

Objectives

- Train from scratch three models to the task of Swimmn Pool Detection in Aerial Images
- Compare the performance of popular CNNs (Faster RCNN[3] and YOLO[4]) with a transformers based vision (DETR[5])
- Demonstrate pratical applications in real-life scenatios

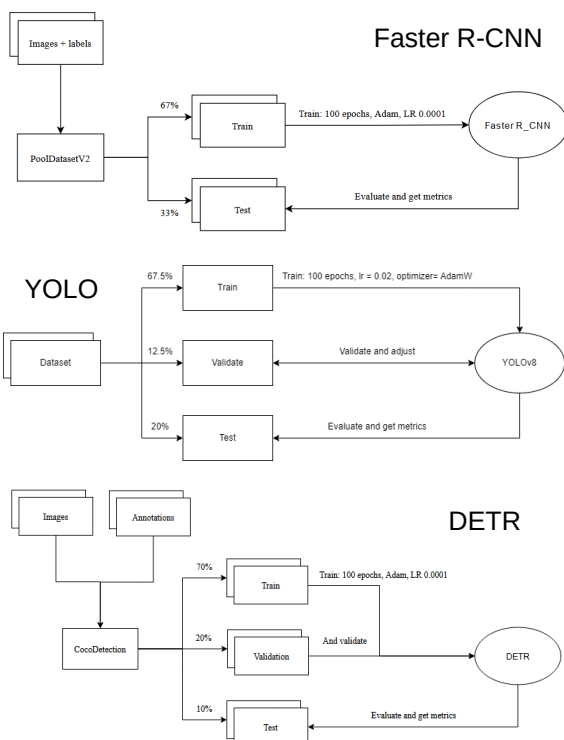
Problem

- Identify correctly swimming pools in aerial images
- Train the models to efficiently learn

Contributions

- Provide a comprehensive pipeline to train three different models for this task
- Comparisson of traditional models with transformers based.
- Scripts that can be used to extract principal features from a raw dataset (image, label) attending specific features of each model

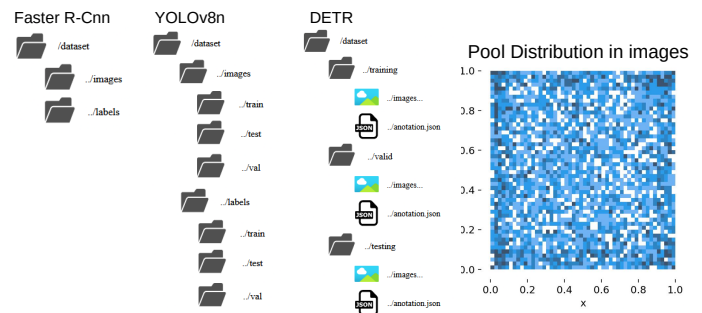
Methodology



Datasets

- Swimming Pool Detection in Satellite Images [1]
- Swimming Pool detection - Algarve's Landscape [2]

In total : 7097 images
3741 labels



Results

Model	Precision	Recall	F1-Score
Faster R-CNN	0.9950	0.9736	0.9842
YOLOv8(nano)	0.9289	0.7140	0.8074
DE:TR	0.7721	0.9009	0.8316



Figure 11. Faster R-CNN label and prediction example



Figure 9. YOLO label and prediction example



Figure 10. DETR label and prediction example



Figure 12. Example of Failed prediction - YOLO

Conclusions

- All three models are capable of learning the task
- Futher work would involve better tunning the models, adapt the model to the so called "difficult" situations and fine-tunning the models to other tasks and asses their perfo-mance.

References

- [1] Cecília Coelho. Swimming pool detection in satellite images, 2024. <https://www.kaggle.com/datasets/cici118/swimming-pool-detection-in-satellite-images>
- [2] Cecília Coelho. Swimming pool detection - algarve's landscape, 2024. <https://www.kaggle.com/datasets/cici118/swimming-pool-detection-algarves-landscape>
- [3] PyTorch. Faster r-cnn, 2024. https://pytorch.org/vision/main/models/fasterr_cnn.html

- [4] Ultralytics. Yolo v8, 2024. <https://github.com/ultralytics/ultralytics>
- [5] Facebook Research. Detr: End-to-end object detection with trans- formers, 2024. <https://github.com/facebookresearch/detr>