Point-to-RBox Network for Oriented Object Detection via Single Point Supervision

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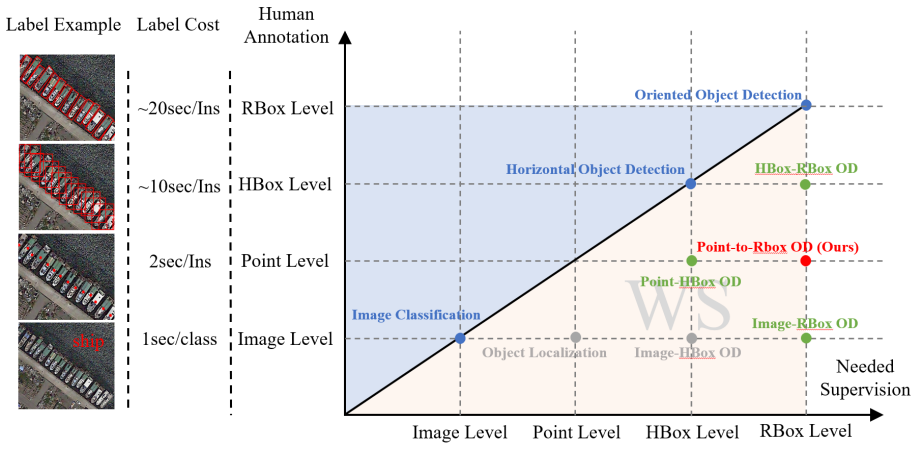
BMVC 2023

Motivation

- The **Rotated Bounding Boxes** used in Oriented object detection are labor-intensive and time-consuming to annotate manually.

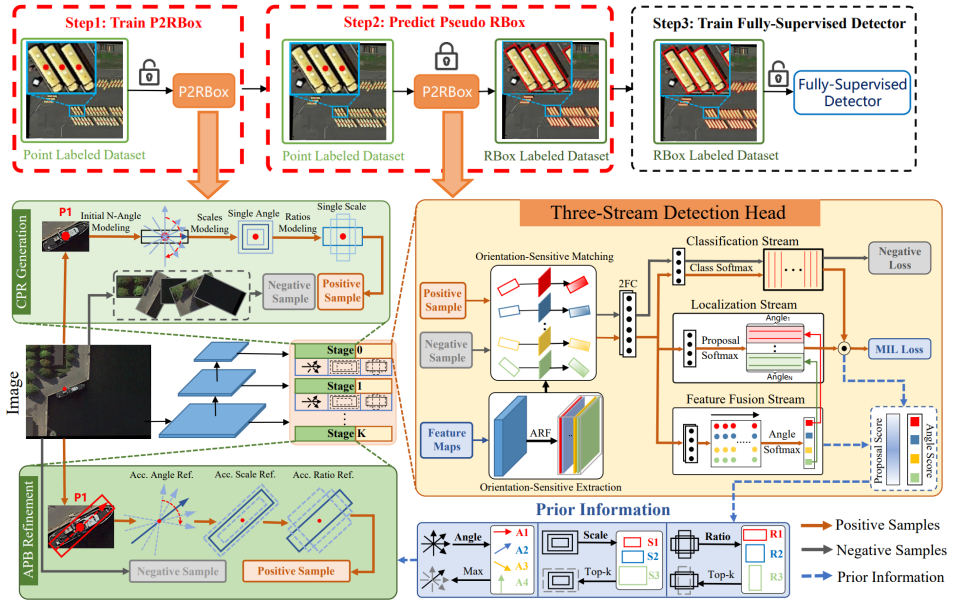


Contribution

- First Work to introduce **point-level annotations** to weakly supervised oriented object detection.
- **Coarse-to-Fine** pseudo RBox generation method can generate high-quality pseudo RBox and save computational resource.
- Experiments show that the pseudo RBox generated by P2RBox can **replace** manual annotation.

Pipeline & Method

- Our Goal is to generate high-quality pseudo RBoxes based on point annotations, as shown in the red steps.



- P2RBox's structure includes two main components:
- The **Coarse-to-Fine** pseudo RBox generation module (green part) can generate pseudo RBox while balanci-ng accuracy and computing resources.
- The Three-stream detection head guided by orientation sensitive features (yellow part) can choose the highest quality pseudo RBox when the orientation is arbitrary.

Experiment

- Performance of detectors trained with pseudo RBox

Method	Label	AP_{DOTA}	AP_{DIOR}
Two-Stages:			
R-FR[ ]*	PB	0.656(96%)	0.568(95%)
	GT	0.681	0.595
RoI-T[ ]*	PB	0.652(93%)	0.602(94%)
	GT	0.696	0.639
One-Stages:			
R-RN [ ]*	PB	0.658(98%)	0.535(98%)
	GT	0.667	0.546
CFA [ ]†	PB	0.695(97%)	0.57(98%)
	GT	0.712	0.578
ORep [ ]†	PB	0.715(97%)	0.635(98%)
	GT	0.739	0.654
Transformer-Based:			
Ao2-D [ ]	PB	0.746(97%)	0.664(94%)
	GT	0.773	0.702

- The pseudo RBox (Red) generated by P2RBox