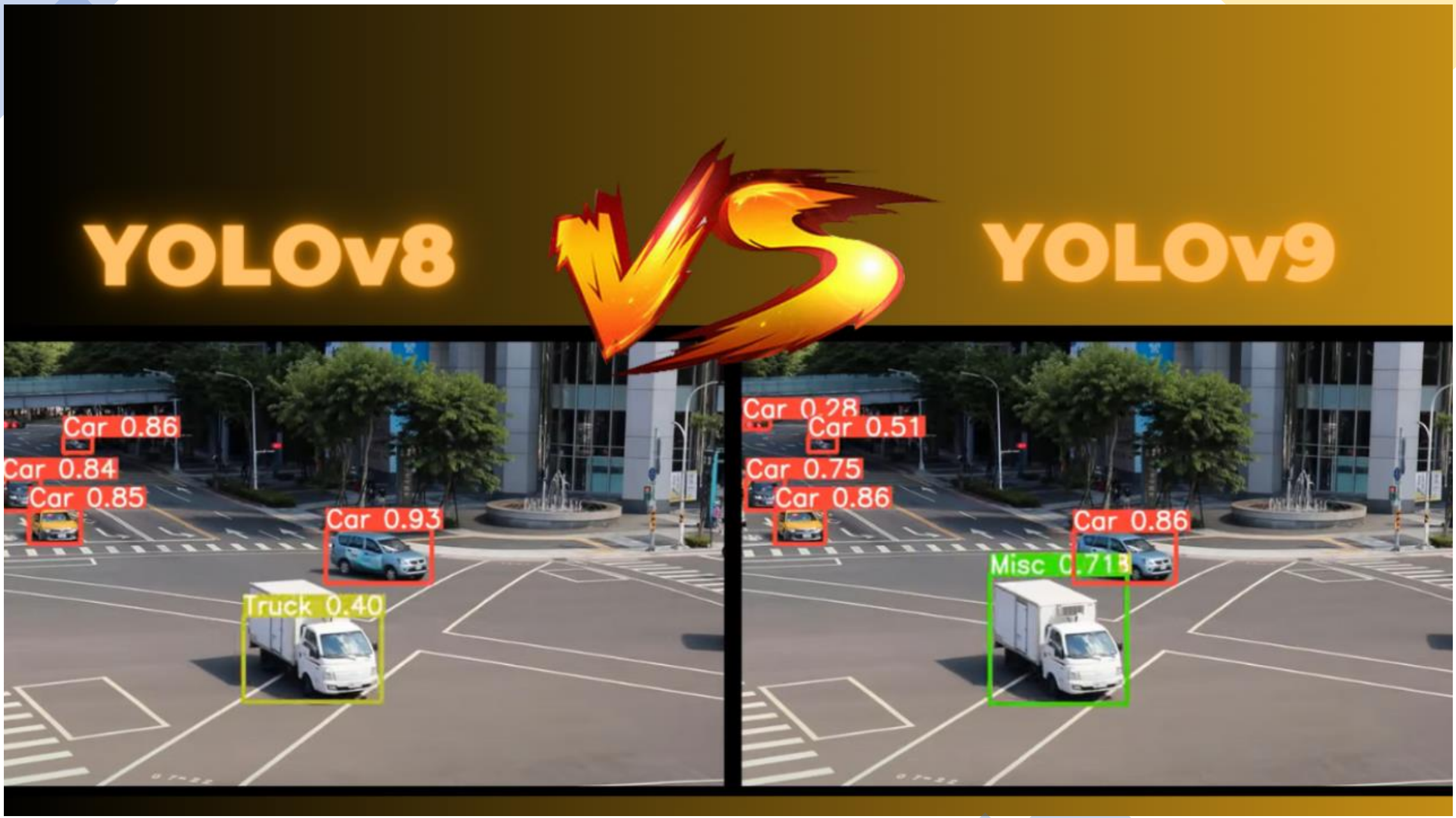
