Ahmedabad University

CSE623 Machine Learning

Weekly Report 1

Improve existing online trackers by measuring feature evolution of objects using Classical Machine Learning models [UAV videos]

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Date of Submission: 14th Feb, 2026

Student Details

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Aim:

Understanding the project problem statement, exploring the DRASHTI-HaOBB dataset, and performing an initial literature review on Multiple Object Tracking (MOT) frameworks and tracking metrics.

Introduction:

This project focuses on drone-based vehicle analysis using the DRASHTI-HaOBB dataset, which contains aerial-view images of Indian traffic annotated with Oriented Bounding Boxes and heading-angle information. The dataset enables direction-aware detection and provides a strong foundation for studying Multiple Object Tracking (MOT) techniques.

During the initial phase, the focus was on understanding tracking pipelines, association strategies, and evaluation metrics such as MOTA, IDF1, and HOTA through the provided reference materials. The primary objective of Week-1 was to build foundational knowledge of trackers, dataset structure, and evaluation methods before moving toward implementation.

Work Completed:

- Reviewed the DRASHTI-HaOBB dataset description and understood the annotation format (OBB coordinates and heading-angle information).
- Studied basic concepts of Multiple Object Tracking (MOT) and explored the reference resources shared by the teaching assistant.
- Gained an initial understanding of tracking metrics and common tracker pipelines through the provided materials.

Next Steps and Goals (Week-2 Plan):

- Perform basic dataset exploration and visualize sample annotations.
- Continue studying different tracking approaches and understand their workflow.
- Set up the required environment to begin experimenting with baseline tracking implementations.

Conclusion:

The first week primarily focused on building foundational knowledge about the dataset and Multiple Object Tracking concepts. Reviewing the provided research materials helped in understanding how tracking systems operate and how evaluation metrics are used to compare performance.

The DRASHTI-HaOBB dataset presents unique challenges due to aerial viewpoints and oriented annotations, making tracker selection an important aspect of the project. Moving forward, the project will shift from conceptual understanding toward practical experimentation with different tracking approaches.

References:

1. CVPR 2025 Poster – Multiple Object Tracking Research
   https://cvpr.thecvf.com/virtual/2025/poster/35174
2. Miguel Mendez – MOT Tracking Metrics
   https://miguel-mendez-ai.com/2024/08/25/mot-tracking-metrics
3. NickNair – Multiple Object Tracking using Kalman Filter
   https://github.com/NickNair/Multiple-Object-Tracking-using-Kalman-Filter
4. BoxMOT Repository
   https://github.com/mikel-brostrom/boxmot
5. Bhavsar et al., DRASHTI-HaOBB Dataset (Zenodo)
   https://doi.org/10.5281/zenodo.18278989