Directional Bounding Boxes for Oriented Object Detection

Szilárd Molnár, Levente Tamás, and Zoltán Kató
Szilard.Molnar@aut.utcluj.ro, *Levente.Tamas@aut.utcluj.ro*, *kato@inf.u-szeged.hu*

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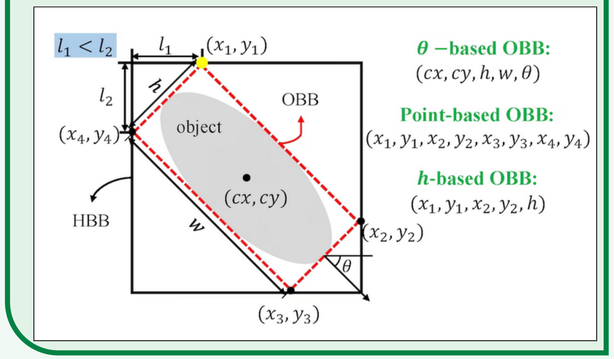
Main Aspects

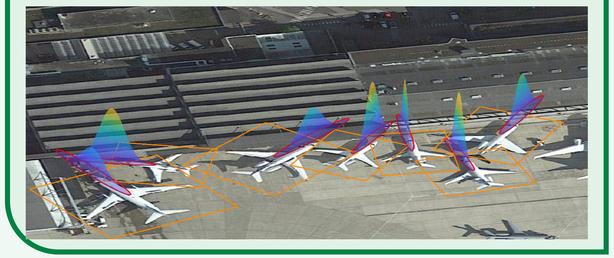
- Oriented bounding box (OBB)
- Additional direction
- Great detection accuracy
- Various applications



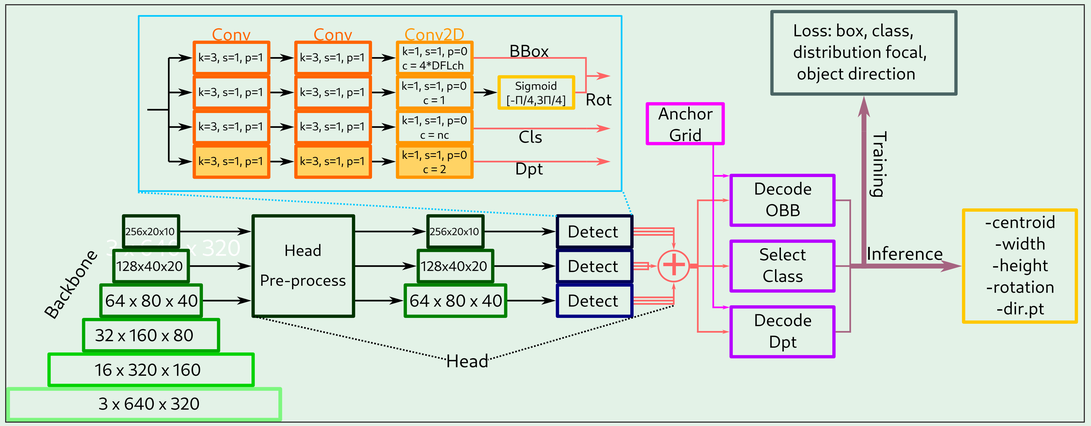
Mahalanobis Loss

- Direction point
- Focus on direction

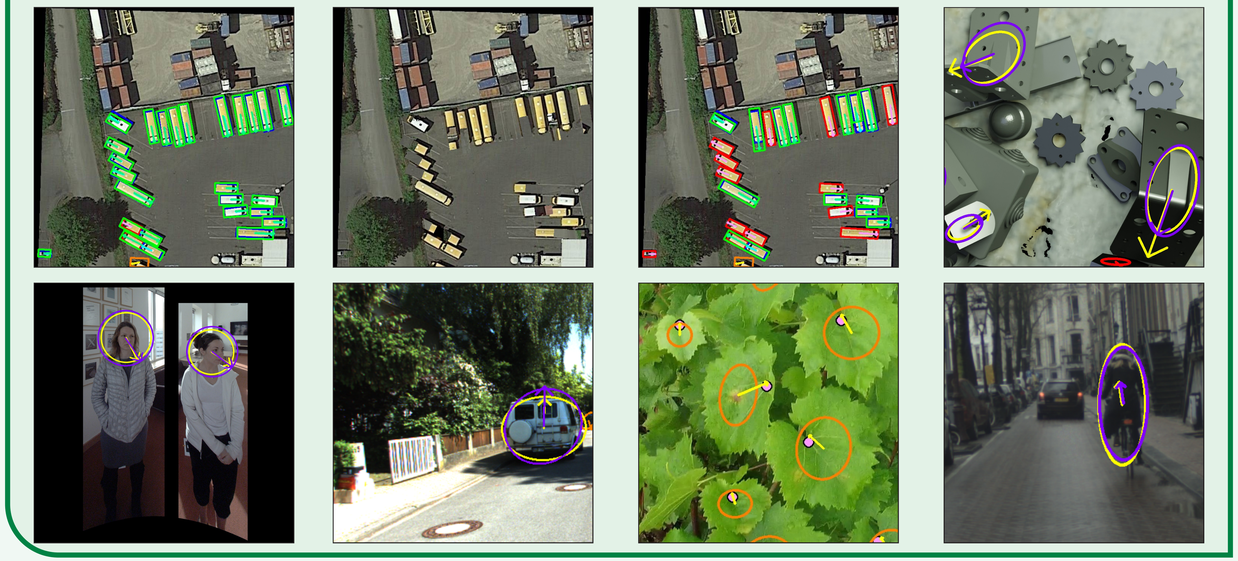
$$\mathscr{L}_{dir} = 1 - \frac{\sqrt{|\Sigma_i^{-1}|}}{2\pi} \exp\left(-\frac{1}{2}(\hat{d}_i - d_i)^T \Sigma_i^{-1} (\hat{d}_i - d_i)\right) \quad (1)$$



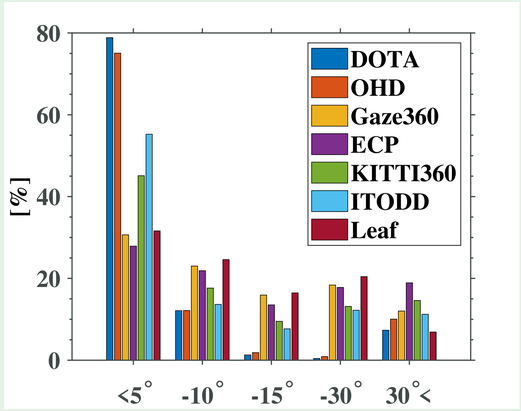
Architecture - Based on YOLO



Results



Angle and detection accuracy



Method	mAP-OHD
OHDet [2]	38.04
HDDet [1]	66.81
DOBB	67.1

Acknowledgements

[1] Siran Ding, Jingxian Liu, Fan Yang, and Mai Xu. HDDet: A More Common Heading Direction Detector for Remote Sensing and Arbitrary Viewing Angle Images. *Transactions on Geoscience and Remote Sensing*, 62:1–14, 2024.

[2] Xue Yang and Junchi Yan. On the arbitrary-oriented object detection: Classification based approaches revisited. *International Journal of Computer Vision*, 130(5):1340–1365, 2022.

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