Jointly Modeling Association and Motion Cues for Robust Infrared UAVs Tracking

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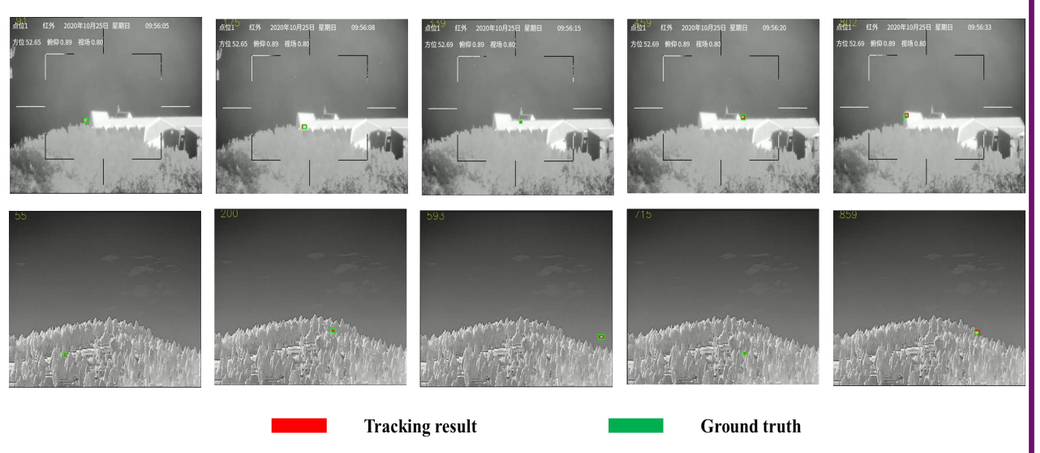
Introduction

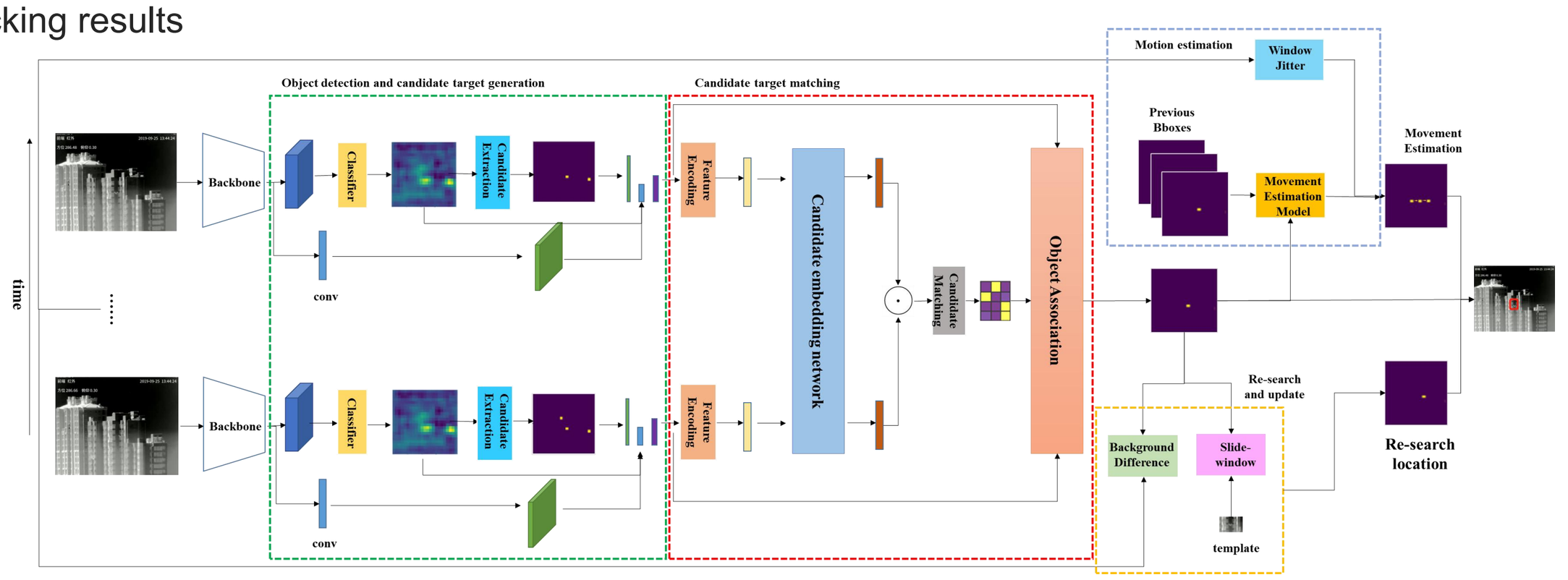
Unmanned aerial vehicles (UAVs) tracking aims to continuously track UAV targets in complex environments to meet the demands of tasks related to security, traffic management, among others

