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WUHAN UNIVERSITY 武漢大學

WHU-MARS: A Multispectral Aerial-Ground Benchmark Towards Any-Scenario Person Re-Identification

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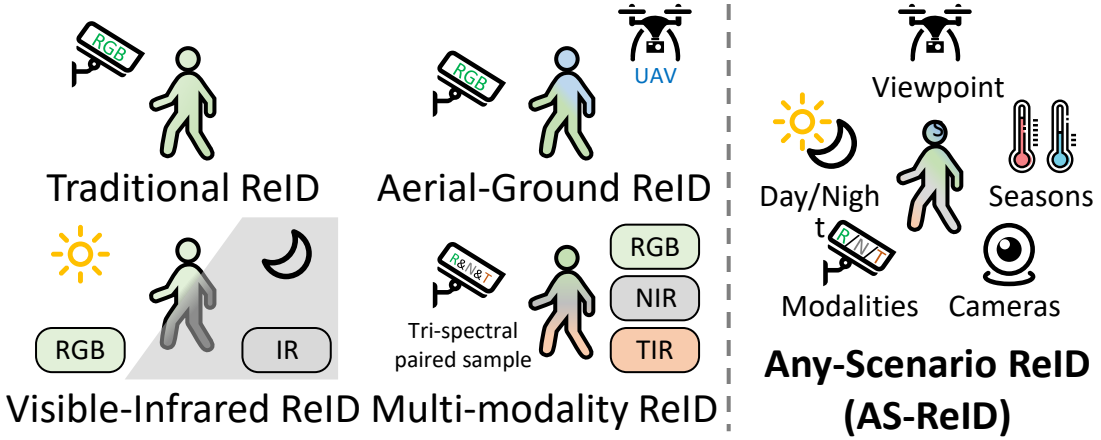
One unified model for person retrieval across any modality-viewpoint scenario.

CVPR 2026 Highlight

Motivation: Why Any-Scenario ReID?

Existing ReID settings

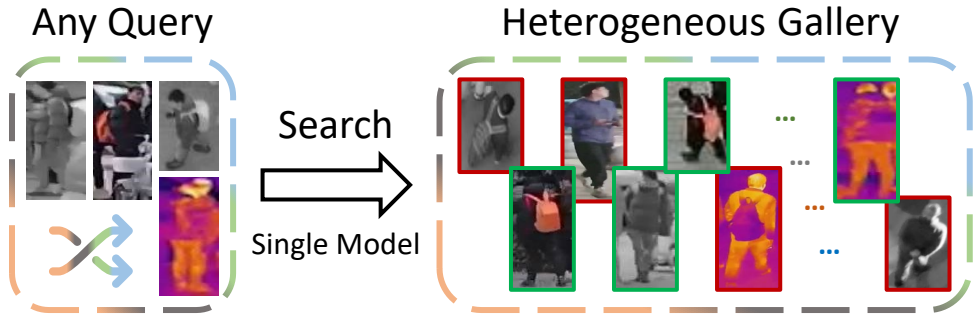
- Predefined scenario pairs: Tr-, VI-, AG-, MM-ReID.
- Separate task-specific models and evaluation protocols.
- Pairwise designs scale poorly as scenarios increase.



Different ReID tasks and their corresponding scenarios.

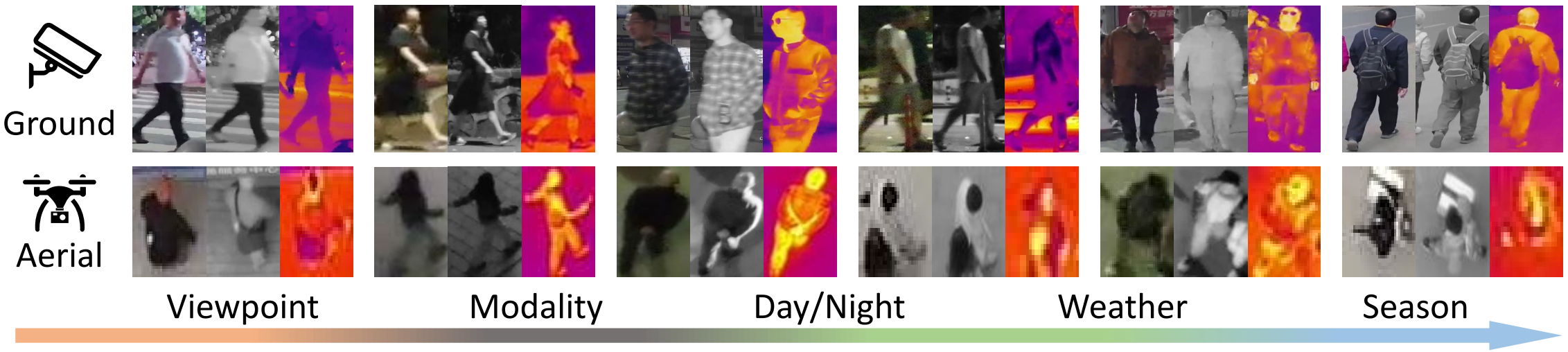
Any-Scenario ReID task

- Scenario = modality × viewpoint.
- Given any query, retrieve from gallery spanning all scenarios.
- Use a single shared model instead of scenario-pair specialists.



AS-ReID: Any-query to heterogeneous gallery retrieval.

