Retail Analysis, Adib's Training Report

1. Overview

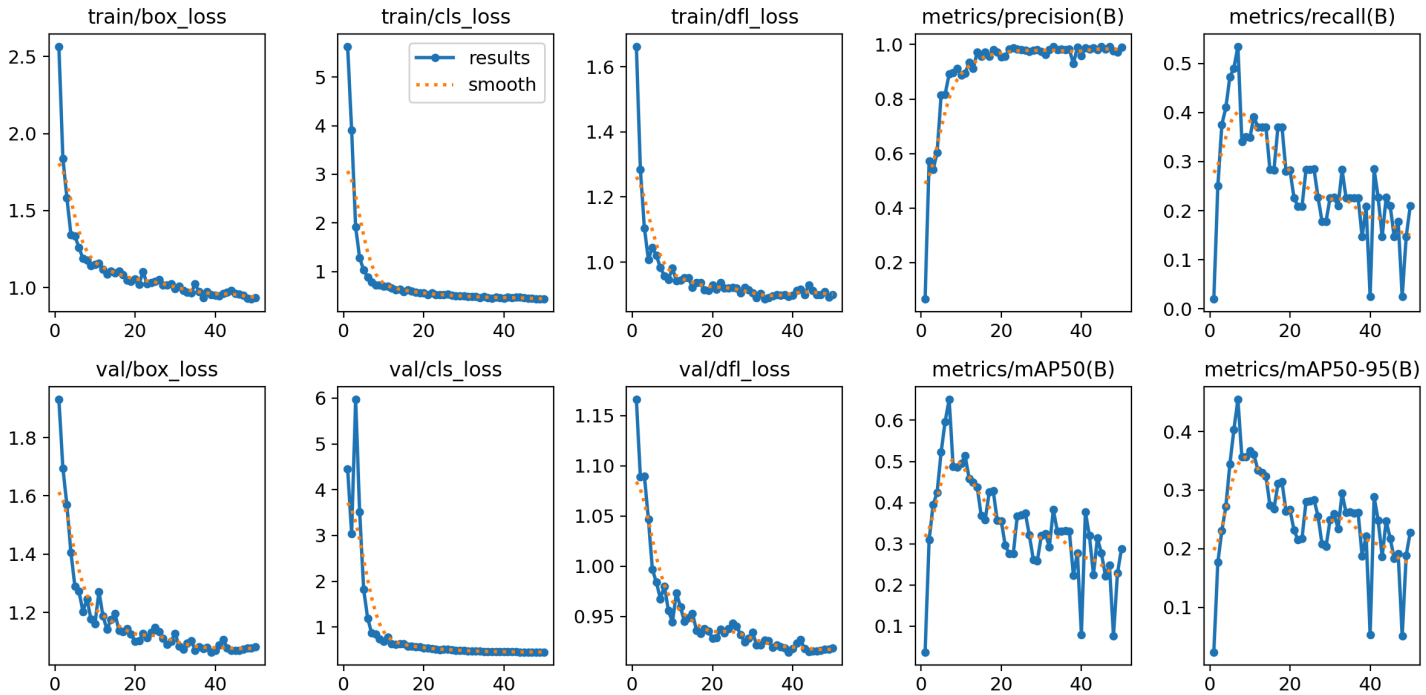
This report will summarize the training performance of the **UBL product detection model (specifically for Clear Men's Shampoo (5ml), Dove Conditioner (7ml), and Horlicks (18ml))** using YOLOv8. The model was trained for **50 epochs**, and key results are presented below.

2. Training Performance

Loss Curves

- The loss curves indicate that the model is learning.
- Training and validation loss decrease consistently, with no major signs of overfitting.

Loss Curves:



