
PROACTIVE WARE

Tasks results

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1 First task

The YOLOv8 model was used for 1.

1.1 Instance segmentation

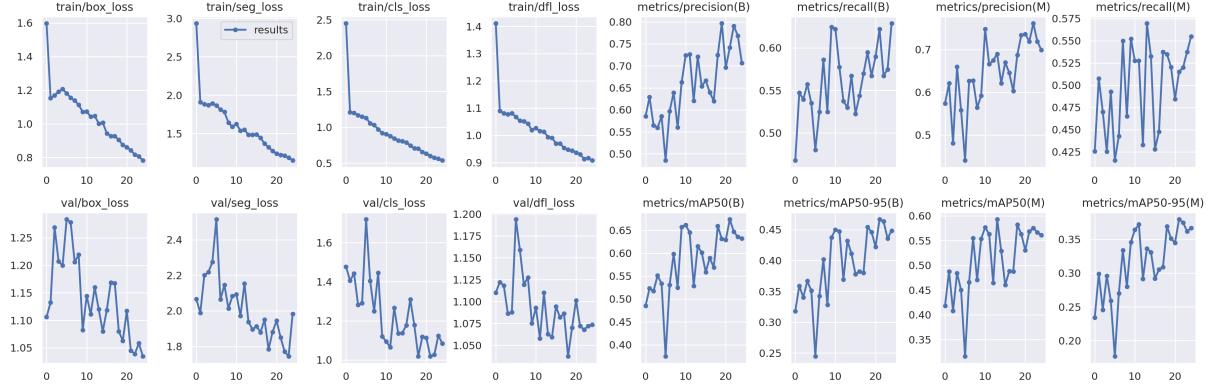


Figure 1: Training and validation process metrics

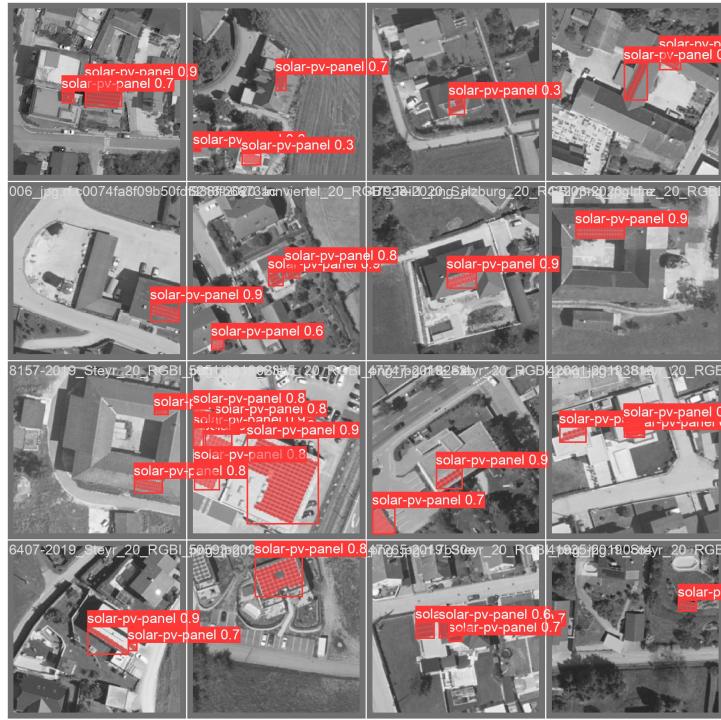


Figure 2: Validation for some pictures

1.2 Object detection

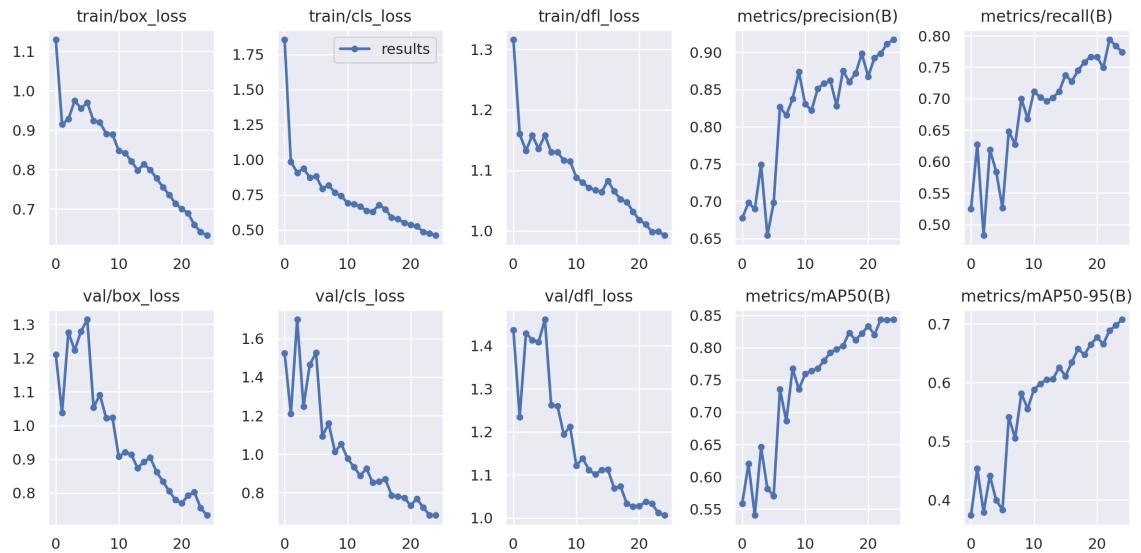


Figure 3: Training and validation process metrics

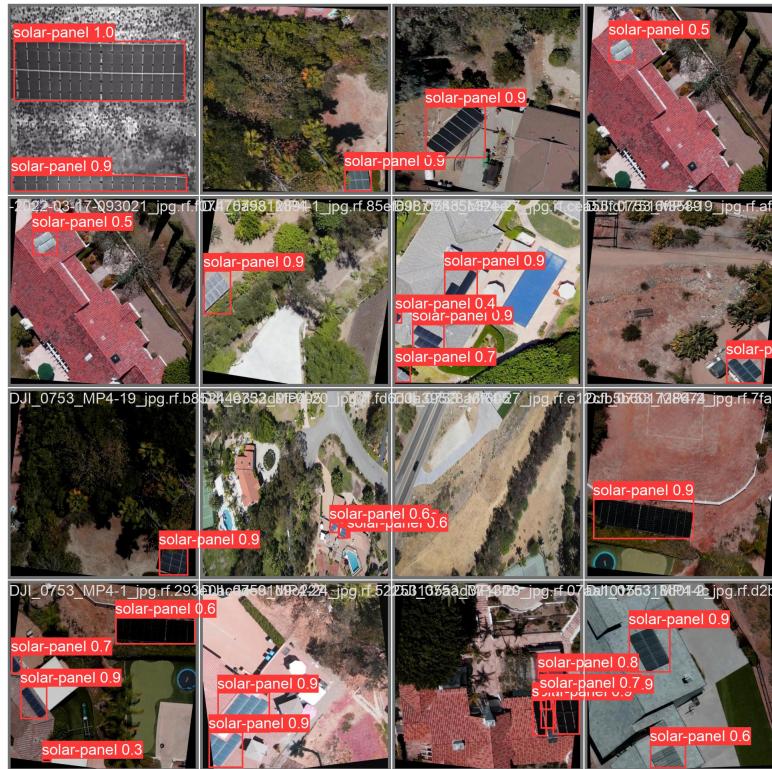


Figure 4: Validation for some pictures



Figure 5: Test result for proactive ware's picture

2 Second Task

In this section, we present the individual results of each neural network separately. Additionally, in section 2.7, we conduct a comparative analysis of all approaches used in the second task, represented through two diagrams.

