

Lightweight Thermal Multi-Object Tracking without Heavy Re-ID

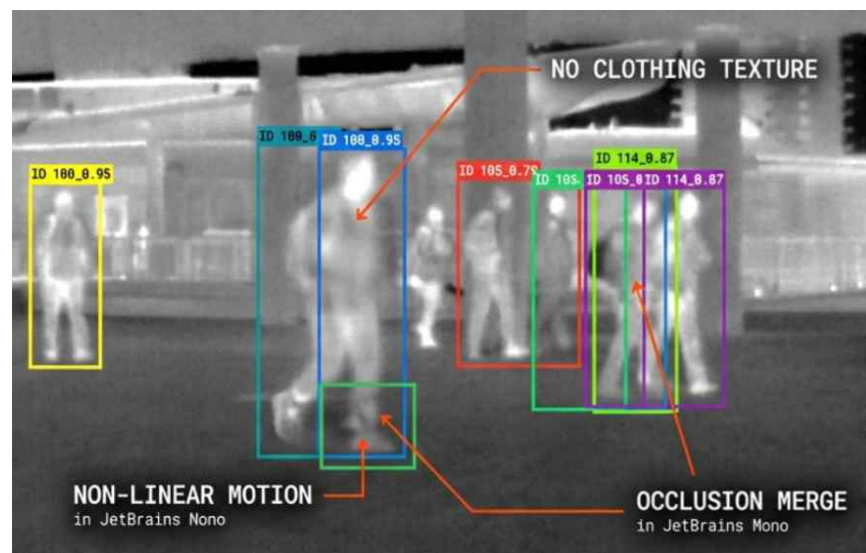


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TL;DR: YOLOv8 + optimized tracking pipeline achieved MOTA 99% & IDF1 5%p higher than SOTA model!

CHALLENGE FOR TMOT



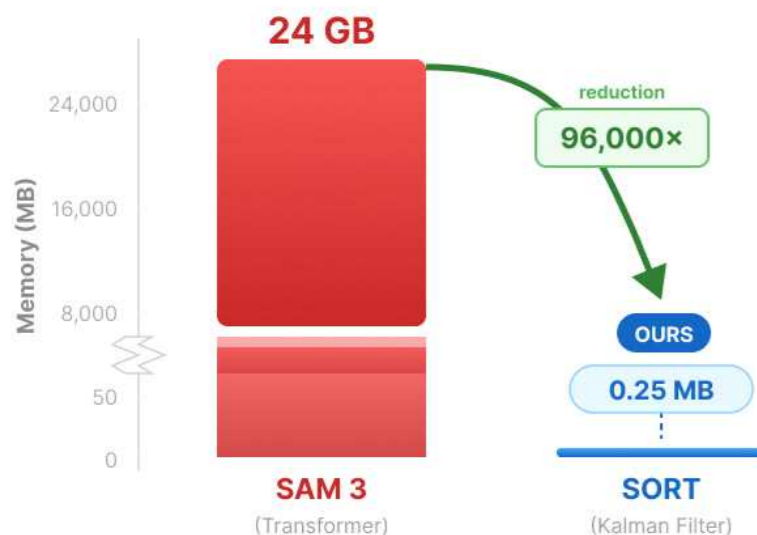
Most methods:

- Add **complex motion** models
- Use **heavy Re-ID** networks
- **Increase** computational cost