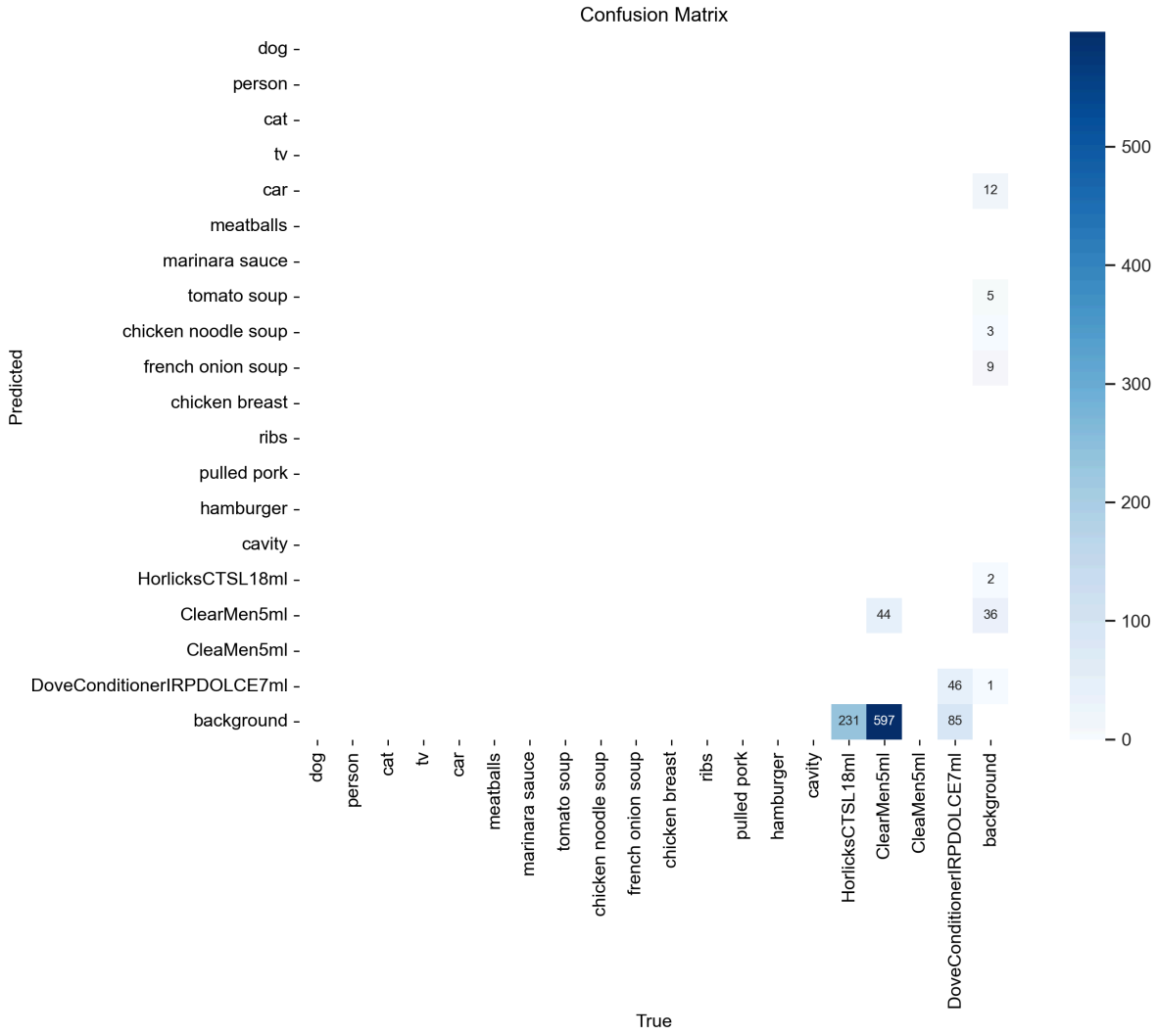
3. Model Accuracy

Confusion Matrices

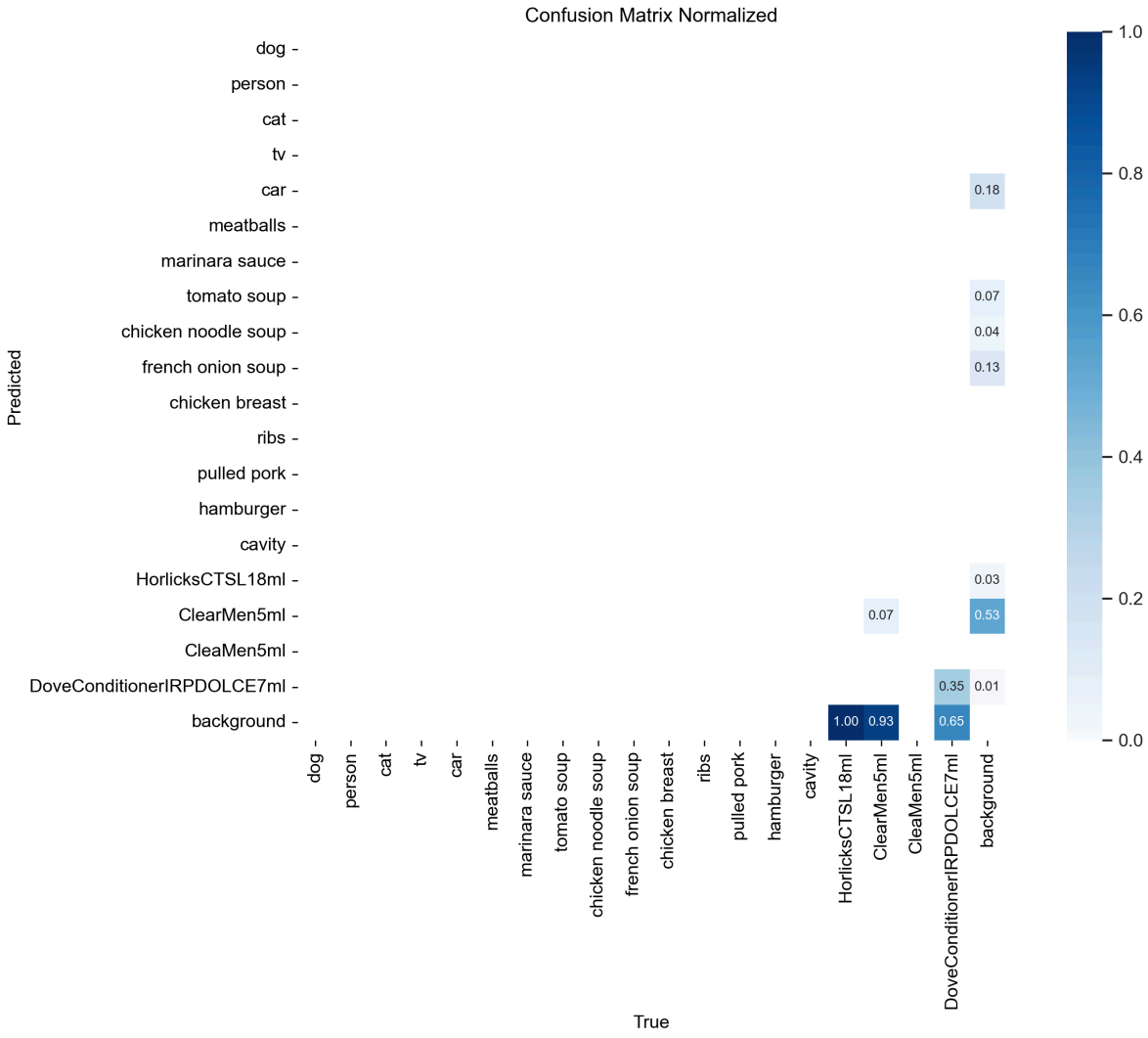
The confusion matrix shows how well the model classified different products.

- **HorlicksCTSL18ml** was not detected correctly.

Confusion Matrix (Raw Count):



Confusion Matrix (Normalized):