2.1 FPN

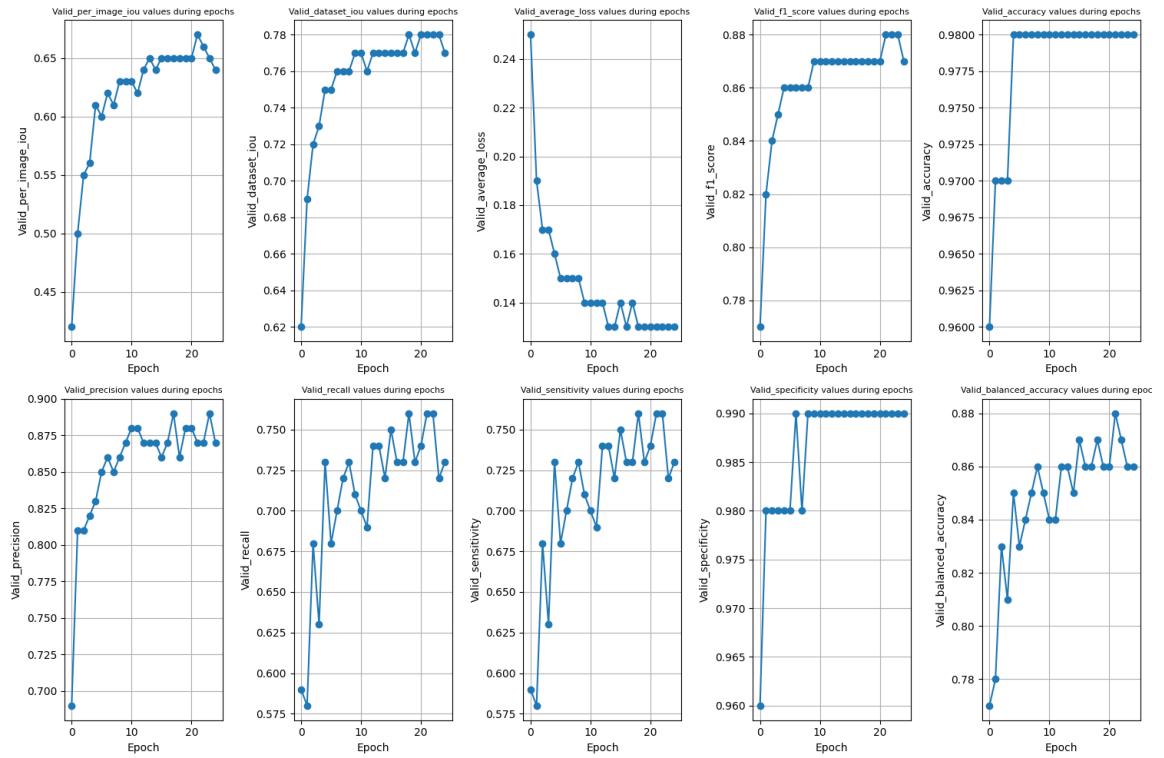


Figure 6: FPN validation process metrics

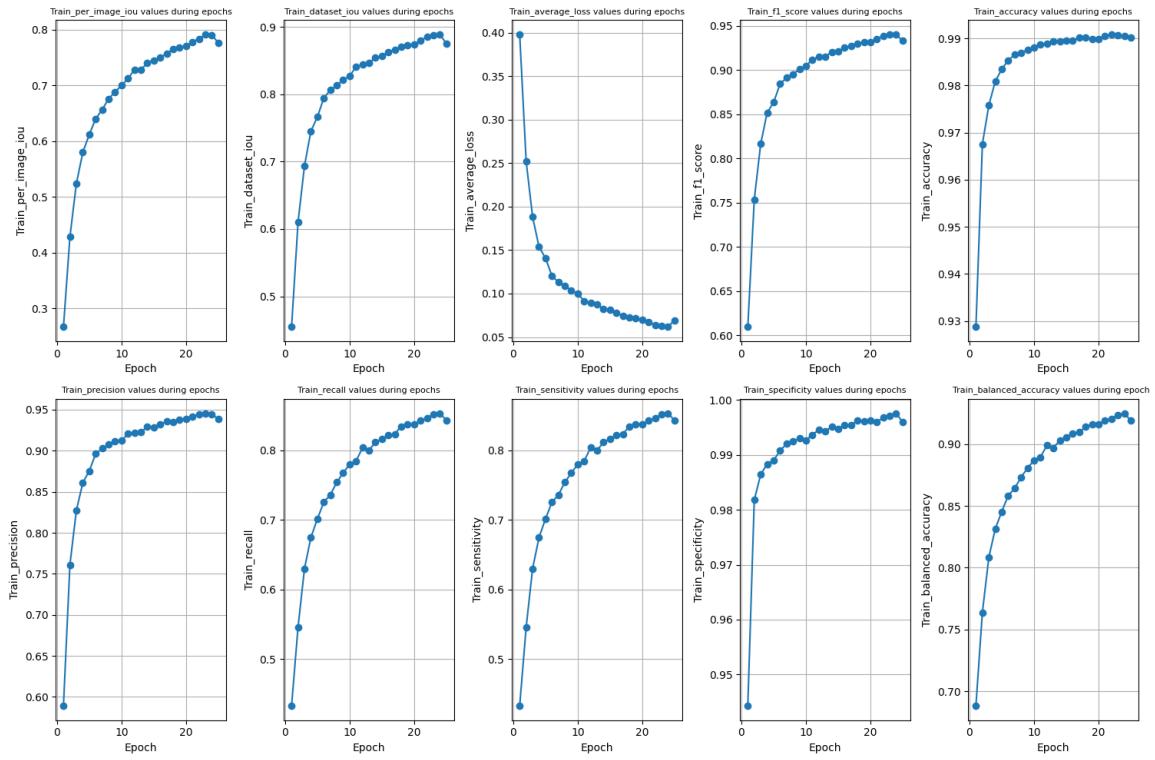


Figure 7: FPN training process metrics

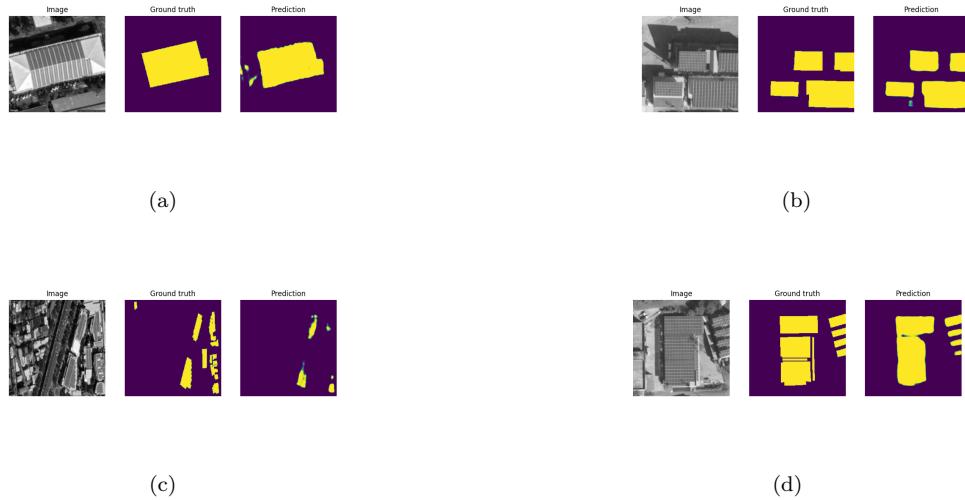


Figure 8: FPN test set results

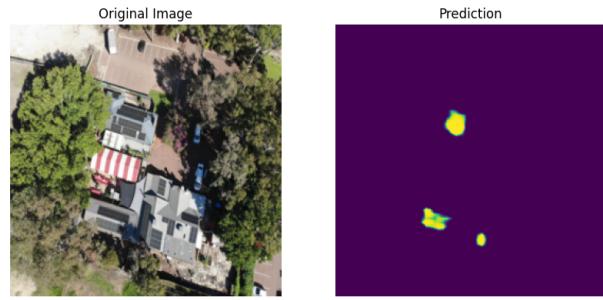


Figure 9: Test result for proactive ware's picture

2.2 PSPNet

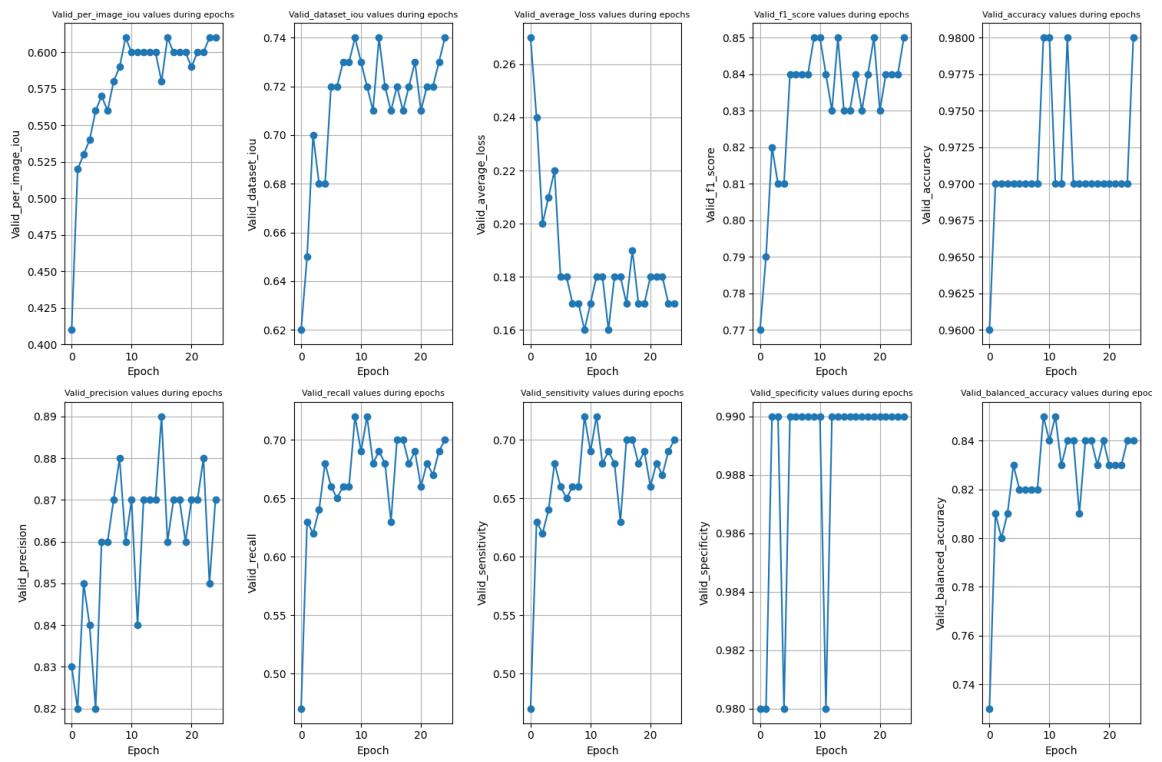


Figure 10: PSPNet validation process metrics

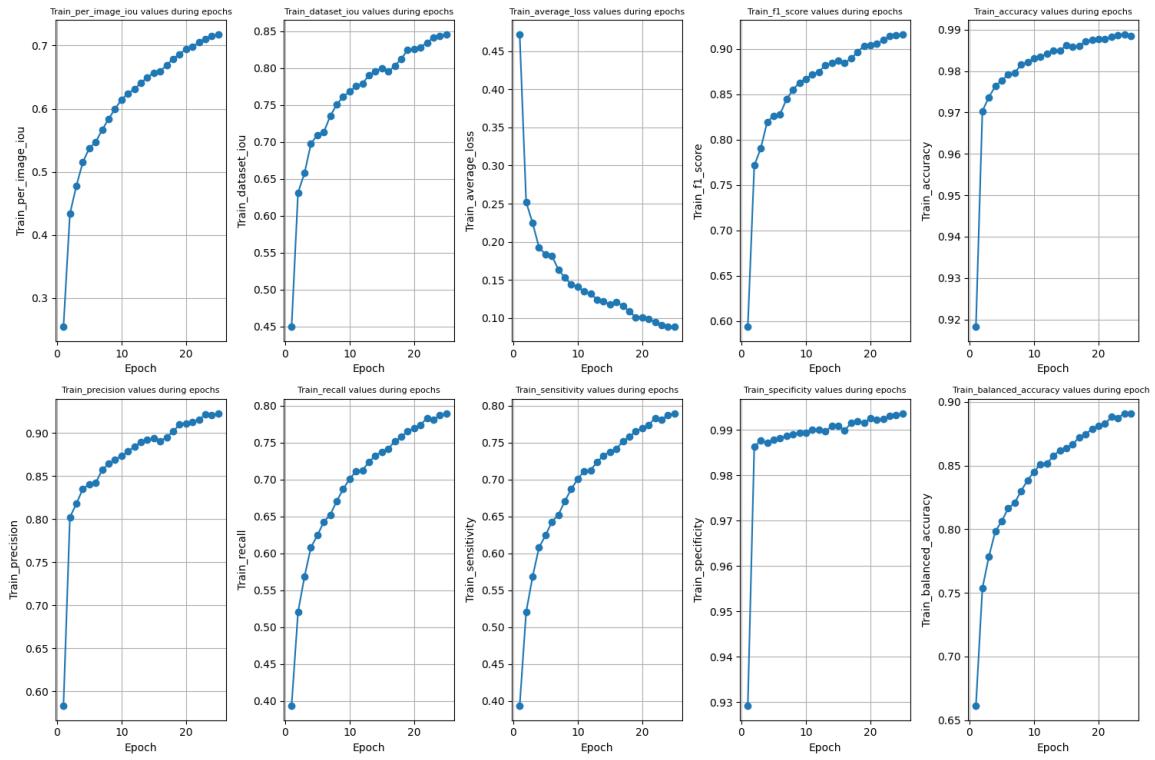


Figure 11: PSPNet training process metrics

