[Tip and Tricks list]

Here is an exhaustive, that you could use to boost your model performance

Data Labeling

• Use representative data for each class

• Avoid adding low-quality data

• Small dataset size for pre-trained models

• Bigger dataset size when training from scratch

• Identify and fix incorrect classes

• Balance your data distribution

• Use Soft-Labeling: Labeling using pre-trained models (free labeled data)

• Use Self-Training: Labeling using the model you are training (free labeled data)

• Add hard examples: images your model is struggling to detect target objects

Image Size

• Use the highest image resolution your GPU can afford.

• Use progressive resizing: Train with small-size images, and gradually increase the size

• Use tiling: Train using image patches

• Use the image size recommended by the model

Anchor-Boxes

• Use anchor boxes with a size/ratio close to target boxes

• Use auto-anchoring: search for the best anchors

• Use some anchor-free object detection models

Data Augmentation (DA)

- Oversample images with small boxes
- Use transforms close to your use case
- Use Copy & Paste / Mosaic DA
- Use Mosaic DA
- Use heavy DA at the beginning of training
- Use light DA at the end of the training
- Use synthetic data

Modeling

- Use larger models: they outperform smaller ones
- Use smaller models when training small dataset
- Use Focal Loss for the classification head
- Use GIoU Loss for the regression head (box location)

Training

- Train from scratch if data is different than the COCO dataset
- Freeze the whole/part of the backbone
- Use suggested LR
- Increase LR when using multiple GPU
- Use the discriminative learning rate technique
- Decrease batch size if the loss plateaus
- Decrease LR if the loss plateaus
- Train as long as your validation loss is decreasing
- Add more data, and data augmentation when overfitting

Inference

• Put the model on evaluation mode

• Use the same image size as in the training phase

• With high-resolution images, apply inference on patches/slices like in the SAHI library