

**Ahmedabad
University**

Oriented object detection (OOD)

**CSE 541 Computer Vision
Mid-Semester Presentation
Group - 3**

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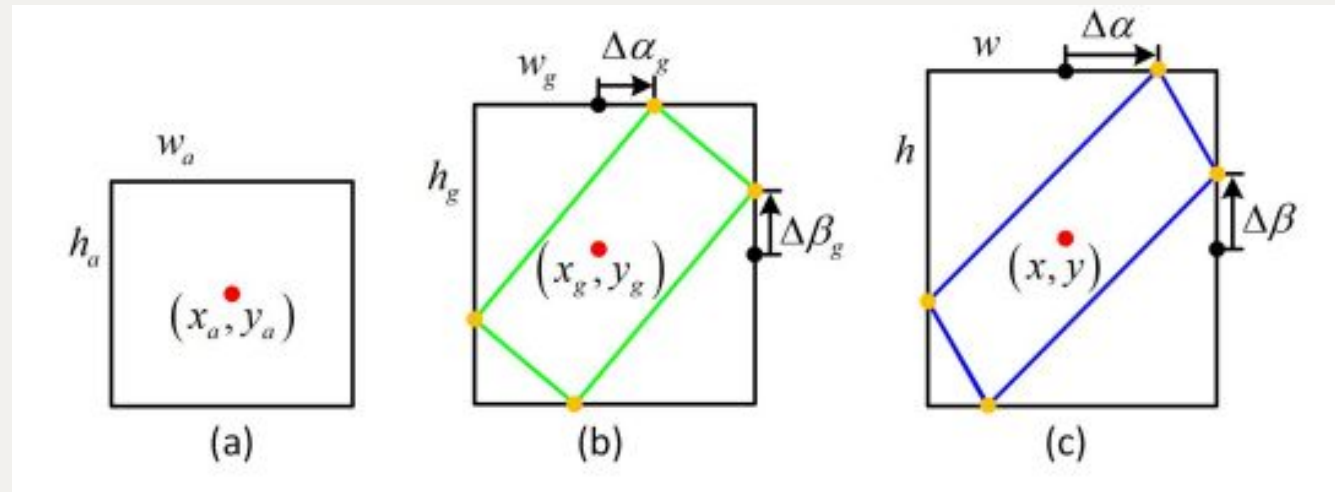
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Problem Statement

- Oriented Object Detection (OOD) models for improved detection of objects with directional movement.
- Investigate OOD model suitable for oriented rectangular bounding box detection.

Oriented object detection using MMRotate:

1. Feature Extraction: Extract relevant features from the image.
2. Candidate Region Generation: Identify potential regions of interest.
3. Orientation Estimation: Estimate the orientation of each region.
4. MMRotate Generation: Compute the minimum bounding rectangle aligned with estimated orientation.
5. Object Classification and Refinement: Classify objects within MMRotate rectangles and refine localization.