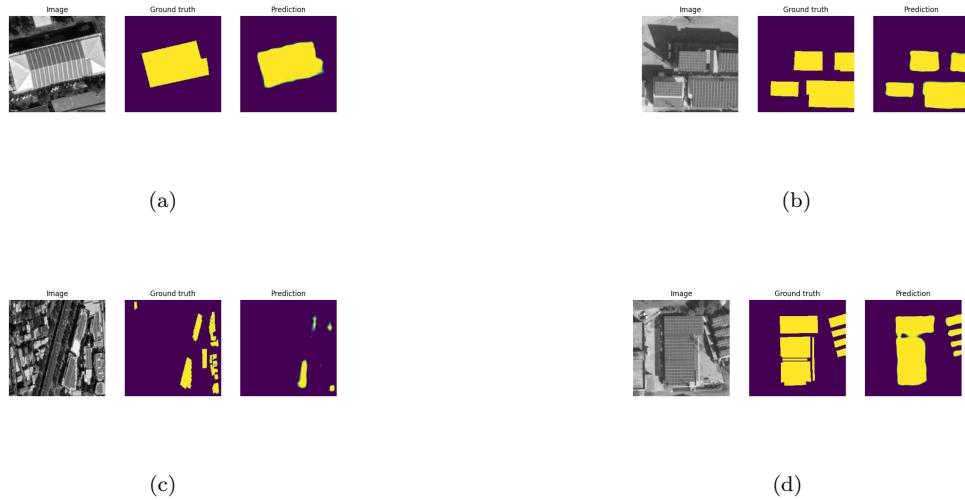


Figure 12: PSPNet test set results

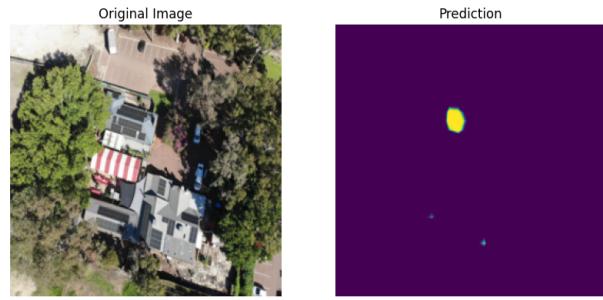


Figure 13: Test result for proactive ware's picture

2.3 Unet

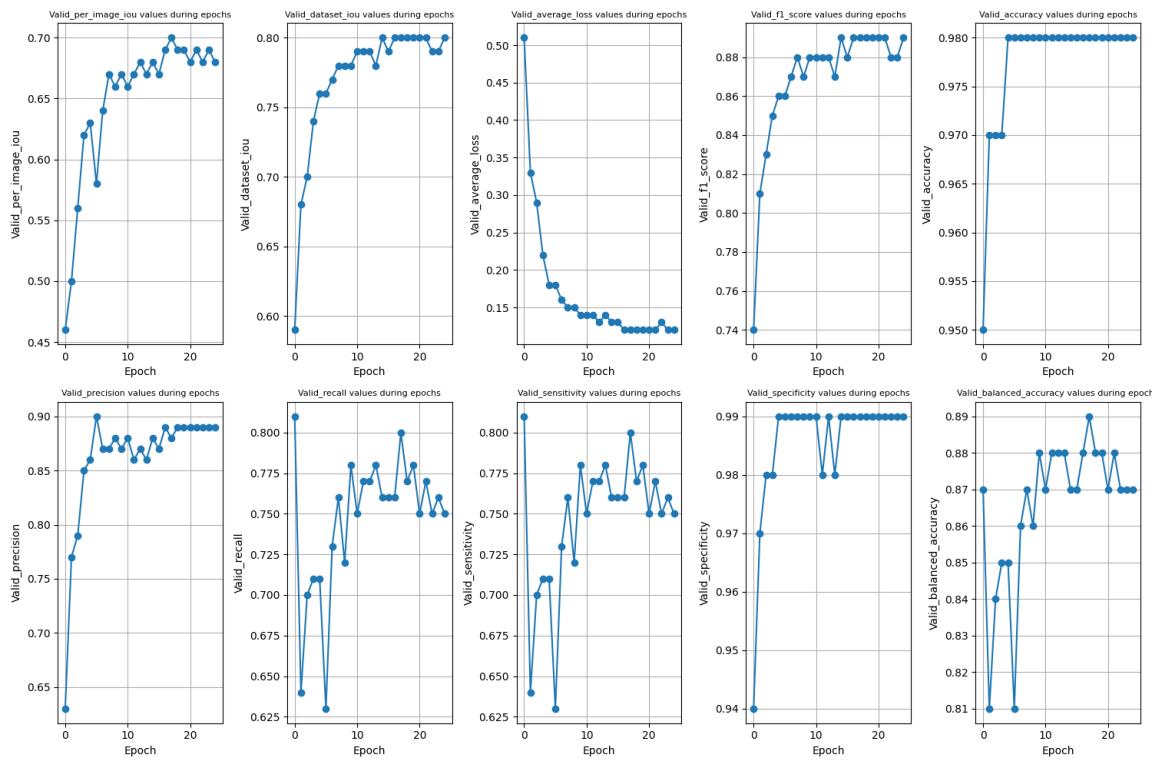


Figure 14: Unet validation process metrics

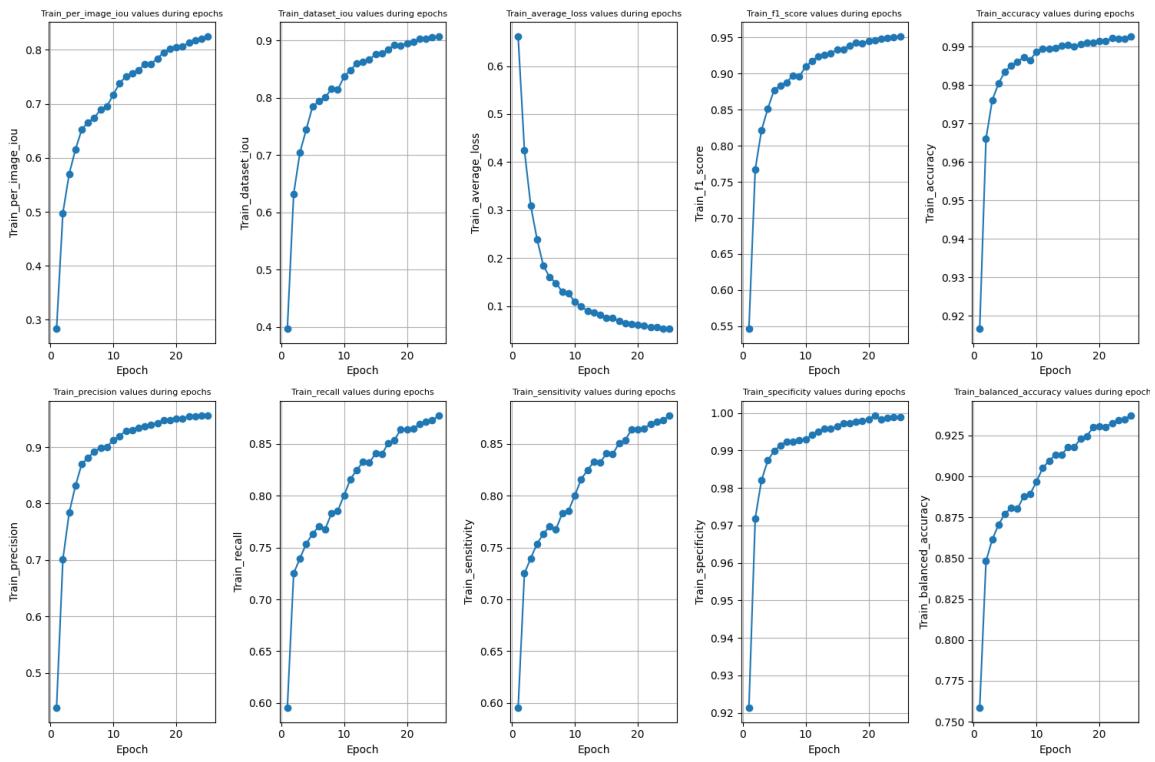


Figure 15: Unet training process metrics

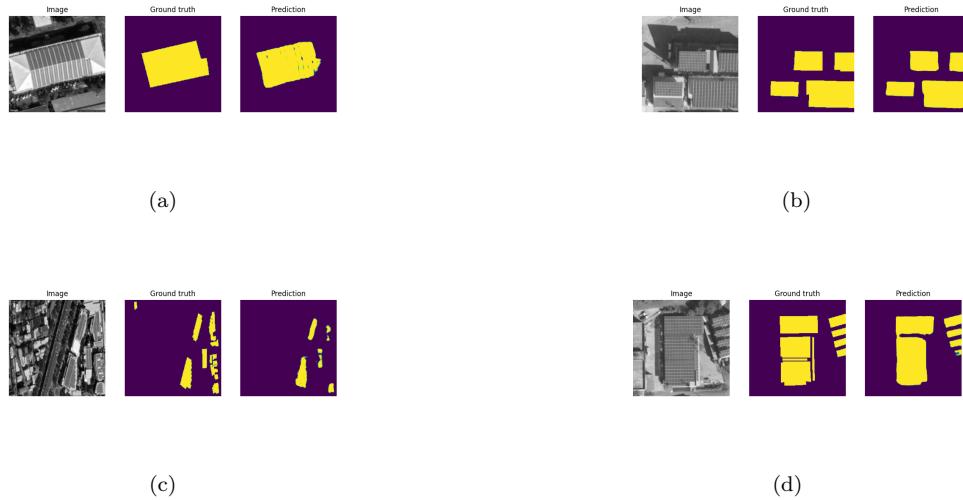


Figure 16: Unet test set results

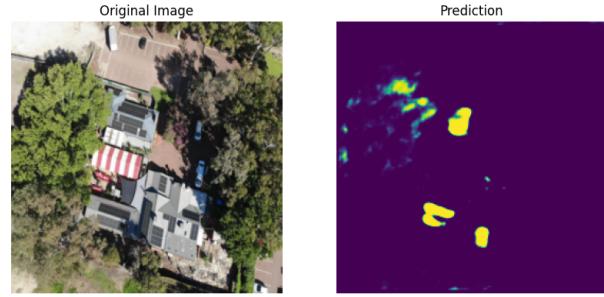


Figure 17: Test result for proactive ware's picture

2.4 DeepLabV3

