Project on Data Fusion

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DATA

- LiDAR 3D detector's output on nuScenes database :
  - Train split
  - Validation split

- Multi-cameras 3D detector's output on nuScenes database :
  - Train split
  - Validation split

- Ground Truth 3D objects of nuScenes database

Method

- Read pkl files : train and validation set + GT data
- Keep 20% of each file if not enough GPUs and RAM
- For uncertainties, choose from normal distribution of mean 0 and known sigma
  1. LiDAR : [0.2, 0.2, 0.2, 0.05, 0.5, 0.5, 0.5]
  2. Camera : [0.5, 0.5, 0.5, 0.5, 1.0, 1.0, 1.0]
- Choose between :
  1. Implement Weighted Least Squares based Method (Fadili et al.,2025): learn some parameters in the process ?
  2. Implement Kalman Fusion based Method (Fadili et al.,2025): learn some parameters in the process ?
  3. Implement Late Fusion IA-based Method inspired by (Jahn et al.,2025)
- Compare metrics like: recall, precision, mATE, mAOE, mASE (nuscenes)

Deliverables

- PPT presentation with :
  1. Method Overview
  2. Results
- Code with train, validation and inference function
- Trained model and checkpoint (.pth)

References

- Fadili, Maryem, et al. "Weighted least-squares multi-detection fusion and kalman filter-based tracking for collaborative perception systems." (2025).
- Fadili, Maryem, et al. "Evaluation of an Uncertainty-Aware Late Fusion Algorithm for Multi-Source Bird's Eye View Detections Under Controlled Noise." *Intelligent Robotics and Control Engineering*. 2025.
- Jahn, Lennart Lorenz Freimuth, et al. "Enhancing lane detection with a lightweight collaborative late fusion model." *Robotics and Autonomous Systems* 175 (2024): 104680.
- Caesar, Holger, et al. "nuscenes: A multimodal dataset for autonomous driving." *Proceedings of the IEEE/CVF conference on computer vision and pattern recognition*. 2020.