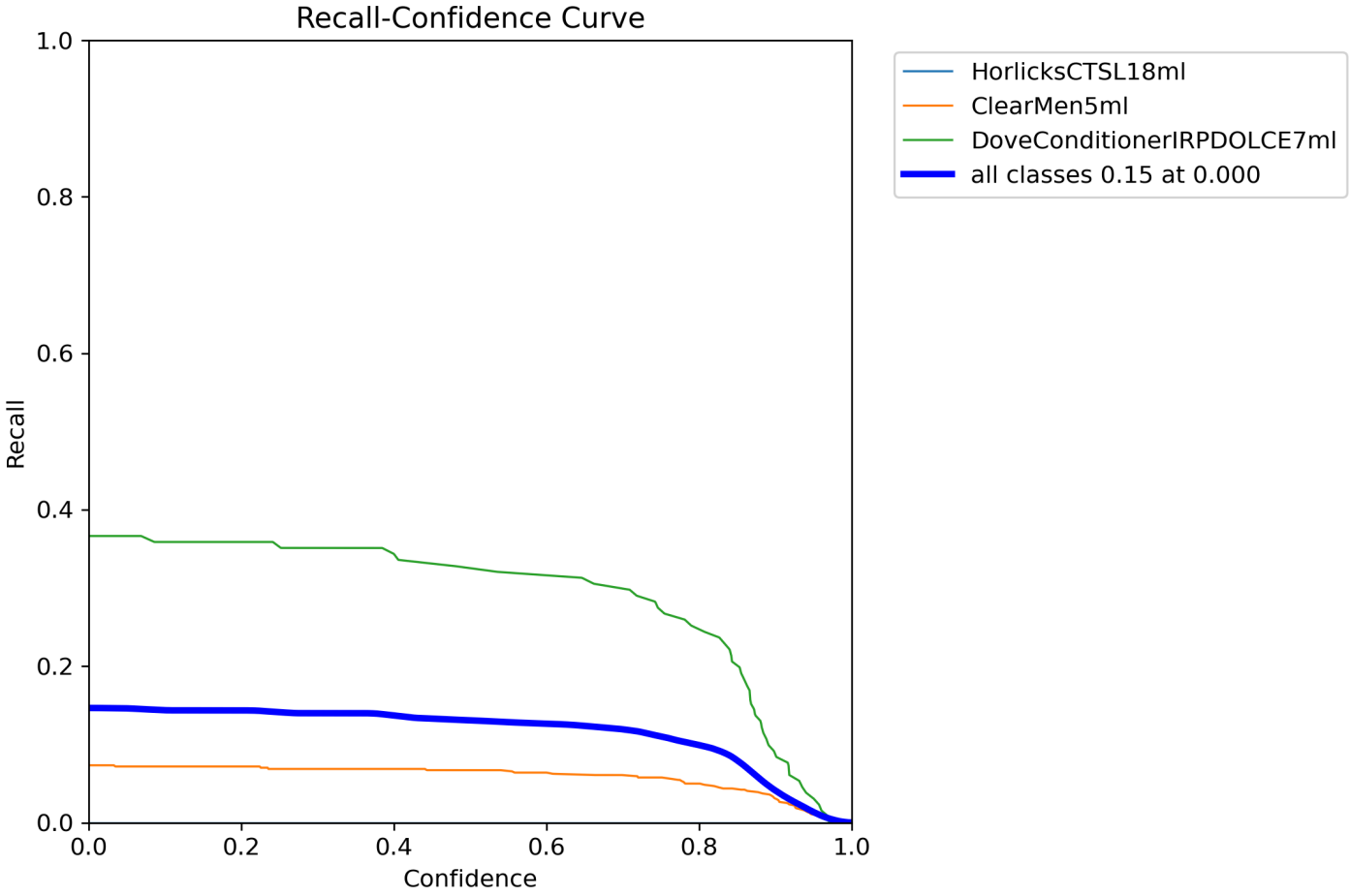


4. Precision, Recall, and F1-Score

These curves help analyze the model's detection reliability.