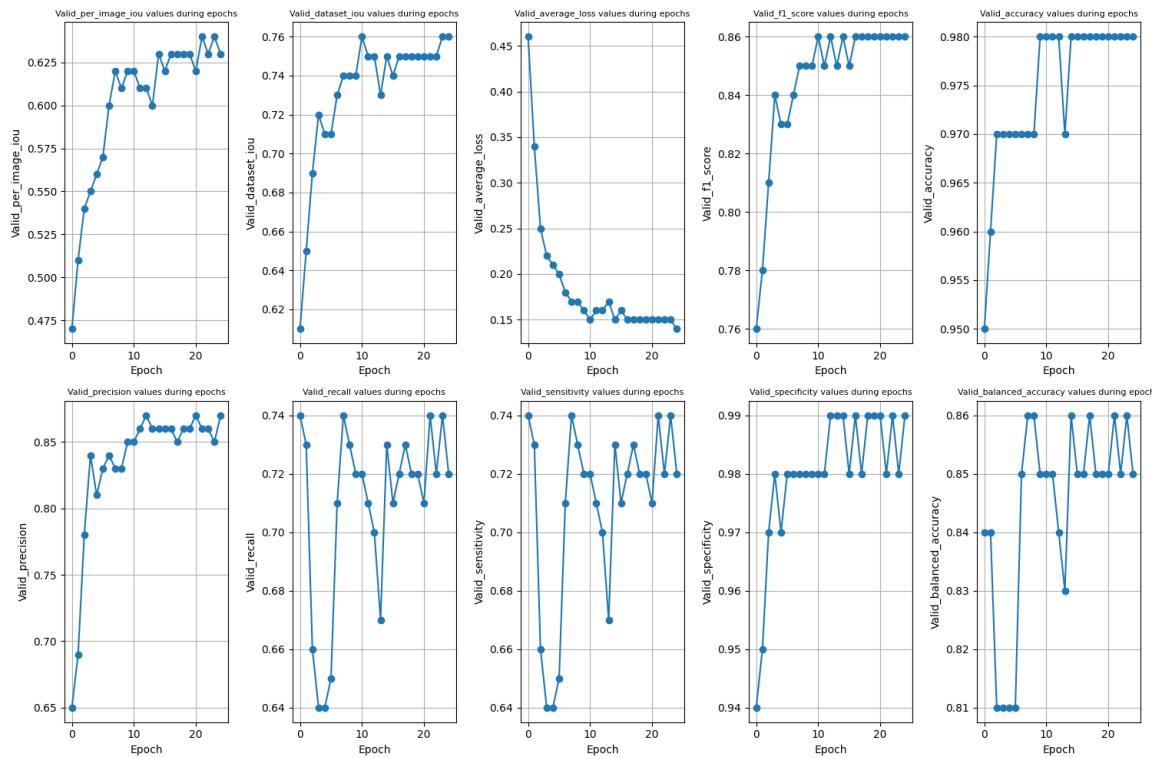


Figure 18: DeepLabV3 validation process metrics

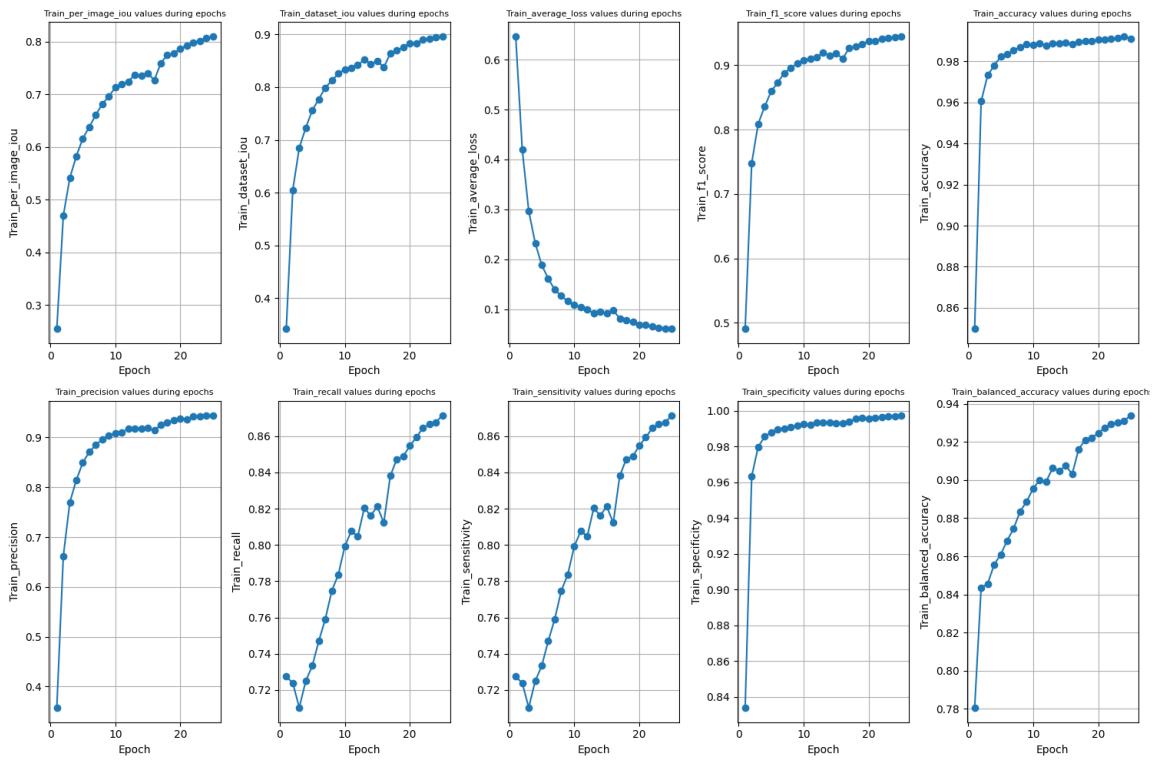


Figure 19: DeepLabV3 training process metrics

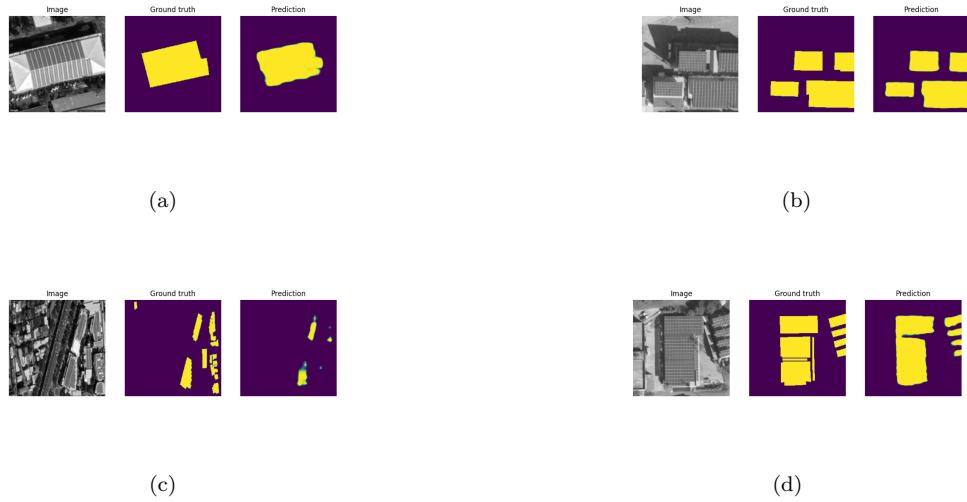


Figure 20: DeepLabV3 test set results

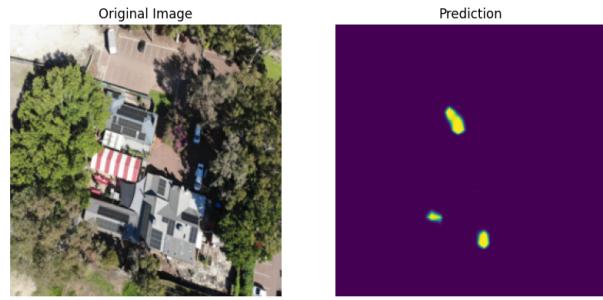


Figure 21: Test result for proactive ware's picture

2.5 PAN

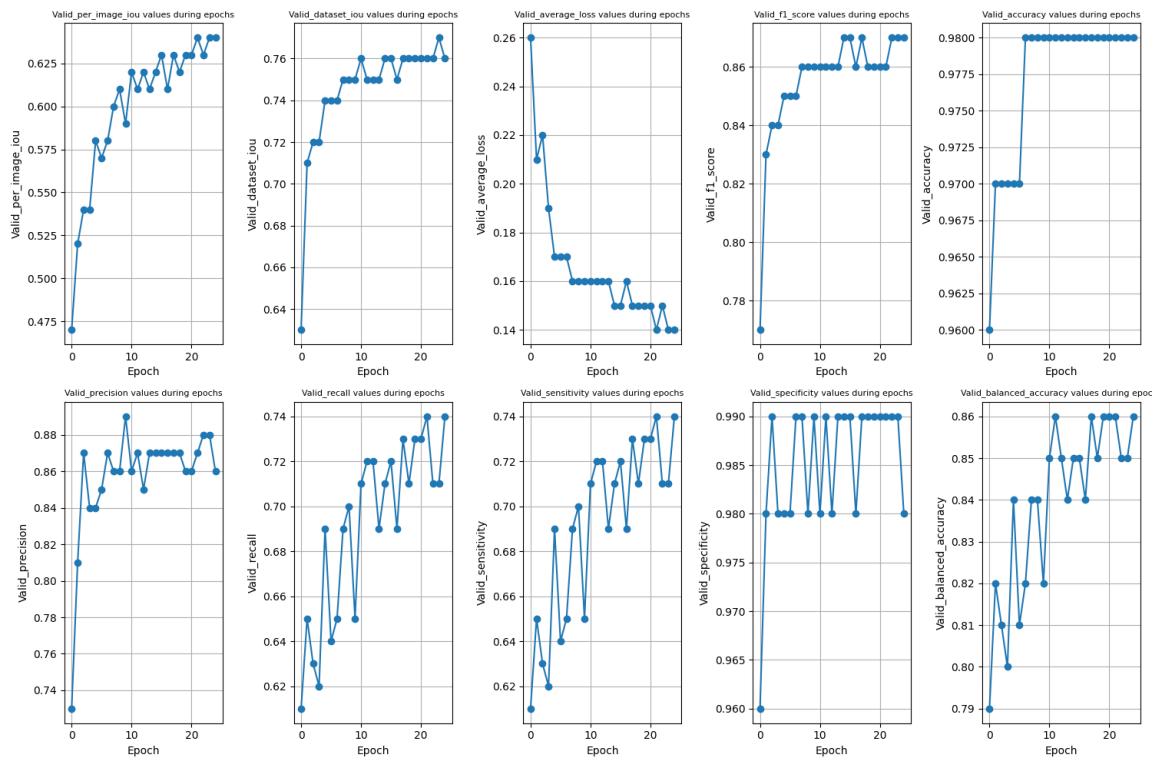


Figure 22: PAN validation process metrics

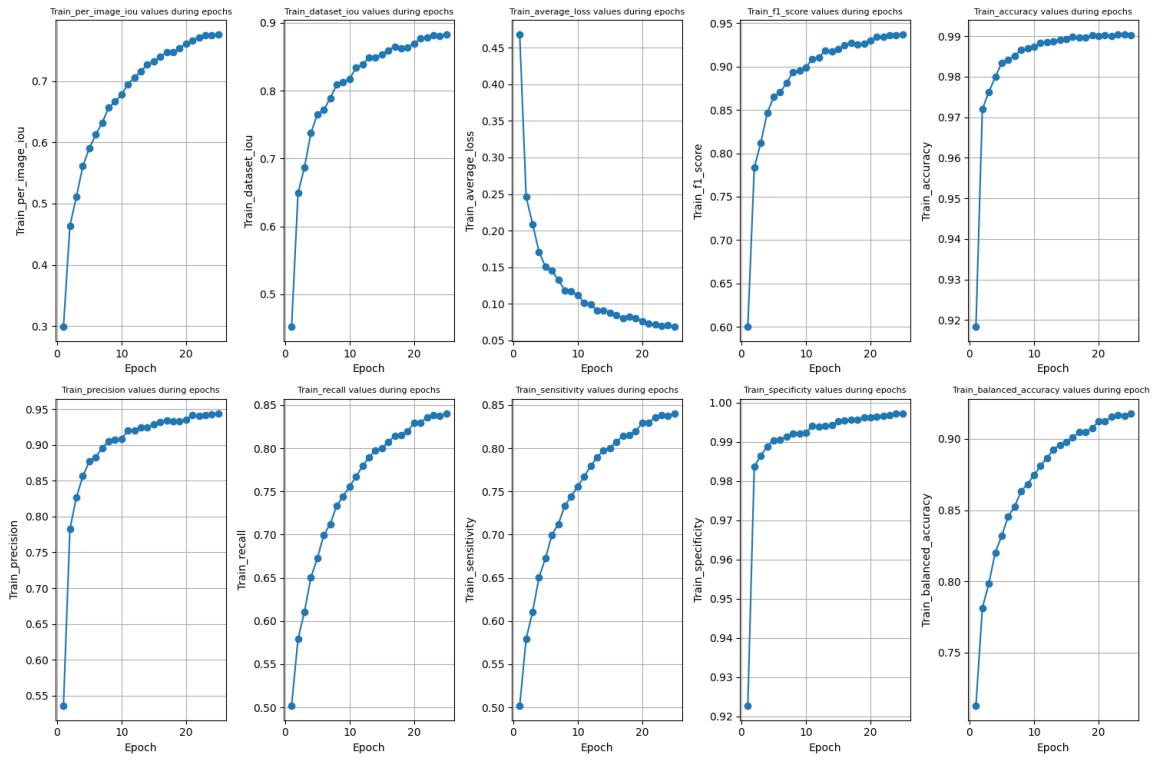


Figure 23: PAN training process metrics

