

PurePlate

Capstone Project - MBD

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Content



01

Problem

Pre-record your Canva presentation to present anytime, anywhere.

02

PurePlate

Pre-record your Canva presentation to present

03

Model

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04

Next Steps and Limitations

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05

Video Demo

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Problem

- Restaurant Size: Medium
- Meals Served Daily: 200
- Error Rate: **1% to 5 %**
- Incorrect Orders: 2 to 10 meals per day
- Cost per Meal: 6-10 €
- Loss per day: 12-100 €
- Loss per Year: 4.380-36.500 €

Impact

1. Customer Dissatisfaction
2. Cost Implications
3. Operational Efficiency





CHALLENGE

Ensuring consistent quality and safety of food products in the manufacturing process. Variations in product quality can lead to customer dissatisfaction, increased costs due to recalls or waste, and potential safety risks.

SOURCE OF VALUE?

- Incremental Revenues
- Customer Satisfaction
- Cost savings
- Safety and Risk

PurePlate

Predict defects in food products during the manufacturing process

Type of Prediction

Defect Detection: Identify whether a food product is defective or meets quality standards.

Process Variations: Detecting deviations in production processes.

Quality Metrics: Predicting critical quality metrics such as product weight, size, and ingredient composition.

Actions based on predictions

- Immediate Corrective Actions
- Proactive Quality Management
- Operational Efficiency
- Customer Satisfaction



MultiClass Classification

Predict: Specific types of defects in products (missing ingredient, incorrect assembly).

Application: Train the model to identify multiple classes of defects, providing more detailed insights into quality issues.



```
results = model.predict(image)
for result in results:
    if result['confidence'] > threshold:
        if result['class'] == 'missing_ingredient':
            print("Missing Ingredient Detected")
        elif result['class'] == 'incorrect_assembly':
            print("Incorrect Assembly Detected")
        else:
            print("Non-Defective Product")
```

Yolov8

Train set: 7065 images

Validation set: 1660 images

Test set: 1173 images

Categories: 168



Success Criteria

Detection Accuracy
Reduction in Defects
Real-Time Performance
Customer Satisfaction



Achievability

With sufficient training data, robust model tuning, and continuous monitoring, these success criteria are achievable.

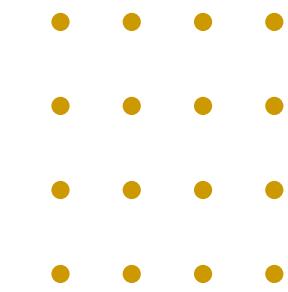


Risks

Model Accuracy
Integration Challenges
Real-Time Processing
False Positives/Negatives

Additional Data

Internal: Production Data, Quality Control Logs, Customer Feedback
External: Market Surveys, Supplier Data
Public: Industry Standards, Economic Indicators





Tecniques

Algorithm Tuning
Ensemble Models
Transfer Learning



Improve Modeling

The model performs well with the training that was given, to personalize for each restaurant is mandatory to make adjustments.

Usability, data-pipeline, workflow

Ensure efficient, scalable data processing. Create intuitive dashboards for real-time monitoring. Streamline processes for model deployment, monitoring, and retraining.



Machine Learning Canvas

Prediction Task

- Real-time defect detection
- Process adjustments
- Resource allocation
- Training focus
- Customer feedback integration.

Impact Situation

Use real-time data to classify products, adjust processes, and predict quality metrics.

Decisions

Multi-class classification using YOLOv8 for defect detection

Making Predictions

Validate models using separate test datasets, check metrics like accuracy, precision, recall.

Monitoring

Continuously monitor model performance, customer satisfaction, defect rates, and production efficiency. Use dashboards for real-time insights.