We proposed a drone tracker named JMAMC, which can stably track drone targets that are small in size and have complex motion trajectories under the infrared modality



Method

The input of the method is a sequence of continuous infrared modality drone images, and the output is the tracking result for each frame. Initially, a backbone network is employed to extract the image features and encode the candidate targets. These targets are then matched with previously tracked targets, obtaining preliminary tracking results. To address complexities arising from the drone target's motion and the relatively small size of the target, the preliminary tracking results along with prior tracking results are fed into a motion estimation module and a re-search and update module for optimization, ultimately yielding the final tracking results

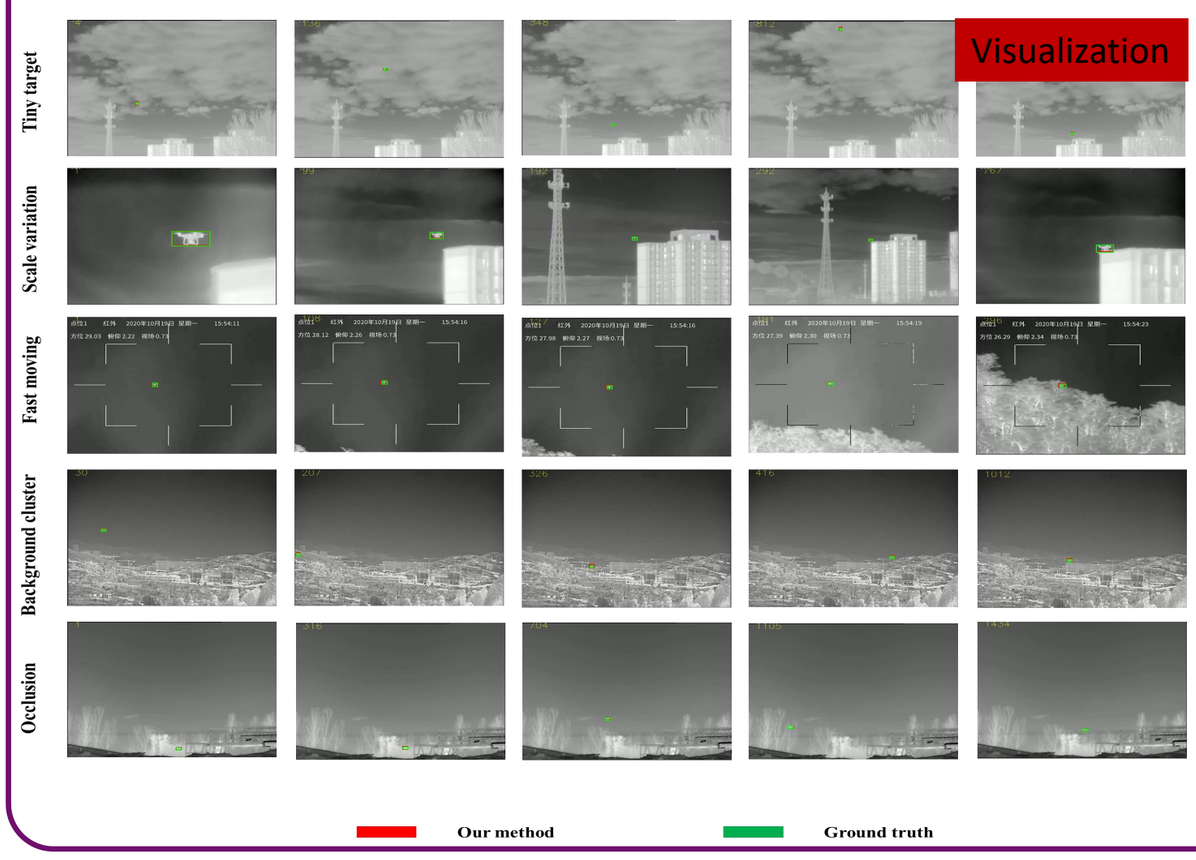


Experiments

Dataset: Anti-UAV dataset

- Training : Test = 160:123
- Challenges: Small target, Fast Movement, Out of focus, Background clutter, Scale variation

Metrics: Tracking accuracy



Comparison with the SOTA: The method is superior to all the tracking methods in accuracy score

Ablation Study: The experiment demonstrates the effectiveness of each component of the method

Data augmentation	Motion estimation	Re-search	Ablation
			56.37
✓			60.35
✓	✓		61.60
✓	✓	✓	65.02

Method	Source	Comparision
TransformerTrack [27]	CVPR21	54.75
TransT [7]	CVPR21	52.14
STMTrack [28]	CVPR21	40.86
HiFT [29]	ICCV21	37.87
Stark [26]	ICCV21	59.08
OStrack [30]	ECCV22	46.88
1st tracker(winner)	Anti-UAV challenge 2021	64.44
2nd tracker	Anti-UAV challenge 2021	63.88
3rd tracker	Anti-UAV challenge 2021	63.80
JMAMC		**65.02**

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