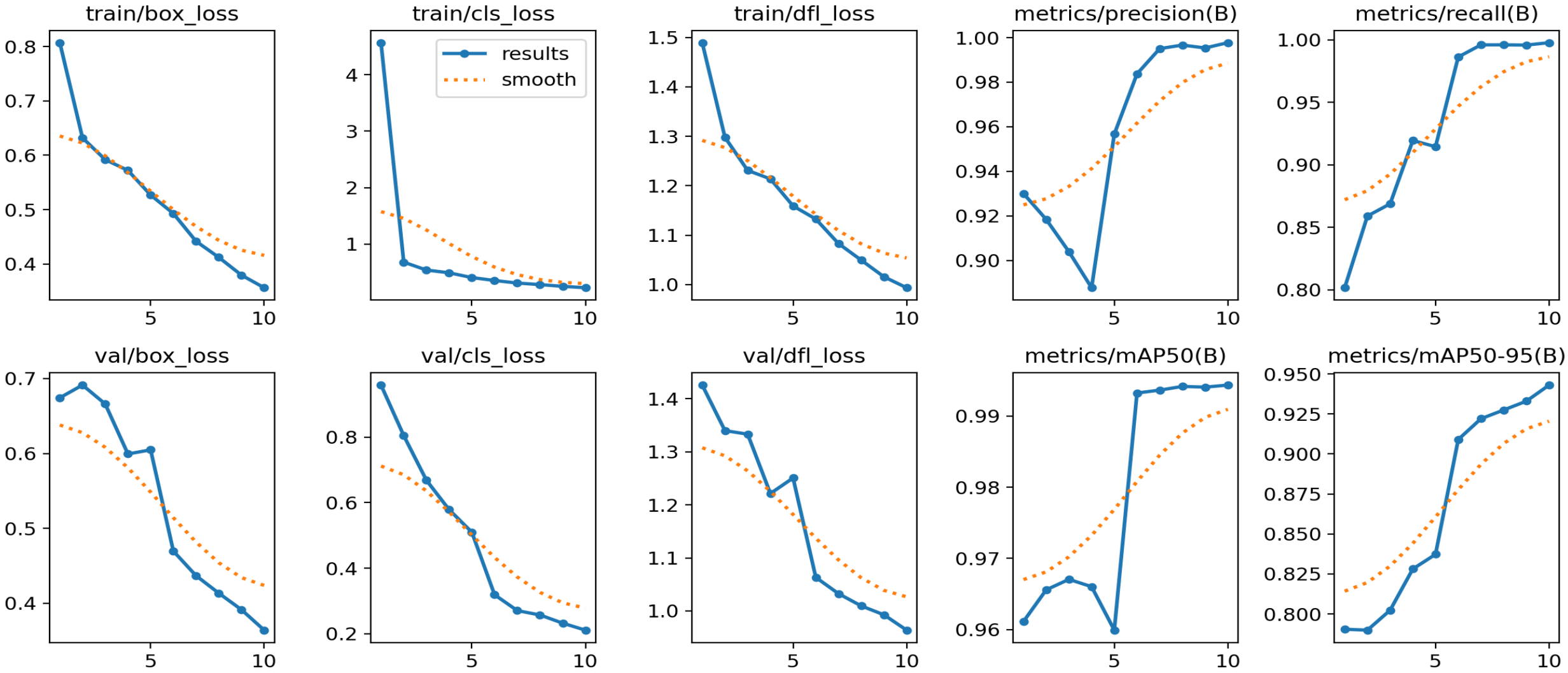
