

Developing an Object Tracker with YOLOv8 and Labellerr

Overview

We built an end-to-end pipeline to train a YOLOv8 instance segmentation model, use it to generate pre-annotations for a Labellerr project, and then apply ByteTrack to track objects in video. This report describes the journey, challenges faced, and solutions.

Data Preparation and Annotation

We prepared a dataset with two classes ('pedestrian' and 'vehicle'). A data.yaml file specified paths and classes. We converted model predictions into COCO JSON format using OpenCV contours and polygons, ensuring they aligned with Labellerr requirements.

Training YOLOv8

We fine-tuned a YOLOv8 segmentation model (yolov8n-seg). Training ran in Google Colab with GPU. Validation metrics (precision, recall, mAP) and plots (confusion matrix, PR curve) provided performance insights.

Uploading Pre-Annotations to Labellerr

Predictions were saved as COCO JSON and uploaded using Labellerr SDK. Initially, errors occurred due to mismatched category IDs and formats. Fixes included aligning IDs and using 'coco_json' format. Successful upload allowed pre-annotations to appear in Labellerr for review.

Model Evaluation and Reporting

We evaluated the model using YOLO's val() function and generated a PDF report with ReportLab. Metrics such as Precision (~0.90), Recall (~0.89), mAP50 (~0.92), and mAP50-95 (~0.73) showed strong performance. Plots like confusion matrices and PR curves were included.

Multi-Object Tracking with ByteTrack

We integrated ByteTrack via the Supervision library. YOLO detections were passed into the tracker, which maintained unique IDs across frames. Annotated videos showed consistent tracking of pedestrians and vehicles.

Challenges and Resolutions

- Data formatting: Fixed invalid polygons in JSON. - Labellerr upload: Corrected annotation format and category IDs. - Tracking: Ensured YOLO outputs matched ByteTrack inputs. - Performance: Used GPU and smaller image sizes for faster processing.

Guide for Others

Steps to replicate: 1. Collect and label data (use Labellerr or convert existing labels). 2. Train YOLOv8 segmentation with your data.yaml. 3. Save predictions and convert them into COCO JSON. 4. Upload predictions as pre-annotations to Labellerr using their SDK. 5. Evaluate your model and generate a PDF report. 6. Integrate ByteTrack with YOLO to build a video tracker. 7. Optionally deploy via Streamlit for an interactive demo.