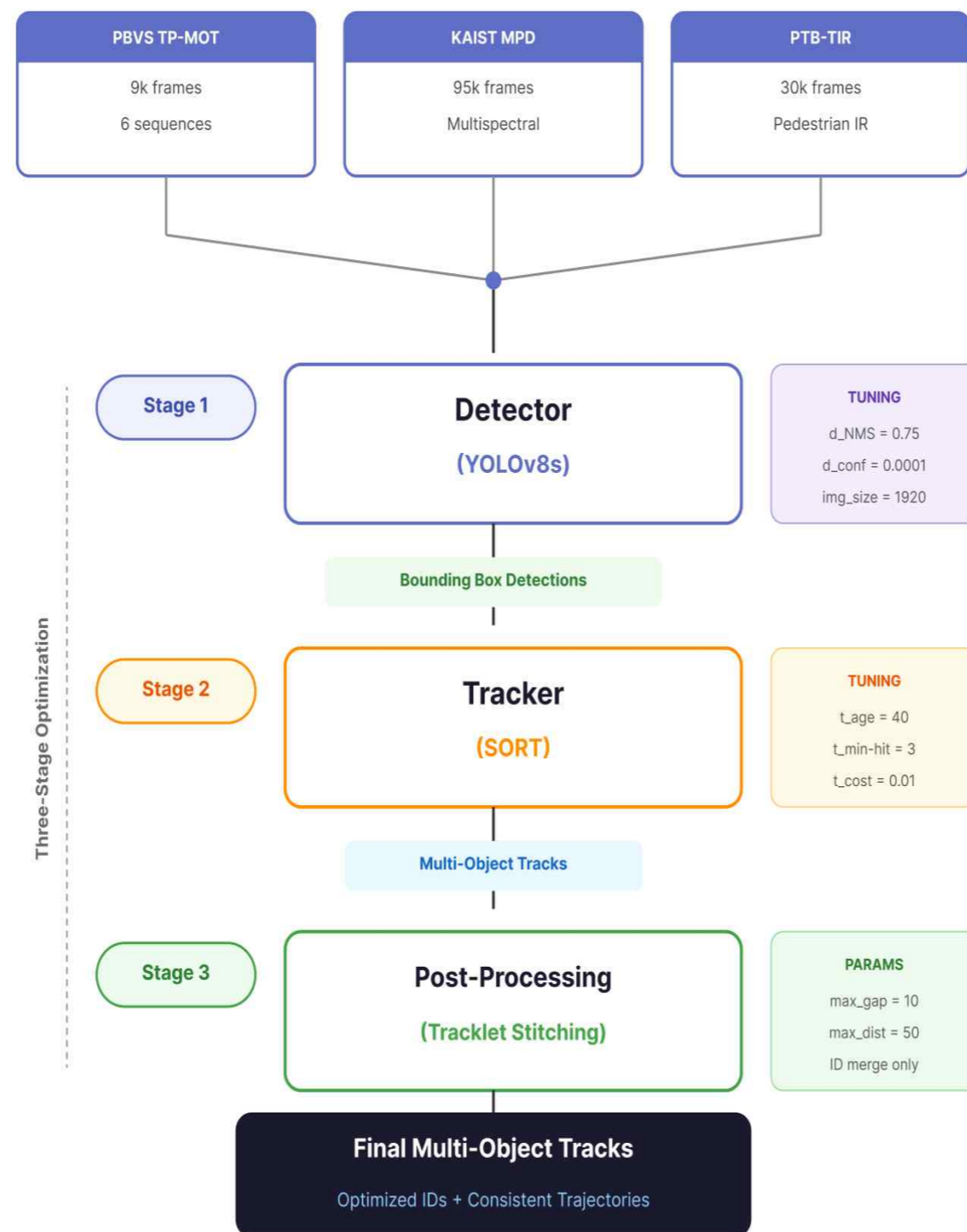
OUR INSIGHT:

Stage-wise parameter tuning achieves strong identity preservation in thermal MOT — **no heavy Re-ID needed.**

MEMORY EFFICIENCY



FRAMEWORK DIAGRAM



Rank	Team	Affiliation	MOTA	MOTP	IDF1	Weighted Result
★	UW_IPL Ours	University of Washington	0.99 ▲	0.13	0.86 ▲	0.74
— PBVS 2025 TP-MOT Challenge Official Results —						
1	AutoSKKU	Sungkyunkwan University	0.98	0.13	0.81	0.71
2	Fh-IOSB	Fraunhofer IOSB	0.82	0.14	0.86	0.55
3	HNU-VPAI	Hunan University	0.75	0.19	0.71	0.42

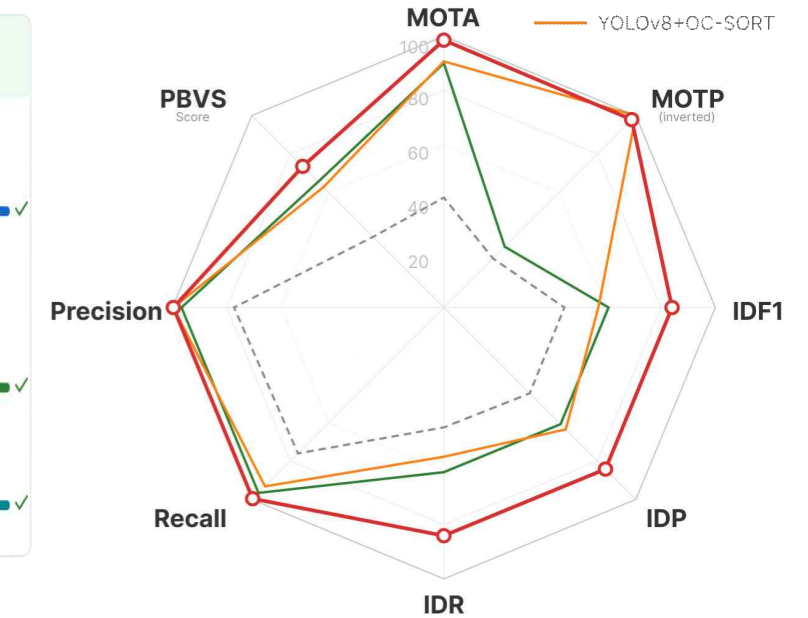
VIDEO EXAMPLE



IDF1 VISUAL EXPLANATION



PERFORMANCE



CONTRIBUTION

- Optimized Sensitivity**: Decoupled detection and tracking tuning for thermal precision.
- High Efficiency**: Eliminated Re-ID computational cost, ideal for real-time applications.
- Thermal Robustness**: Maintained consistent IDs even in texture-scarce environments.

FUTURE DEPLOYMENT

- Target Device**: Embedded systems: NVIDIA Jetson Orin, Raspberry Pi
- Next Step: RGB-T Fusion Tracking**: Integrating RGB sensors for all-weather, day/night tracking
- Applications**: Drone Surveillance, Search and Rescue (SAR) operations