AHMEDABAD UNIVERSITY

SCHOOL OF ENGINEERING AND APPLIED SCIENCE

Winter Semester 2024

CSE-541 Computer Vision

Team Number: 3

Members:

Khwahish Patel	**Krishang Shah**	**Sachin Dindor**	**Dhruvesh Panchal**

Project 6: Explore oriented object detection (OOD) models. Create our own AU drone dataset for such a model and then test/validate trained models.

WEEKLY REPORT

(Week 3)

(12/02/2024 - 18/02/2024)

Tasks Completed:

- ➔ Prepared and delivered a comprehensive presentation on the importance of oriented rectangular bounding boxes for object detection tasks, highlighting their significance in applications like aerial surveillance and autonomous driving.
- ➔ Explored the paper "H2RBox-v2: Incorporating Symmetry for Boosting Horizontal Box Supervised Oriented Object Detection", "Oriented R-CNN for Object Detection" and “RBox-CNN: rotated bounding box based CNN for ship detection in remote sensing image” to deepen understanding of oriented object detection approaches.
- ➔ Investigated state-of-the-art oriented object detection models including YOLOv8.1, emphasizing their relevance for handling oriented rectangular bounding boxes effectively.
- ➔ Examined benchmark datasets such as DOTAv1 and DOTAv2, understanding their importance in evaluating object detection algorithms in aerial imagery.

Proposed Approach for the Project:

Data Preprocessing:

- ➔ Collect and curate the AU drone dataset, annotating oriented rectangular bounding boxes for small objects.

Model Training:

- ➔ Implement YOLOv8.1 and other SOTA oriented object detection models.
- ➔ Train models on the AU drone dataset, monitoring mAP and loss values for each epoch.

Evaluation:

- ➔ Evaluate trained models on a separate validation set.
- ➔ Analyze model performance, focusing on detection accuracy for small objects.

Challenges Faced:

- ➔ Understanding the intricacies of oriented object detection models and their implementation.
- ➔ Familiarizing with various datasets such as COCO 2020 Object Detection Task, DOTA, and HRSC2016 to comprehend their characteristics and challenges.

Next Steps:

- ➔ Initiate data preprocessing phase by collecting and annotating images for the AU drone dataset.
- ➔ Begin implementing YOLOv8.1 and other selected models for training on the prepared dataset.
- ➔ Continuously monitor model training progress and evaluate model performance on validation sets.
- ➔ Address any challenges encountered during implementation and seek solutions through further research and collaboration.

Pending Tasks:

- ➔ Finalize the selection of additional SOTA models for implementation.
- ➔ Develop a detailed plan for data annotation and preprocessing of the AU Drone Dataset
- ➔ Study YOLOv8.1
- ➔ Explore techniques for addressing challenges related to small object detection and varying lighting conditions in the AU drone dataset.

Upcoming Milestones:

- ➔ Completion of data preprocessing phase.
- ➔ Commencement of model training and evaluation process.

➔ Initial analysis of model performance and identification of potential improvements.`

References

1. Yu, Y., Yang, X., Li, Q., Zhou, Y., Zhang, G., Da, F., & Yan, J. (2023, October 16). *H2RBOX-V2: Incorporating symmetry for boosting horizontal box supervised oriented object detection*. arXiv.org. https://arxiv.org/abs/2304.04403
2. *Papers with code - oriented R-CNN for object detection*. Oriented R-CNN for Object Detection | Papers With Code. (n.d.). https://paperswithcode.com/paper/oriented-r-cnn-for-object-detection
3. Awsaf. (2020, September 4). *Coco 2017 dataset*. Kaggle. https://www.kaggle.com/datasets/awsaf49/coco-2017-dataset
4. Dota. (n.d.). https://captain-whu.github.io/DOTA/dataset.html
5. Gfeng. (2018, August 23). *HRSC2016*. Kaggle. https://www.kaggle.com/datasets/guofeng/hrsc2016