WHU-MARS: Multispectral Aerial-Ground ReID Benchmark



2,337 Identities

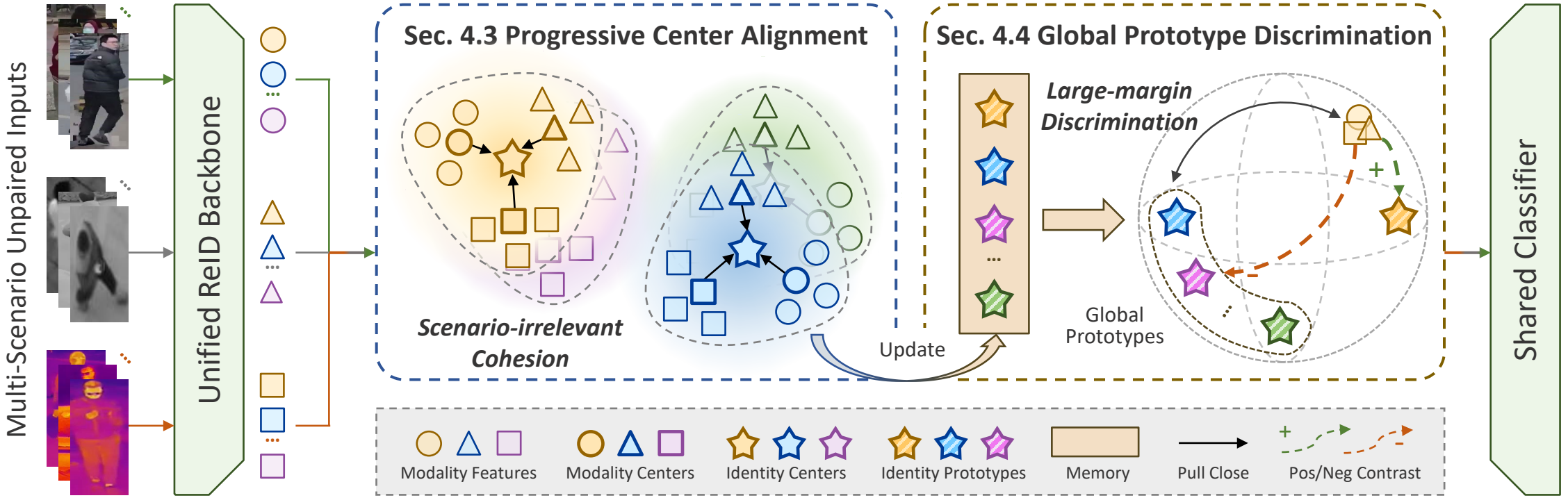
434,620 Images

RGB / NIR / TIR Modalities

Ground + UAV Viewpoints

- **Covers day and night, multiple seasons, and diverse weather conditions.**
- **Supports unified training and evaluation for AS-ReID and conventional AG-ReID, VI-ReID, and MM-ReID protocols.**

The UAD Framework



- ProCA aligns modality centers to identity centers for scenario-invariant cohesion.
- GPD contrasts features with global ID prototypes for large-margin discrimination.

Experiments

Method	Venue	Params	WHU-MARS-1000-GD				WHU-MARS-1000				WHU-MARS-2337			
			mAP	R-1	R-5	R-10	mAP	R-1	R-5	R-10	mAP	R-1	R-5	R-10
BoT	CVPRW19	23.5M	10.6	24.9	37.9	45.6	5.9	18.4	32.5	40.1	4.6	14.8	26.2	32.5
AGW	TPAMI21	23.5M	6.1	17.0	27.8	35.9	4.0	15.6	28.7	36.0	5.2	16.9	28.7	35.1
MSINet	CVPR23	2.3M	9.7	26.9	39.5	46.3	5.6	21.1	37.5	46.0	2.6	14.8	25.4	31.6
TransReID	ICCV21	99.9M	9.6	18.9	34.1	43.4	7.4	17.1	30.3	38.2	5.5	13.1	23.4	29.1
TransReID-SSL	arXiv21	88.4M	14.0	30.1	44.1	51.7	10.1	26.7	43.8	51.7	9.2	24.4	39.1	46.2
DC-Former	AAAI23	85.8M	9.9	20.1	34.9	42.0	6.5	16.3	29.9	36.7	4.3	10.9	19.8	25.5
CLIP-ReID	AAAI23	125.3M	13.8	28.9	42.7	49.6	10.6	26.6	42.6	50.4	9.3	24.1	37.5	44.0
PHA	CVPR23	107.0M	9.6	22.0	33.9	42.3	7.5	15.9	28.2	35.3	5.5	12.0	21.1	26.3
VDT	CVPR24	85.8M	13.1	31.0	44.1	51.1	7.8	25.2	41.9	50.4	6.3	20.0	33.5	40.4
DTST	arXiv24	86.9M	11.6	29.8	42.5	47.9	6.8	23.4	39.8	47.9	7.5	23.5	37.9	45.3
SeCap	CVPR25	130.9M	13.4	28.1	41.2	47.8	10.4	26.4	42.4	50.4	8.0	21.4	34.1	41.0
UAD (Ours)	**CVPR26**	85.7M	**14.5**	**31.9**	**45.0**	**52.5**	**11.0**	**29.5**	**46.3**	**54.8**	**9.6**	**25.7**	**40.9**	**48.2**

- **AS-ReID is a challenging task.**
- **UAD achieves the best performance across all three AS-ReID settings.**

Takeaway

- **Unified ReID Task: AS-ReID.** We formulate Any-Scenario ReID (AS-ReID), a unified task for any-to-any retrieval across modality-viewpoint scenarios.
- **Multi-Protocol Benchmark: WHU-MARS.** We construct the first multispectral aerial-ground ReID benchmark, supporting unified benchmarking across multiple tasks.
- **Unified Framework: UAD.** We propose the Unified Alignment and Discrimination, combining Progressive Center Alignment and Global Prototype Discrimination.

- Code & Dataset: https://github.com/msm8976/WHU-MARS