Oriented R-CNN for Object Detection Architecture

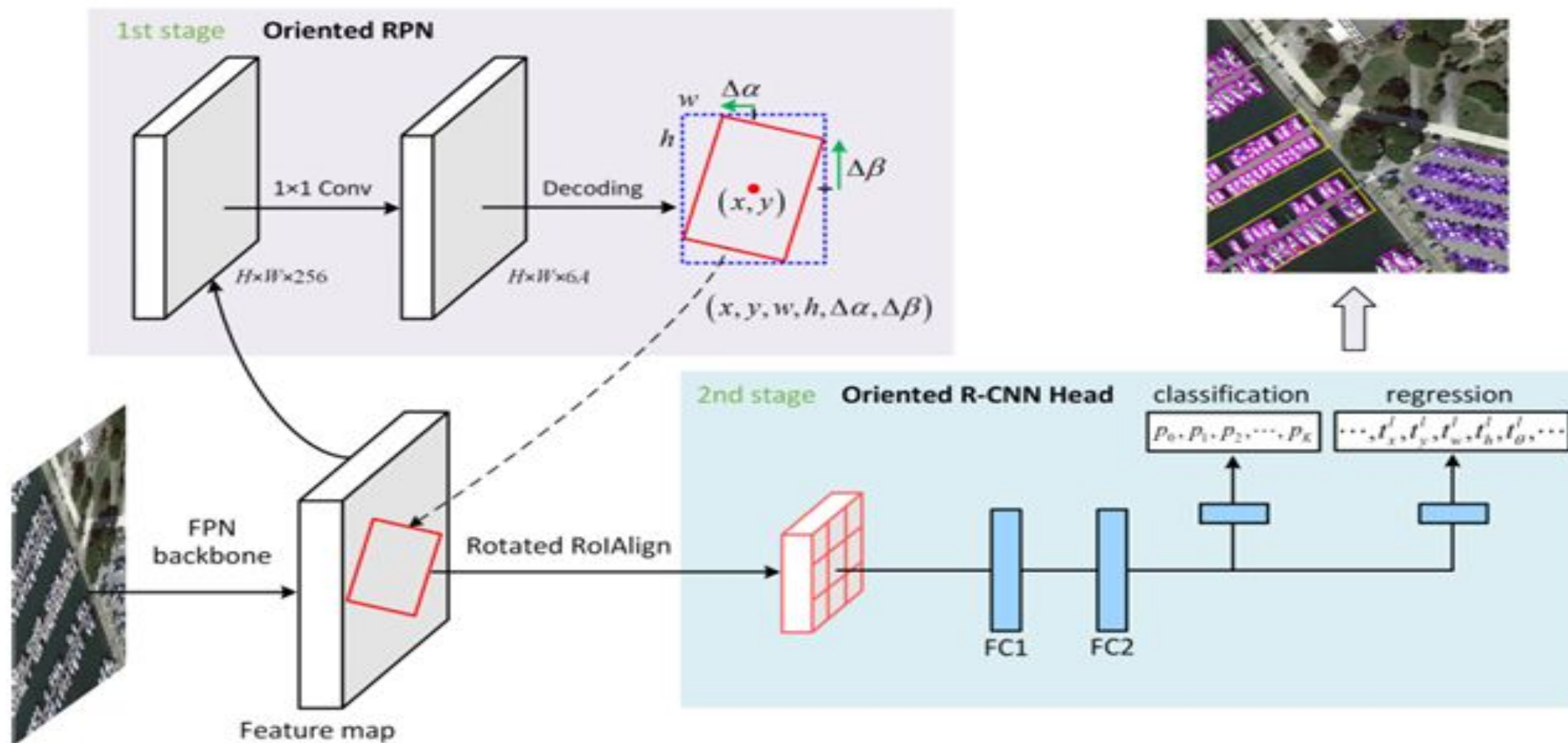
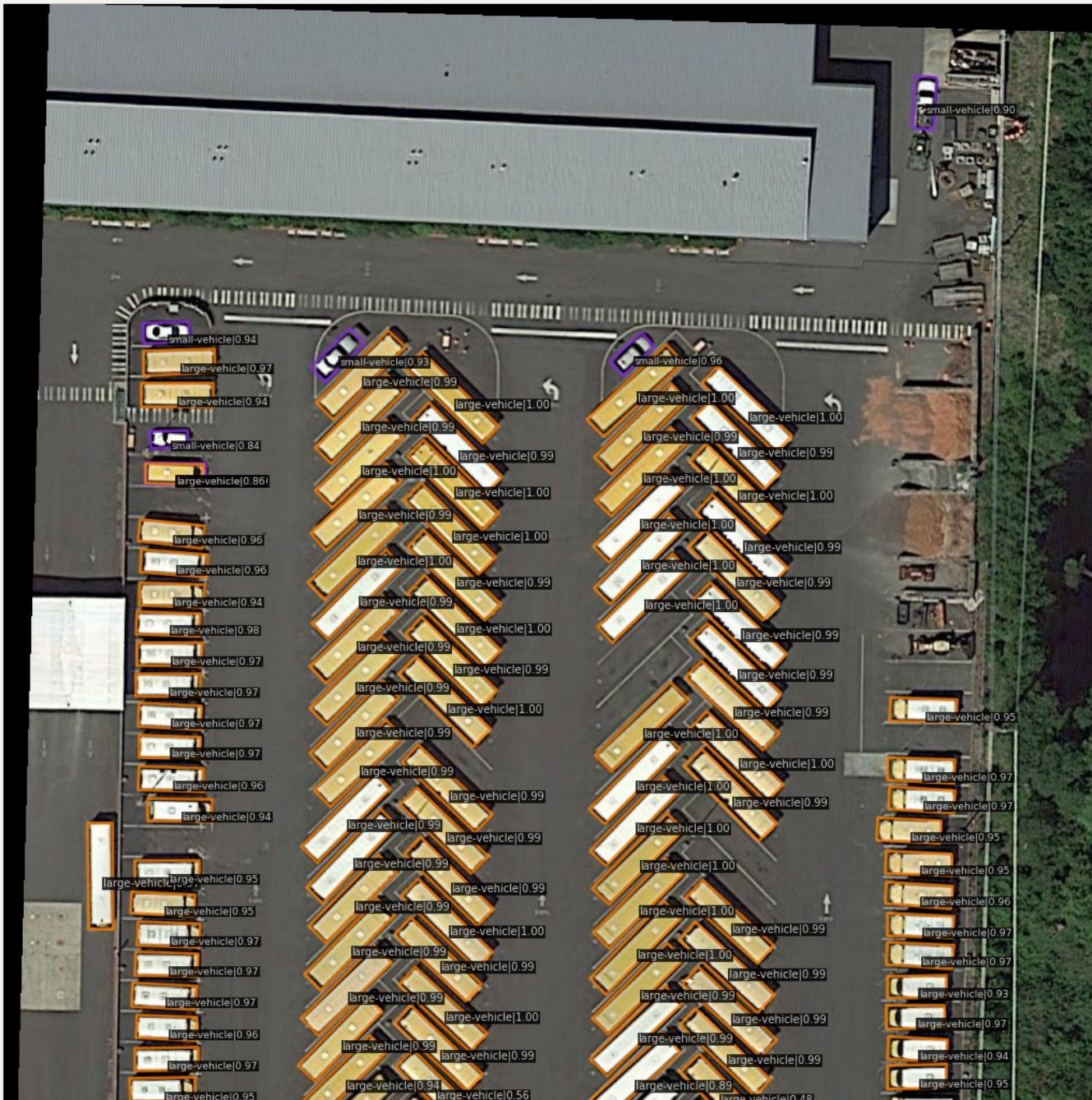