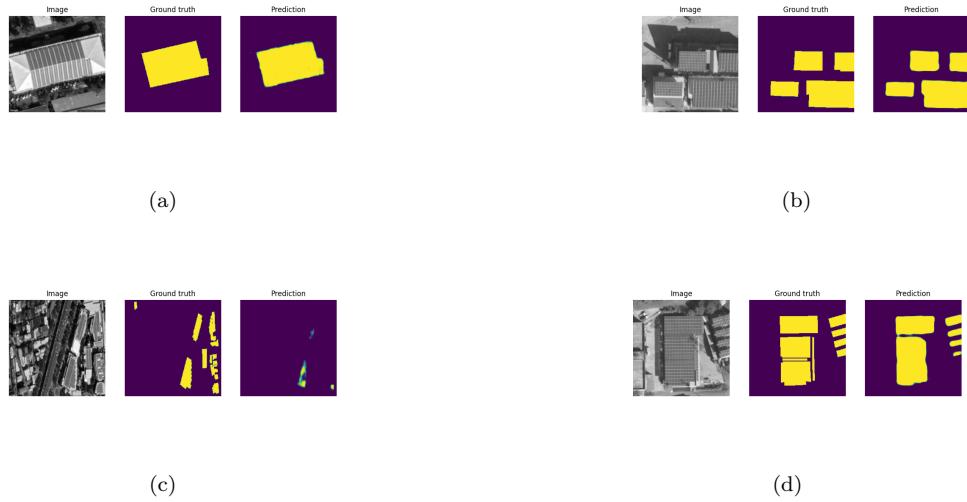


Figure 24: PAN test set results

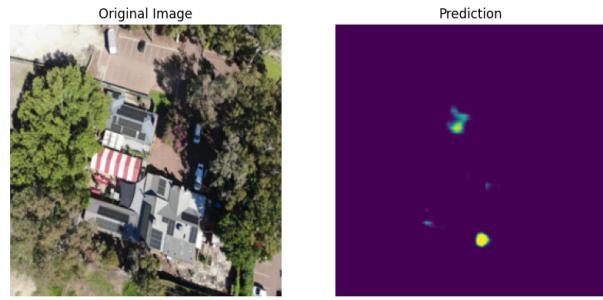


Figure 25: Test result for proactive ware's picture

2.6 MAnet

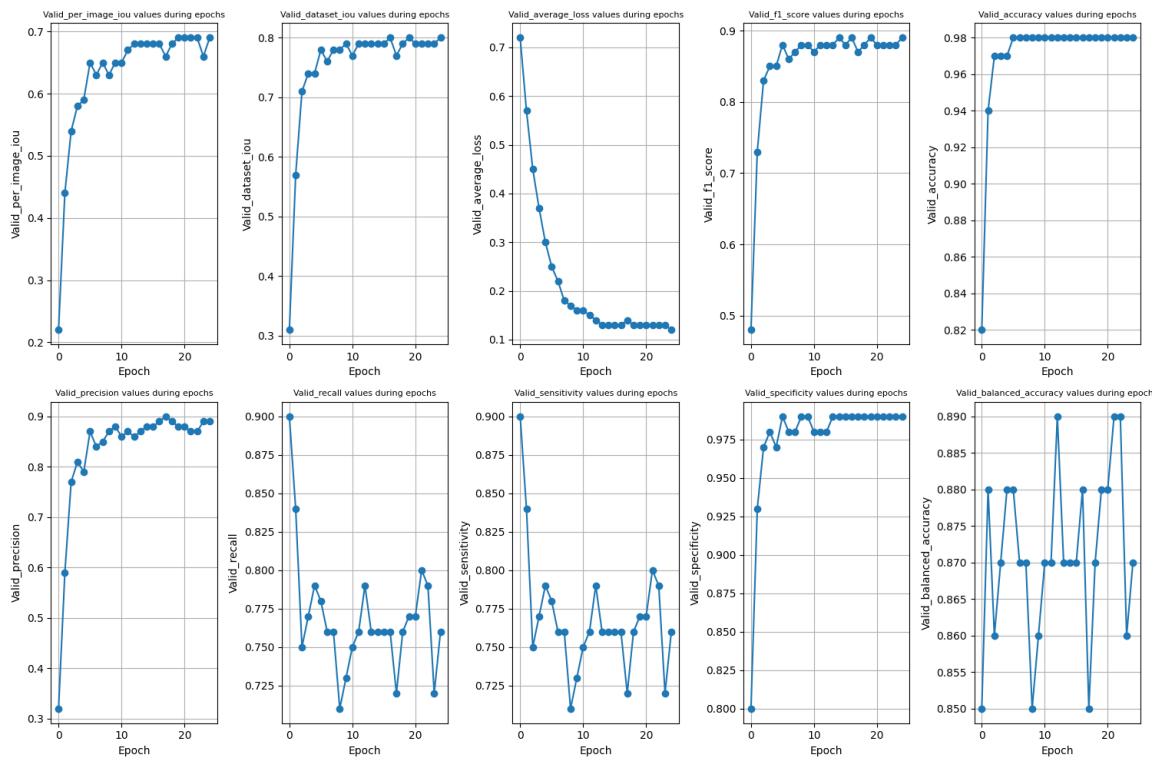


Figure 26: MAnet validation process metrics

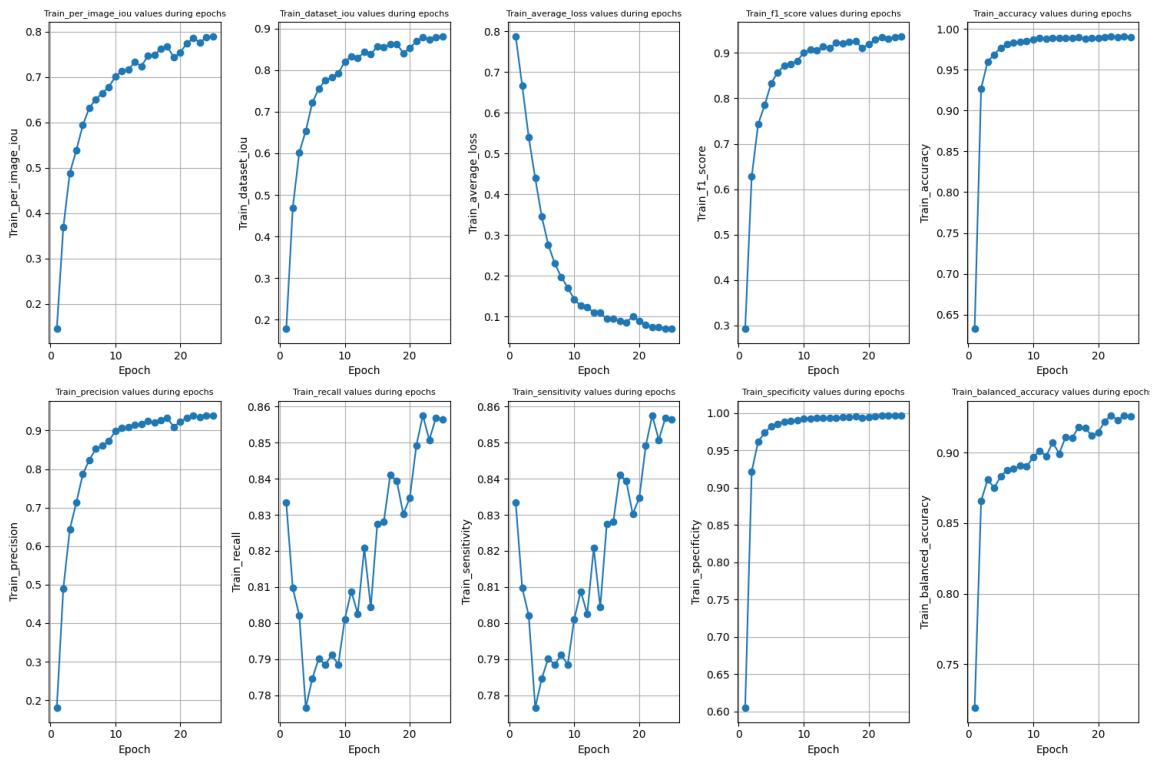


Figure 27: MAnet training process metrics

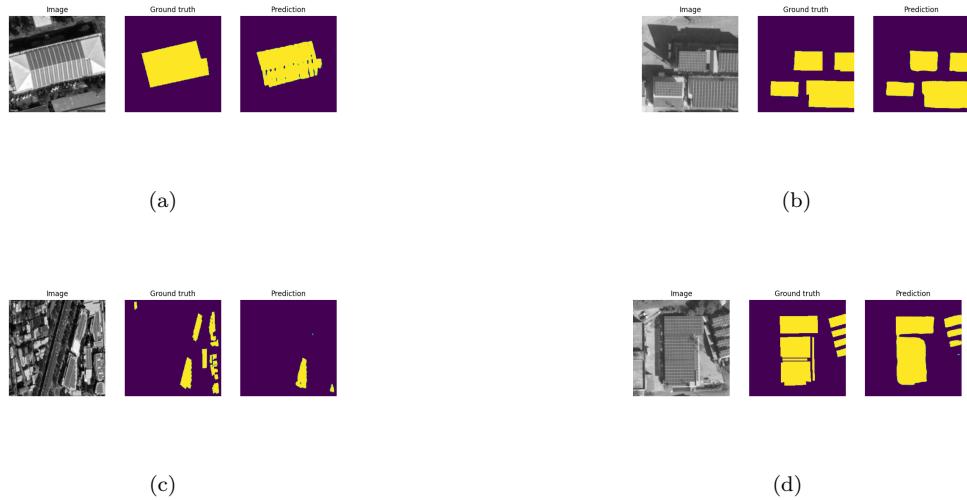


Figure 28: MAnet test set results

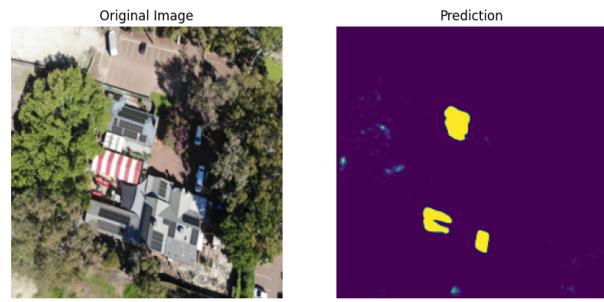


Figure 29: Test result for proactive ware's picture

2.7 Conclusion