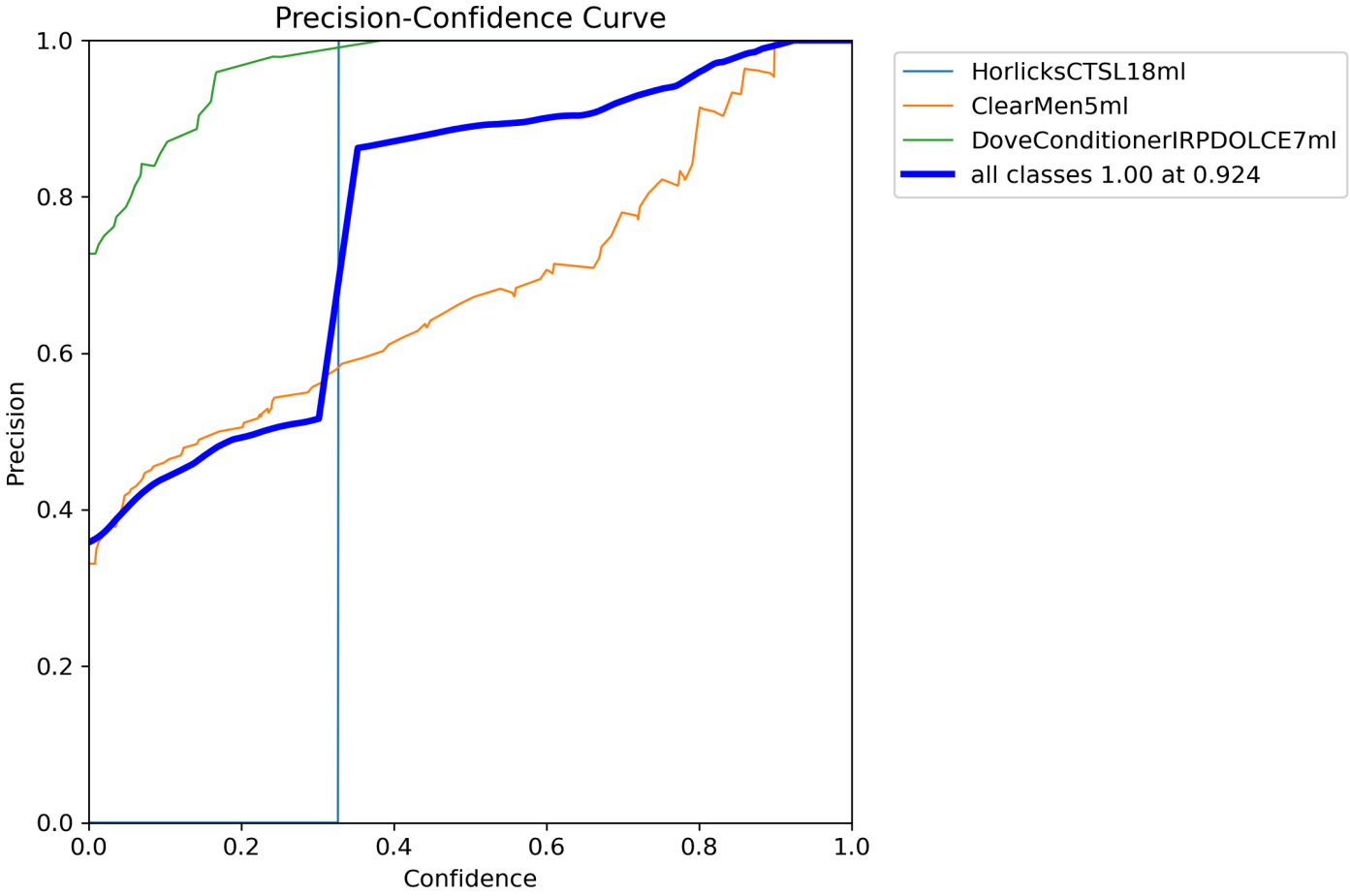
Recall-Confidence Curve

- The model's recall decreases as confidence increases.
- Some classes struggle to achieve high recall.



