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Labellerr Internship Assignment

This document presents a concise summary of the end-to-end workflow built as part of the AI Software Engineer technical assessment. The primary goal is to demonstrate the key stages of a computer vision pipeline including data preparation, model training, and tracking.

# 1. Objective

To build a small but functional image segmentation and object tracking workflow using Labellerr for annotation, YOLOv8-seg for model training, and ByteTrack for video tracking.

# 2. Data Collection & Annotation

A custom dataset of approximately 150 open-license images containing vehicles and pedestrians was curated from public sources. Around 100 images were manually annotated in Labellerr using polygon masks for the chosen classes. The remaining images were reserved for testing.

# 3. Model Training

The Ultralytics YOLOv8-seg nano model was trained on Google Colab using the annotated dataset. Training was kept short to illustrate the workflow while ensuring a working checkpoint. Key metrics such as mAP and IoU were logged for basic evaluation.

# 4. Tracking Integration

The trained YOLO model was integrated with ByteTrack to perform multi-object tracking on a sample video. The pipeline generates a JSON file with object IDs, classes, bounding boxes, and frame numbers.

# 5. Results & Observations

The prototype successfully produced segmentation masks and tracking outputs on test images and videos. While the accuracy was not fine-tuned, the experiment validates the complete data-to-deployment flow.

# 6. Conclusion & Future Work

This project highlights the essentials of dataset creation, model training, and tracking integration using modern open-source tools. Future improvements could include larger datasets, longer training schedules, and UI enhancements for more user-friendly interactions.