Figure 2: Overall framework of oriented R-CNN, which is a two-stage detector built on FPN. The first stage generates oriented proposals by oriented RPN and the second stage is oriented R-CNN head to classify proposals and refine their spatial locations. For clear illustration, we do not show the FPN as well as the classification branch in oriented RPN.

Earlier Dataset Used

- SAR Ship Detection Dataset (SSDD): Official Release and Comprehensive Data Analysis
- <https://github.com/TianwenZhang0825/Official-SSDD>

result

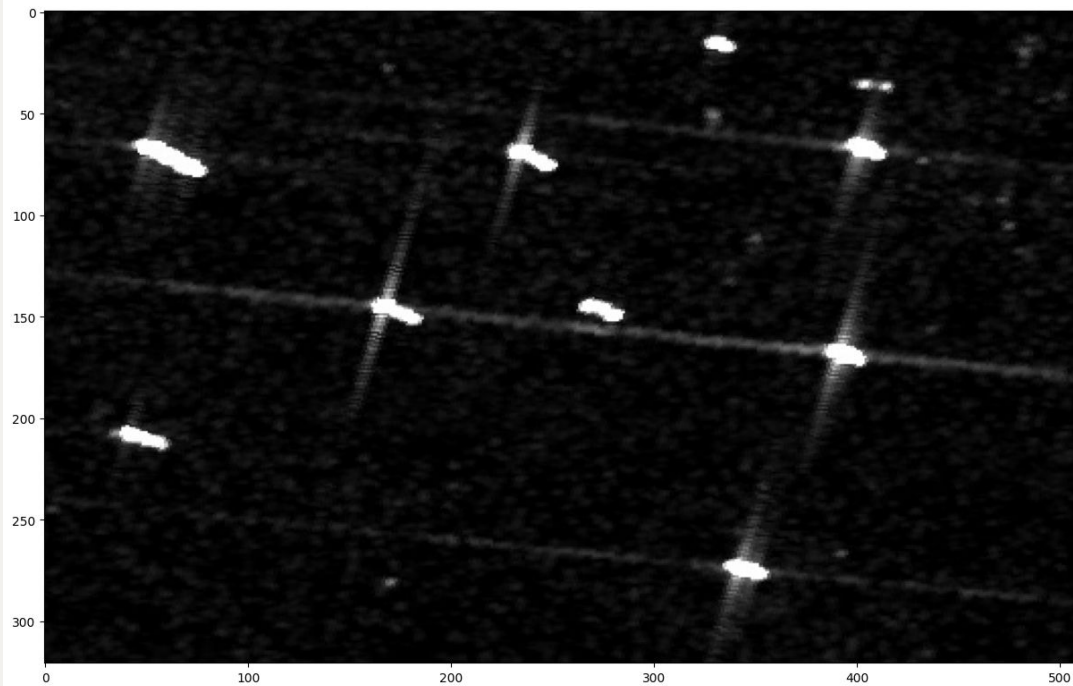


Primary Results: Oriented RCNN

Methodology

- In this tutorial, we are using the SSDD dataset.
- Modifying the config to train the model on the SSDD dataset.
- Train the detector.
- After fine tuning the detector, let's visualize the prediction results!