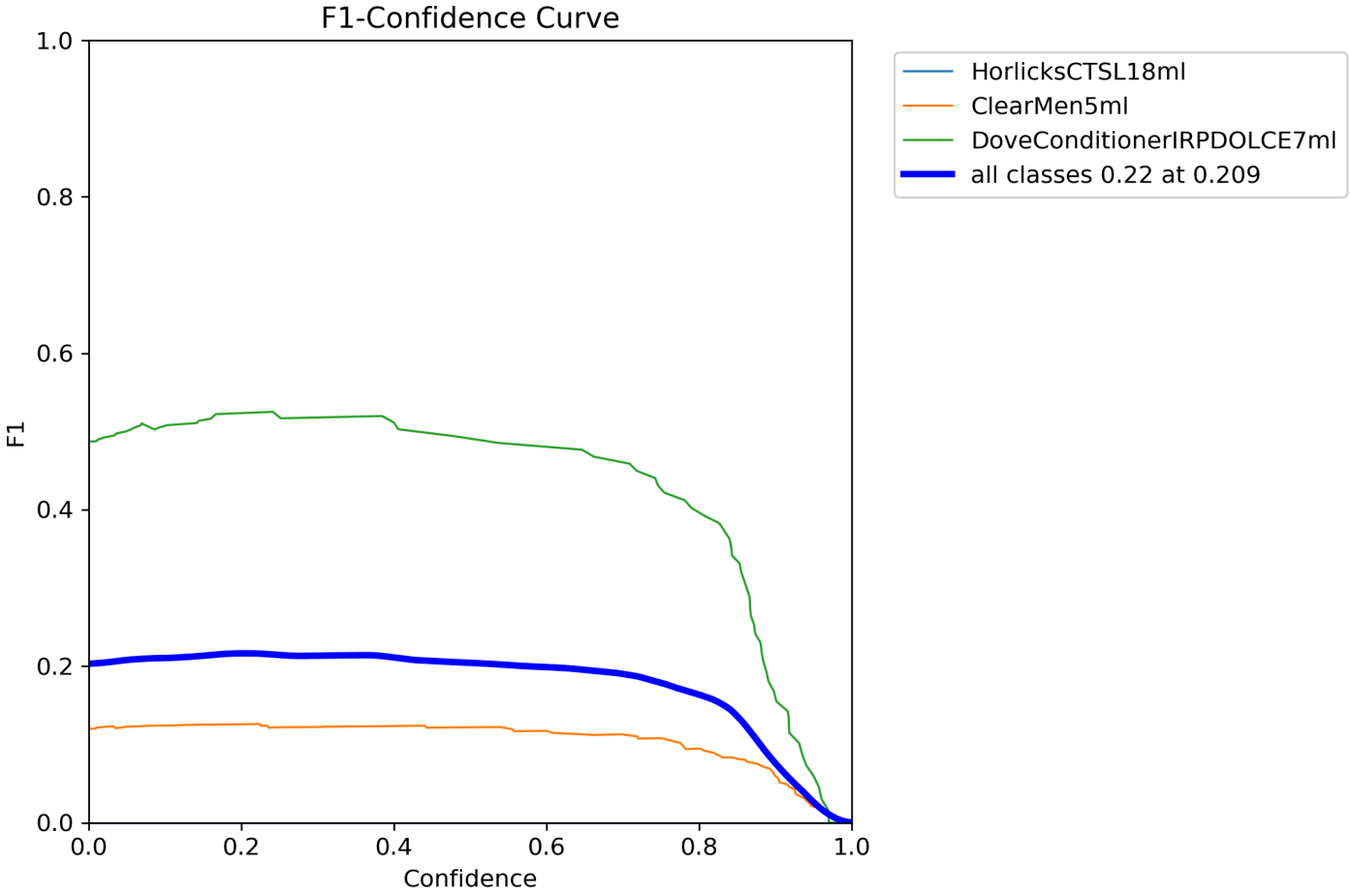
Precision-Confidence Curve

- Precision improves at higher confidence thresholds.
- Lower confidence detections tend to be inaccurate.