Value Propositions

Ensure consistent product quality and safety, reduce recalls, and improve customer satisfaction

Data Collection

- Production data
- Quality control logs
- Customer feedback
- Images from production line

Building Model

- Images of products
- Historical quality metrics
- Process parameters

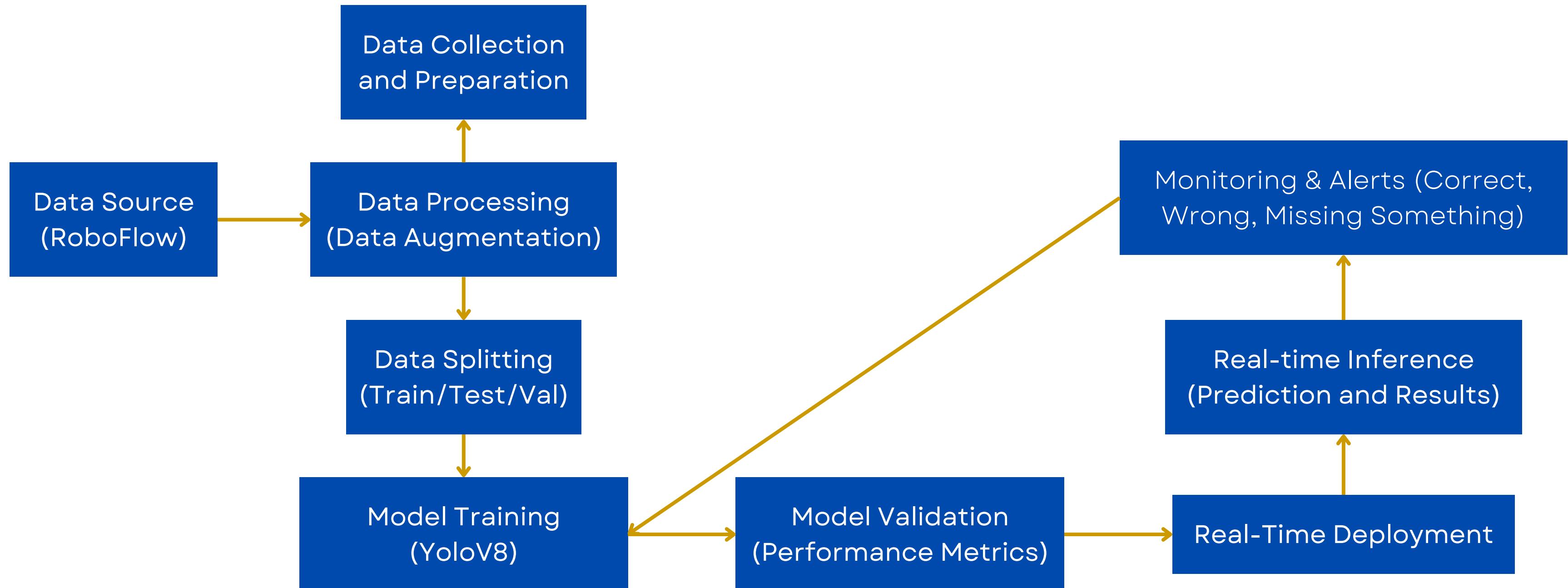
Data Sources

Gather images and quality control data from internal systems, augment with external data sources if needed.