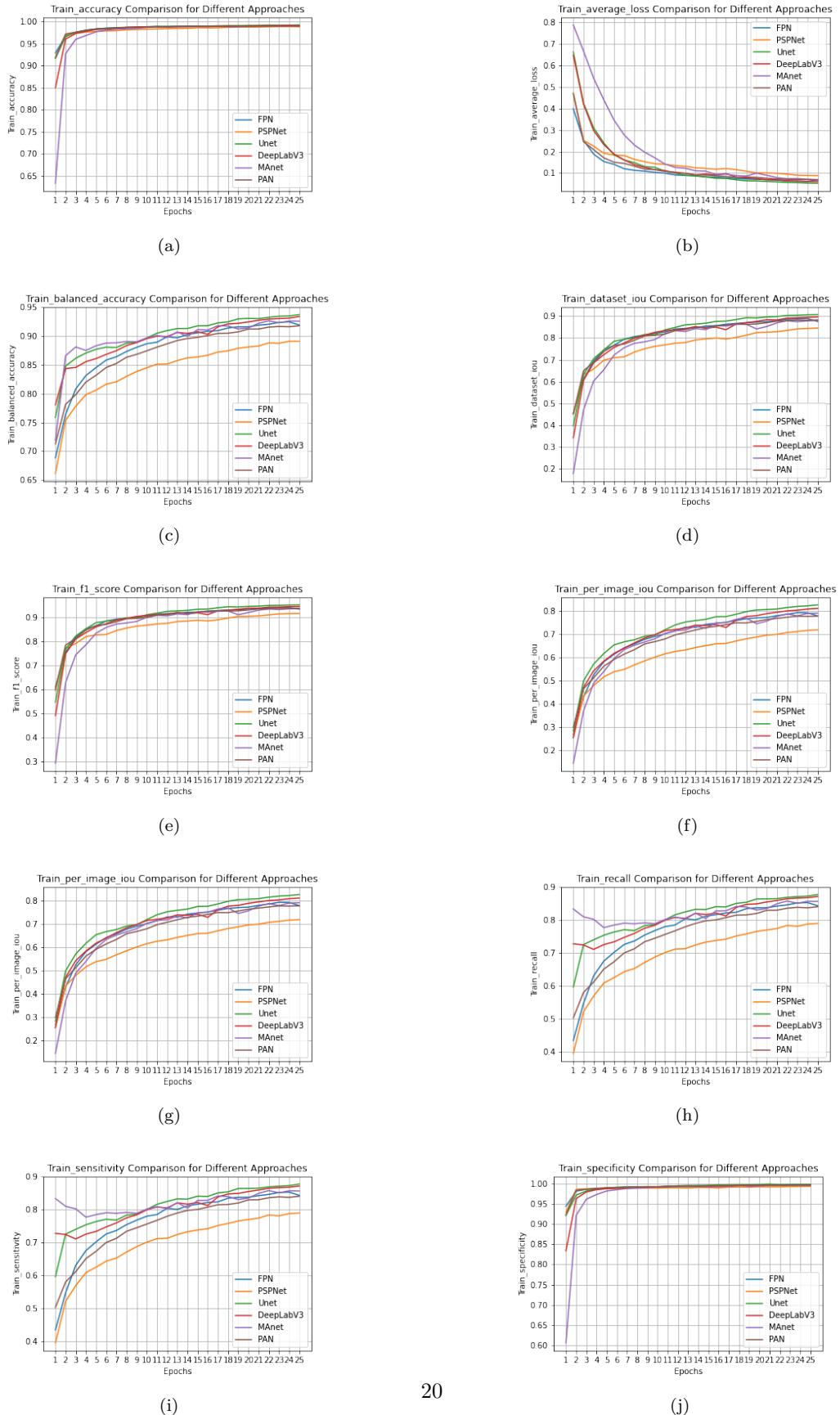


Figure 30: Training process metrics for separated neural nets

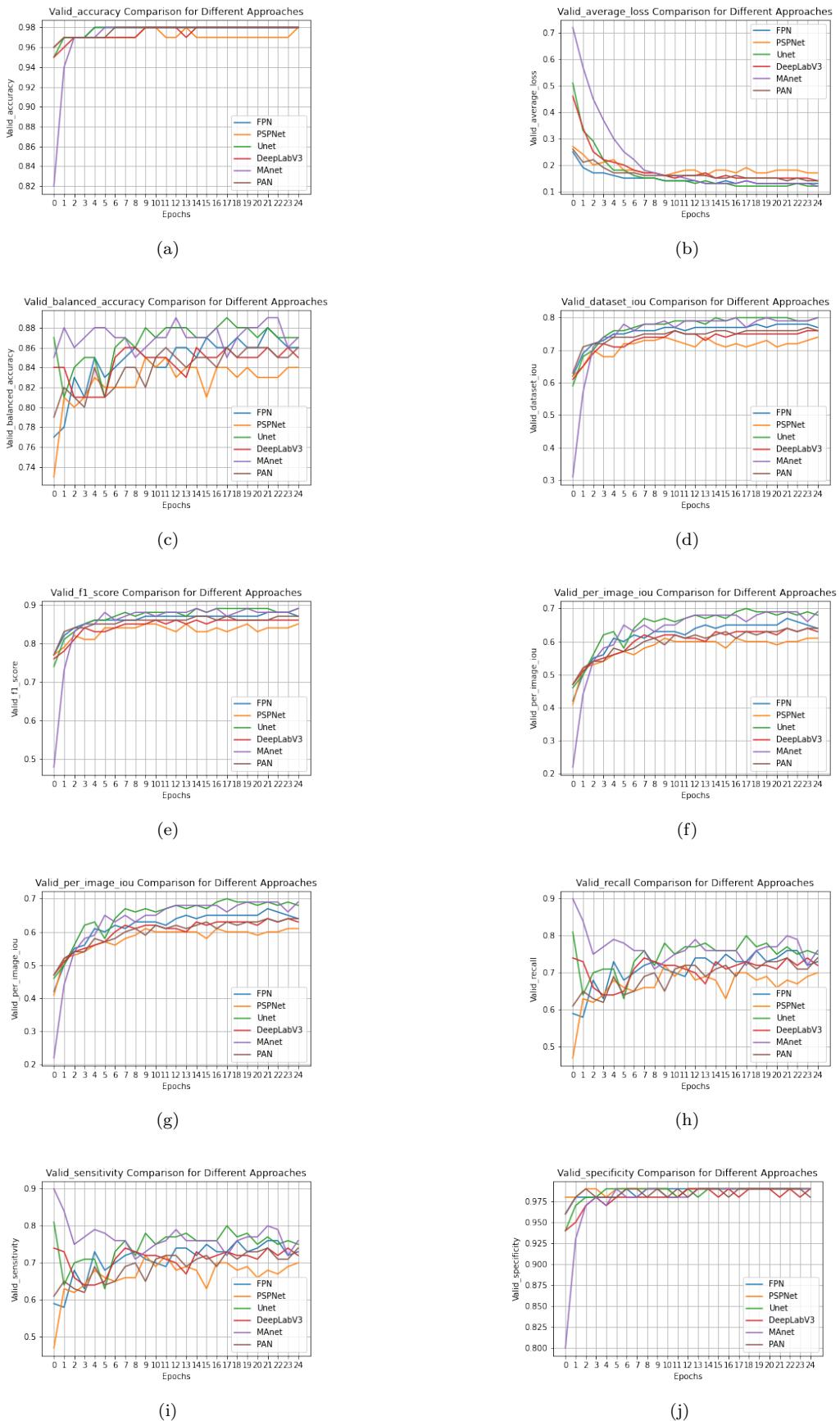


Figure 31: Validation process ²¹ metrics for separated neural nets

3 Conclusion

Based on what we observed in section 1 and 2, it is evident that all approaches yield similar and competitive results on the dataset. However, the first approach, which utilized the YOLOv8 model, demonstrated a higher degree of generalizability. This characteristic becomes apparent when we assess the model’s performance on an external image that does not necessarily adhere to the dataset’s distribution. Notably, due to the utilization of a significantly lower number of trainable parameters, the models presented in section 2 exhibited remarkable performance on the test dataset. Nevertheless, their generalization capabilities were compromised when applied to images outside the dataset. The superior model in this context can be identified as the one represented in Figure 28. Furthermore, some models discussed in section 2 proved inadequate for detecting small features in images.

In summary, the model discussed in Section 1 demonstrates a higher level of generalization, albeit at the cost of slightly slower inference time. On the other hand, the models described in Section 2 displayed excellent performance within the dataset but exhibited limitations in terms of generalization. However, their inference time was significantly reduced due to a lower number of trainable parameters. Combining these architectures with large language models as their backbones may potentially yield even more significant improvements.