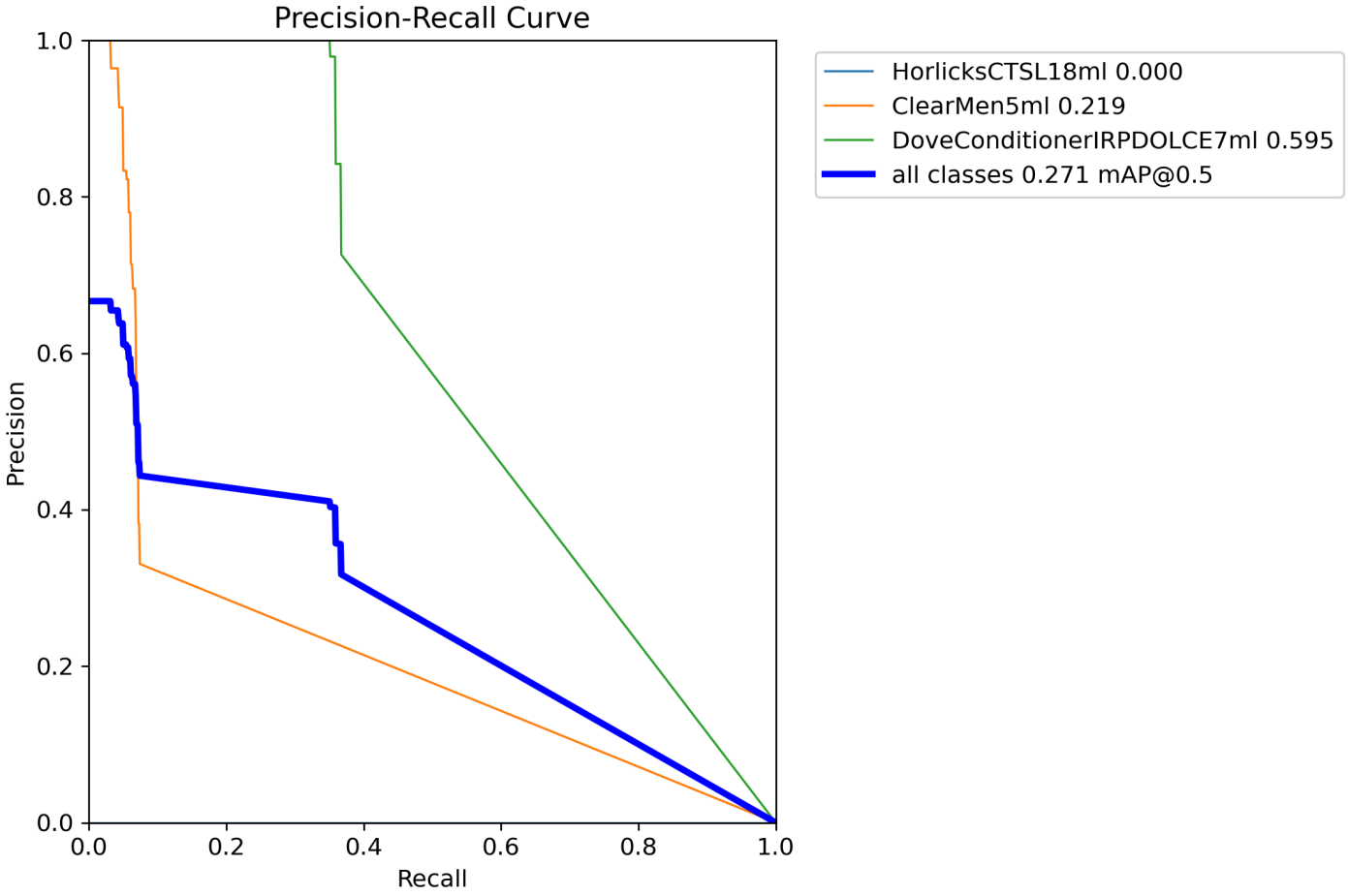
F1-Confidence Curve

- The best balance between precision and recall occurs at **low to mid-confidence levels**.