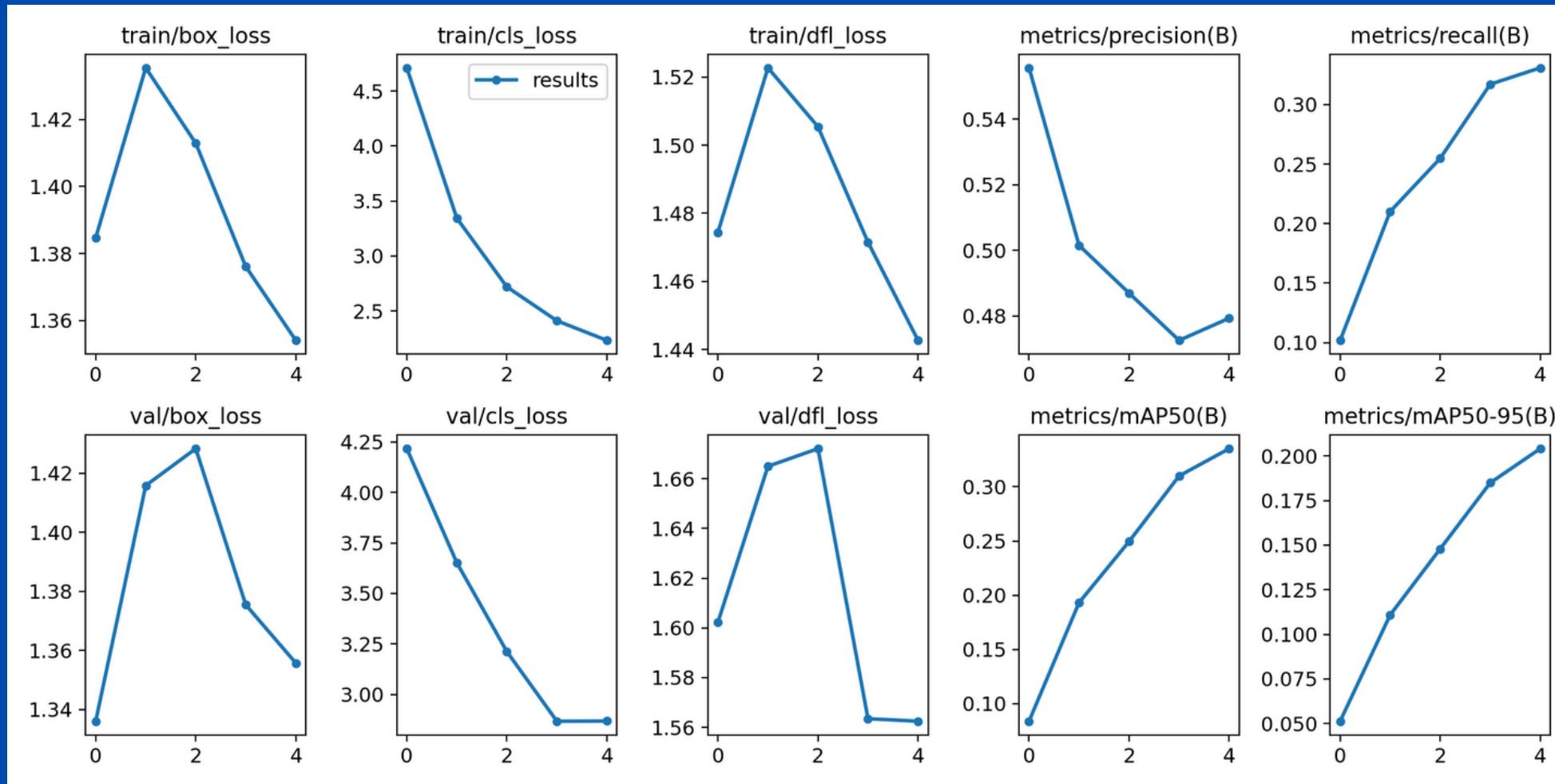
Features

Train YOLOv8 for image recognition

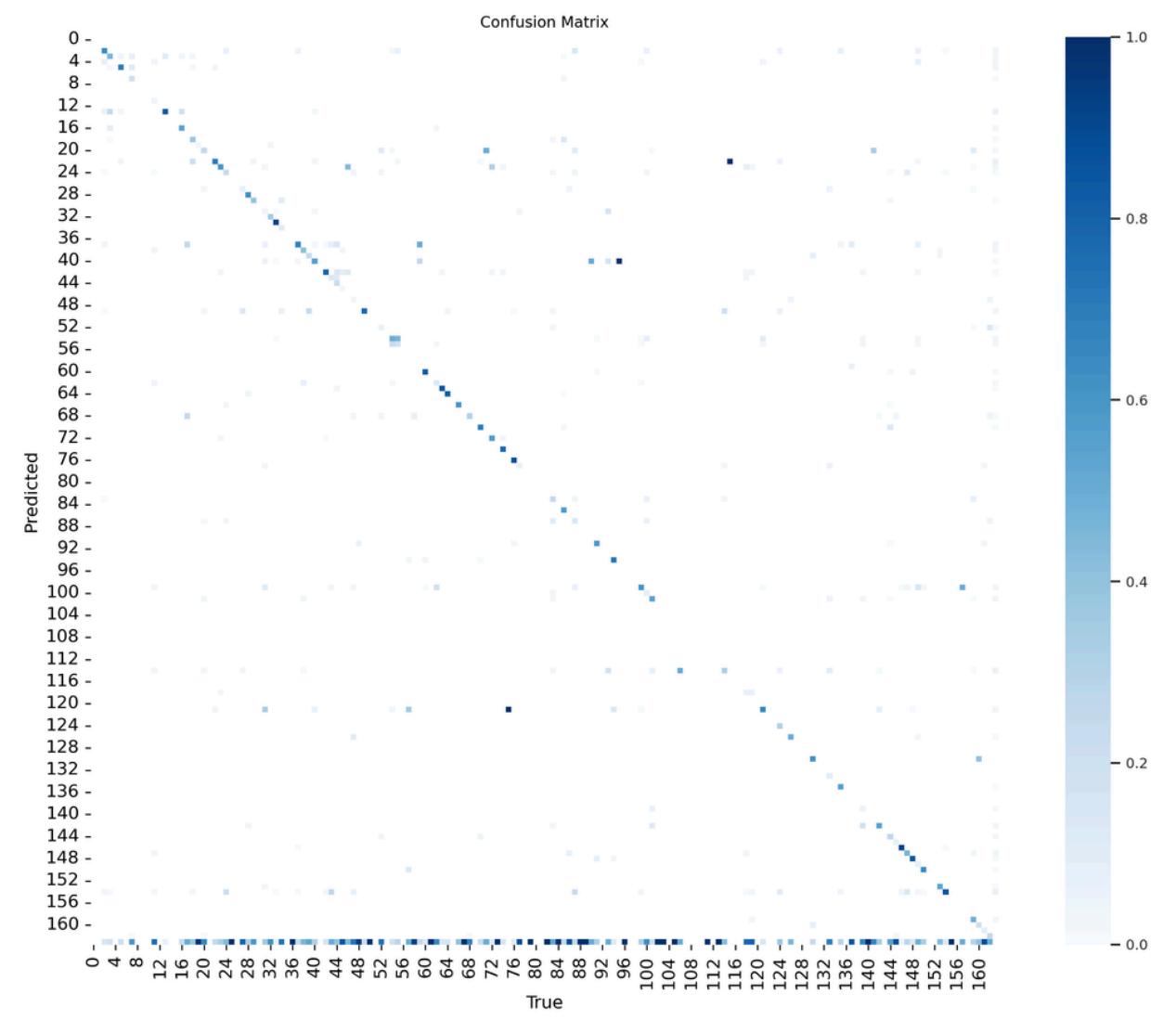
Architecture

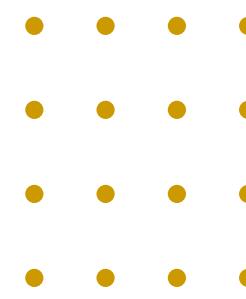


Results



Correlogram





Next steps y limitations

The system can be effectively maintained and improved, ensuring ongoing high performance and adaptability to changing production needs