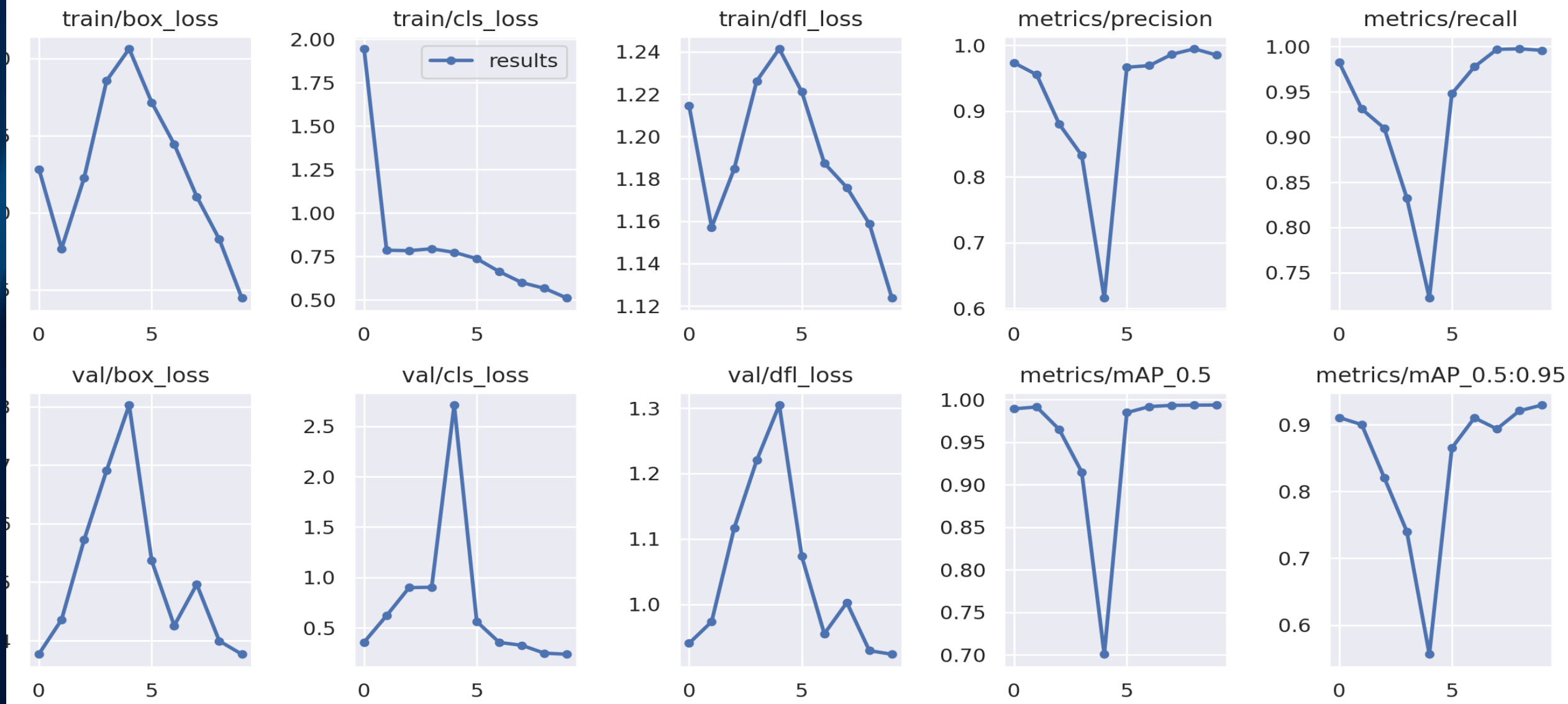
Grocery Data Set Samples:-