Precision-Recall Trade-off

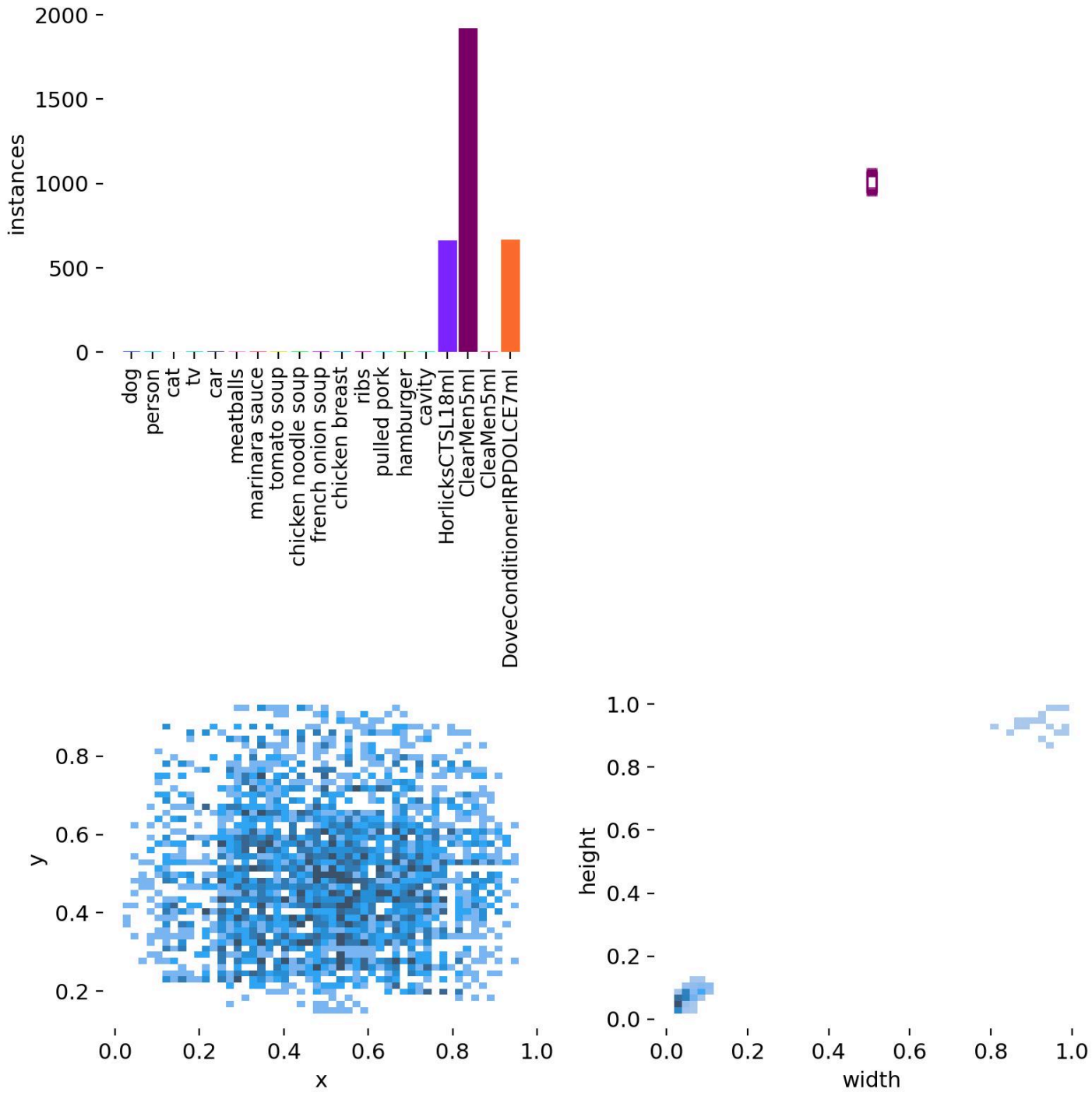
- **DoveConditionerIRPDOLCE7ml** has the highest mAP score.
- **HorlicksCTSL18ml** was not detected at all.



