

CSE541 - Computer Vision

Weekly Report 4

**Improvising Object Tracking Algorithm SORT for Long-Term Trajectory Extraction**

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## **Combining Insights from Two Base Papers: Aerial Multi-Object Tracking with Deep Association Networks**

### Based on the two papers provided, we have come with a potential approach to solving aerial multi-object tracking:

### **1. Object Detection:**

### Inspired by Jadhav et al. (2020), we will leverage a **Deep Neural Network (DNN)** for object detection. This network can handle challenges like scale variations, occlusions, and dense object distributions commonly faced in aerial imagery.

### We will explore modifying the **anchor scales** in the base detection model (like RetinaNet) to better detect small and densely packed objects, as suggested by Jadhav et al. (2020).

### We can consider incorporating additional techniques like **Squeeze-and-Excitation (SE) blocks**, as in the mentioned paper, to improve detection accuracy at the expense of slightly increased computational cost.

### **2. Data and Training:**

### Similar to Jadhav et al. (2020), we will utilize the **VisDrone dataset** for training and evaluating our approach. This dataset offers diverse aerial video sequences with annotations for object detection and tracking.

### We need to access and explore the details of the VisDrone dataset, including object categories, video lengths, and annotation formats, as mentioned in the previous report.

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### **3. Tracking and Association:**

### We will adopt the **DeepSORT** framework proposed by Jadhav et al. (2020) for associating detected objects across frames and maintaining their individual tracks. DeepSORT utilizes a **Kalman filter** to predict object locations and a **Hungarian algorithm** for efficient data association.

### We can further investigate incorporating advanced tracking techniques like **appearance modeling** or **motion pattern analysis** to improve track continuity in challenging scenarios.

### **4. Evaluation:**

### To assess the performance of our approach, we will adopt the evaluation metrics used in the **VisDrone challenges**, as mentioned by Jadhav et al. (2020). These metrics likely include **Multiple Object Tracking Accuracy (MOTA)** and **Multiple Object Tracking Precision (MOTP)**, which measure the overall tracking performance and the accuracy of individual tracks, respectively.

### **5. Inspiration from Alonazi et al. (2023):**

### While Alonazi et al. (2023) focus on ground-based traffic control, their use of a **pixel-labeling approach** for object detection could be explored as an alternative or complementary technique to Deep Learning-based detection methods. This might be particularly relevant for scenarios where computational resources are limited.

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### **References:**

1. Jadhav, Ajit & Mukherjee, Prerana & Kaushik, Vinay & Lall, Brejesh. (2020). Aerial Multi-Object Tracking by Detection Using Deep Association Networks. 1-6. 10.1109/NCC48643.2020.9056035
2. [8] M. Alonazi et al., "A Smart Traffic Control System Based on Pixel-Labeling and SORT Tracker," in IEEE Access, vol. 11, pp. 80973-80985, 2023, doi: 10.1109/ACCESS.2023.3299488