Data Annotation and Dataset Preparation Report

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Task: Annotate 150 images and prepare a dataset for object detection.

1. Introduction

The objective of this task was to annotate a dataset containing **vehicles, pedestrians, and traffic signs** and prepare it for training an object detection model. Proper annotation is crucial for model performance, ensuring accurate detection and classification.

2. Image Collection

The dataset was compiled using publicly available sources such as:

- Open Images Dataset (Google)
- COCO Dataset
- Pascal VOC Dataset
- Custom images downloaded using Python scripts

3. Annotation Process

- **Tool Used:** LabelImg for Pascal VOC XML format and CVAT for COCO JSON format.
- **Procedure:**
    1. Loaded images into **LabelImg**.
    2. Manually drew bounding boxes around objects.
    3. Labeled each object correctly as **vehicle, pedestrian, or traffic sign**.
    4. Saved annotations in **Pascal VOC XML** format.
    5. Converted VOC XML annotations to **COCO JSON format** using a Python script.

4. Challenges Faced

- **Class Imbalance:** More vehicle images than pedestrians and traffic signs.
- **Occlusion:** Some objects were partially hidden.
- **Small Object Detection:** Traffic signs were sometimes too small to annotate precisely.

5. Solutions Implemented

- **Data Augmentation:** Applied flipping, rotation, and scaling to balance the dataset.
- **Bounding Box Adjustments:** Increased box size for occluded objects.
- **Manual Verification:** Rechecked annotations for accuracy.

6. Dataset Splitting

The dataset was split into **training (80%)** and **validation (20%)** sets using a Python script. The final dataset structure:

dataset/

├── train/

│ ├── images/ (80%)

│ ├── annotations/

├── val/

│ ├── images/ (20%)

│ ├── annotations/

7. Conclusion

This dataset is now ready for training an object detection model using YOLO or Faster R-CNN. High-quality annotations ensure improved model performance, making it suitable for real-world applications like autonomous vehicles and traffic monitoring.