5. Dataset Analysis

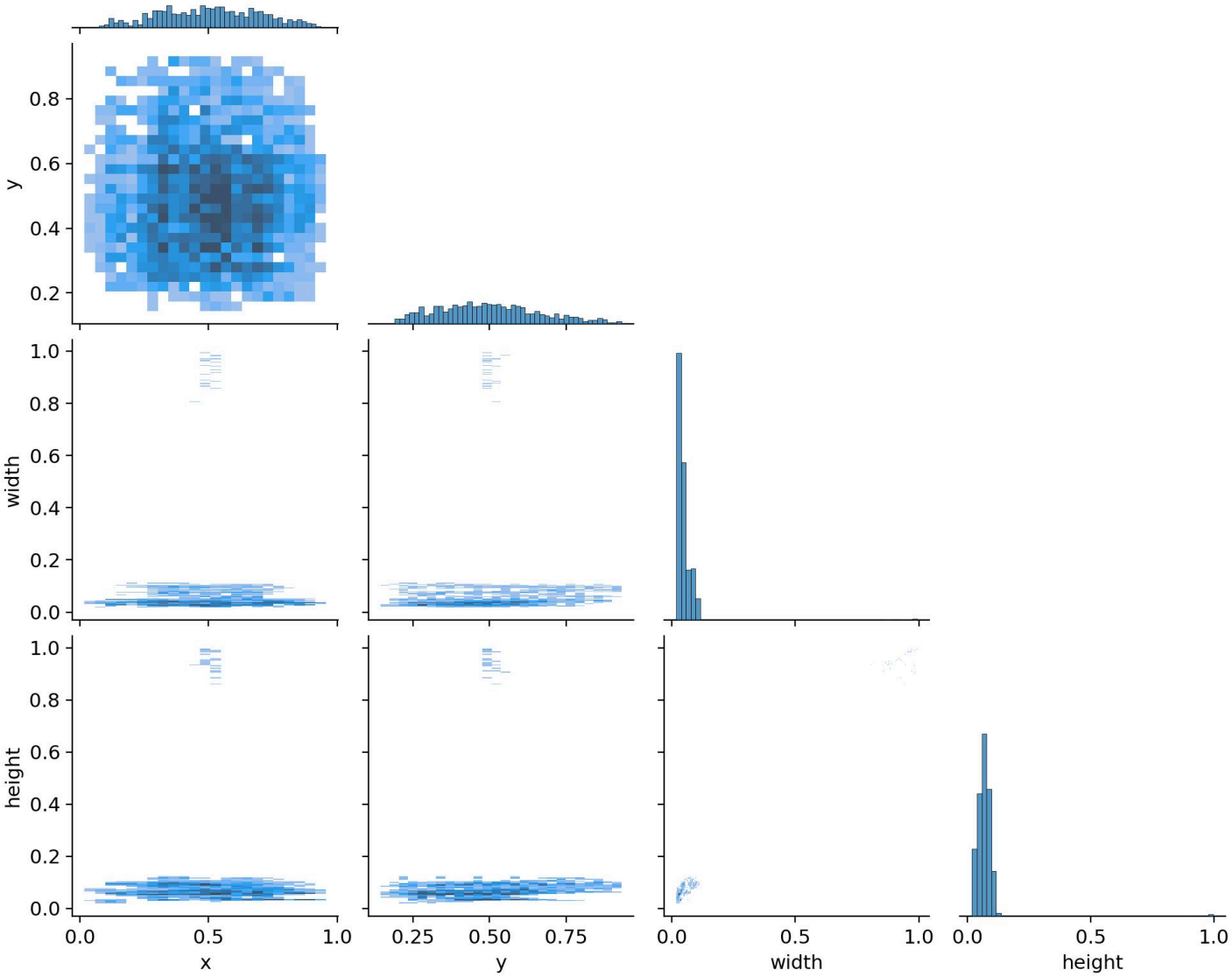
Class Distribution

- **ClearMen5ml and HorlicksCTSL18ml** have significantly more instances than other classes.
- This imbalance may affect detection performance.



Bounding Box Analysis

- Bounding boxes are well-distributed but show **clustering in certain areas**.
- The dataset may need further augmentation to diversify bounding box locations.



6. Key Takeaways

What Went Well

- The model learned effectively, with decreasing loss.
- Precision improves with higher confidence thresholds.

- Some classes, such as **DoveConditionerIRPDOLCE7ml**, perform well.

Challenges

- **Low recall and mAP scores indicate potential dataset imbalances.**

Recommendations

- **Increase training epochs** to allow the model to generalize better.

7. Conclusion

This model shows promise but requires improvements in **training duration**. Addressing these issues should lead to **higher recall and improved overall accuracy**.