YOLOv8
VS
YOLOv9
Car 0.86
Car 0.84
Car 0.85
Car 0.93
Truck 0.40
Car 0.28
Car 0.51
Car 0.75
Car 0.86
Car 0.86
Misc 0.71



YOLOv8 Results



YOLOv9 Results

LIVE Detection

YOLOv9

YOLOv8

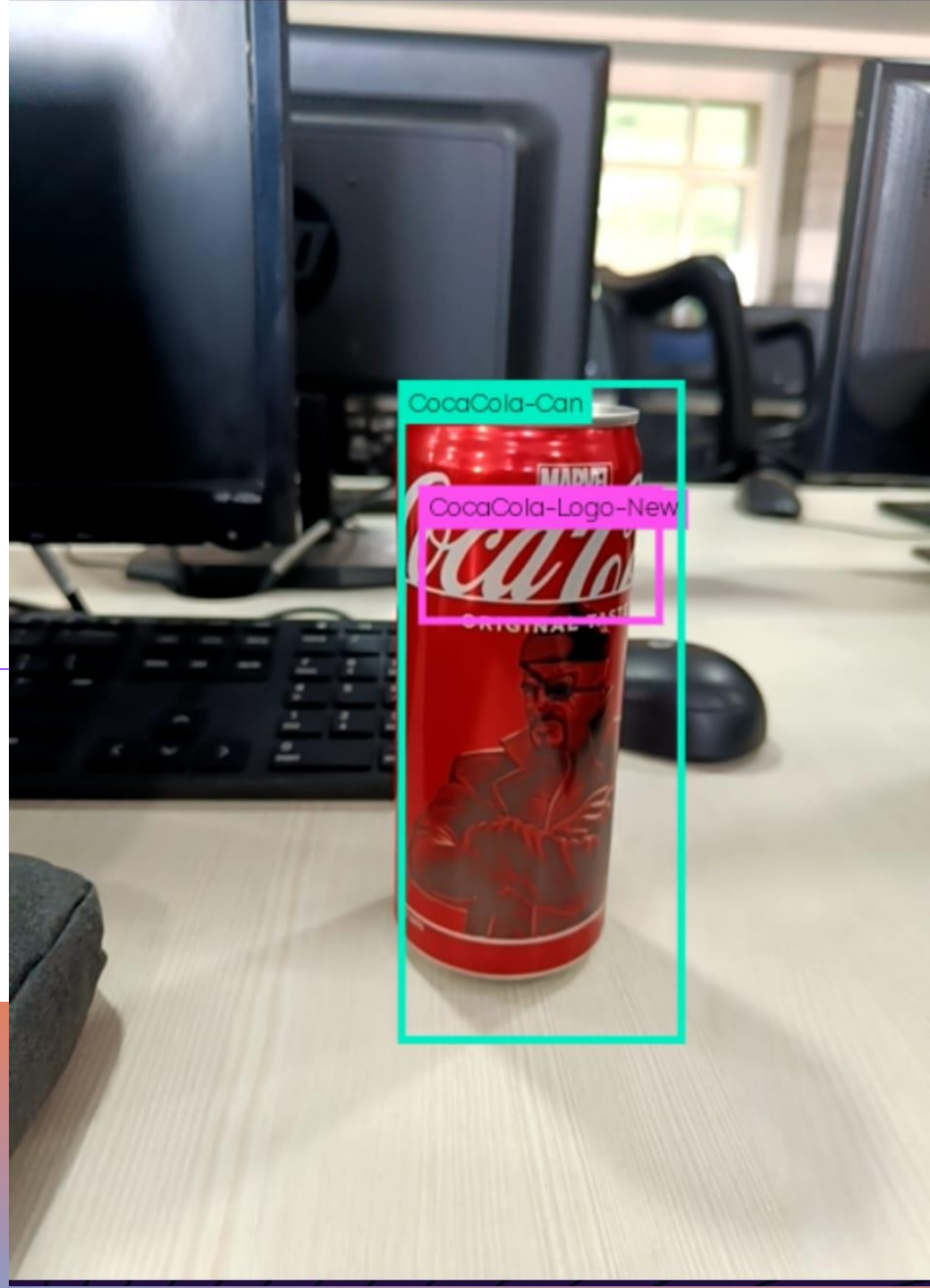
Which is Better: YOLOv8 or YOLOv9

YOLOv8	YOLOv9
Standard detection layers	Improved small object focus
Lightweight but moderate efficiency	More optimized and faster
Good accuracy, struggles small items	Better accuracy, fine details
Adequate for large objects	Enhanced for tiny details
Moderate FPS, real-time capable	Faster FPS, real-time optimized
Moderate inference time	Faster frame processing
Struggles with occluded items	Better handling of clutter
Good in normal lighting	Handles varied lighting better
Needs optimization for mobile	Optimized for mobile deployment
Standard training time	Requires longer training
Moderate resource consumption	More resource efficient

mAP
91.4%

Precision
87.7%

Recall
84.8%



YOLOv8 scores:-

Tools To Be Used:-

OpenCV	PyTorch	TensorFlow
Ultralytics YOLOv8	YOLOv9 Repository	GPU (e.g., NVIDIA GPU)
Google Colab	AWS EC2	TensorBoard

Next Steps and Conclusion:-

Model Fine-Tuning-

Further adjust YOLOv8 and YOLOv9 models to enhance detection accuracy and efficiency for grocery items.

User Testing-

Conduct testing sessions with visually impaired users to gather insights and improve usability based on real-world feedback.

App Integration-

Integrate the selected model into a mobile app, ensuring compatibility, intuitive design, and easy access to audio feedback for users.

Interface Enhancement-

Refine the app's interface for a seamless experience, with responsive and accessible audio cues.

Deployment Optimization-

Optimize the system for deployment on mobile and edge devices, maintaining real-time performance and stability.

Scalability and Expansion

Expand item recognition capabilities and explore additional features like item categorization and nutritional details.

Team Members:-

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Thank you