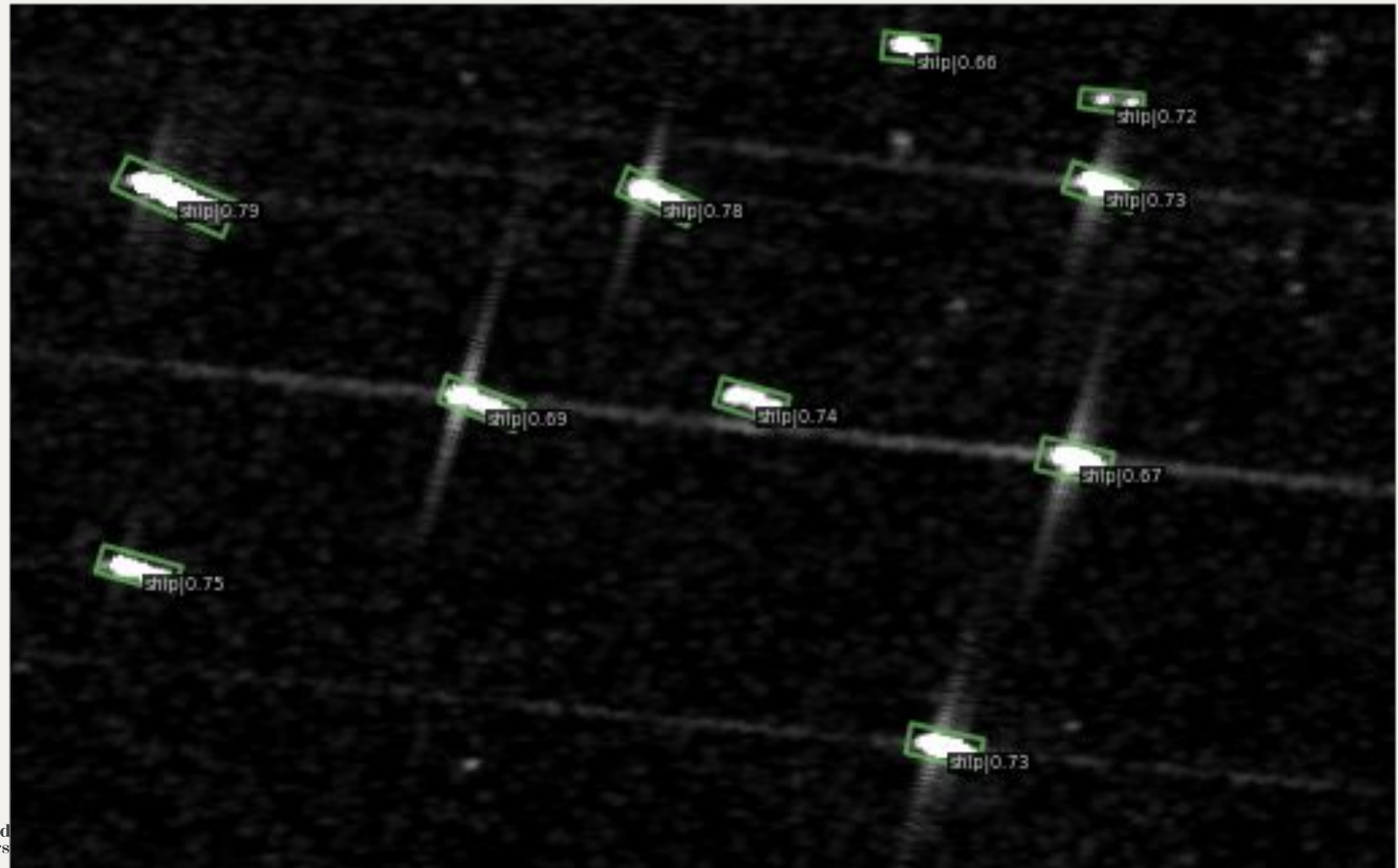
Test image



DOTA annotation of the image:

331 276 356 283 360 272 334 266 ship 0
382 171 406 176 410 165 383 161 ship 0
259 148 284 154 287 146 263 139 ship 0
156 146 185 160 191 145 165 136 ship 0
32 209 57 217 63 208 40 200 ship 0
43 69 75 85 83 74 51 58 ship 0
222 70 250 85 255 73 231 60 ship 0
325 18 345 23 344 13 325 8 ship 0
388 66 415 77 419 67 392 59 ship 0

result



Future Milestone

- Complete implementation of models and report mAP, losses values for each epoch in TFrecord files
- Compare performance of models w.r.t small objects on AU drone dataset

References

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References

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- Open-Mmlab. (n.d.). GitHub - open-mmlab/mmrrotate: OpenMMLab Rotated Object Detection Toolbox and Benchmark. GitHub. <https://github.com/open-mmlab/mmrrotate>
- Xie, X., Cheng, G., Wang, J., Yao, X., & Han, J. (2021, August 12). Oriented R-CNN for object detection. arXiv.org. <https://arxiv.org/abs/2108.05699>

Dataset link:

<https://drive.google.com/file/d/1g1NJUGotrbEyK43twwB9556AdngJsynZ/view?usp=sharing>

Thank You