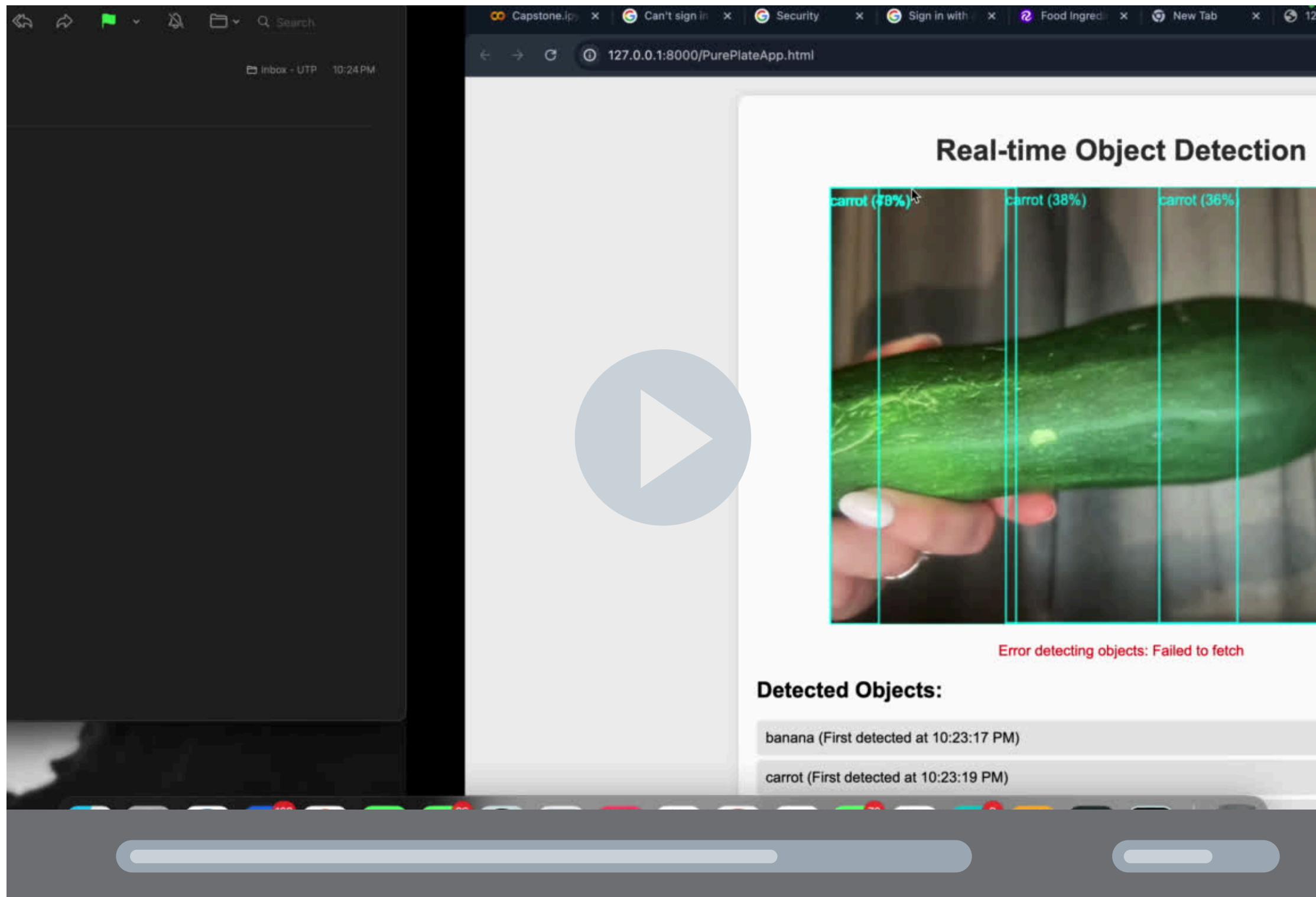
Next steps

Performance Monitoring
User Training
Feedback Loop
Maintenance and Updates
Scalability

Limitations

Data Dependency
Integration
Complexity: Real-Time Constraints
Model Maintenance
False Positives/Negatives

Demo



Thank You

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