Multi-Camera Multiple 3D Object Tracking on the Move for Autonomous Vehicles

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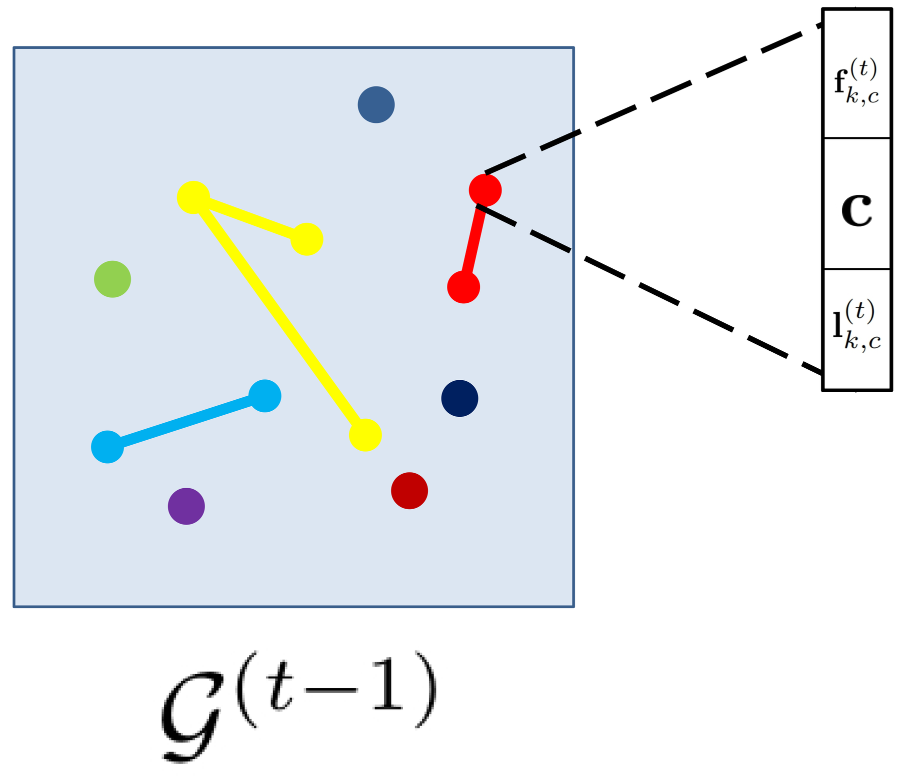
1. Motivation

- Existing two-stage MCMOT approaches firstly apply the MOT on each camera individually. Then links local tracklets together via global matching steps based on Re-ID features.
- Those approaches create more errors, i.e. fragmented local tracklets, and more computation, since the data association and the matching steps will perform multiple times both locally and globally.
- They are also unable to handle scenarios when the detector fails to detect objects from one of the cameras.

2. Contributions

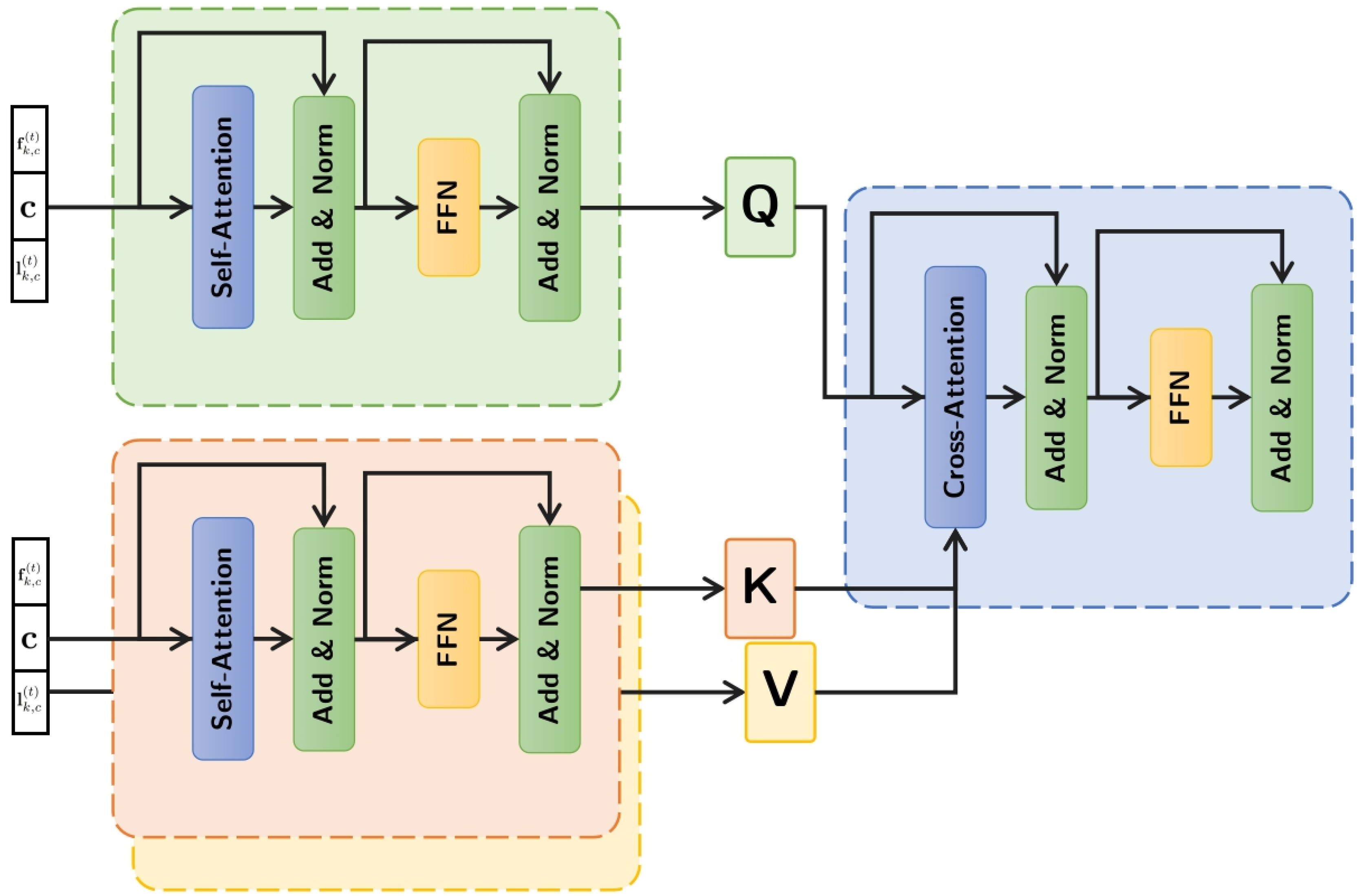
- Propose a global graph whose nodes represent tracked objects and edges represent the relation between the nodes.
- Present an *Auto-regressive Graph Transformer* network including self-attention layer to transform appearance features and cross-attention to predict the motion features of objects.

3. Global Graph Constructing

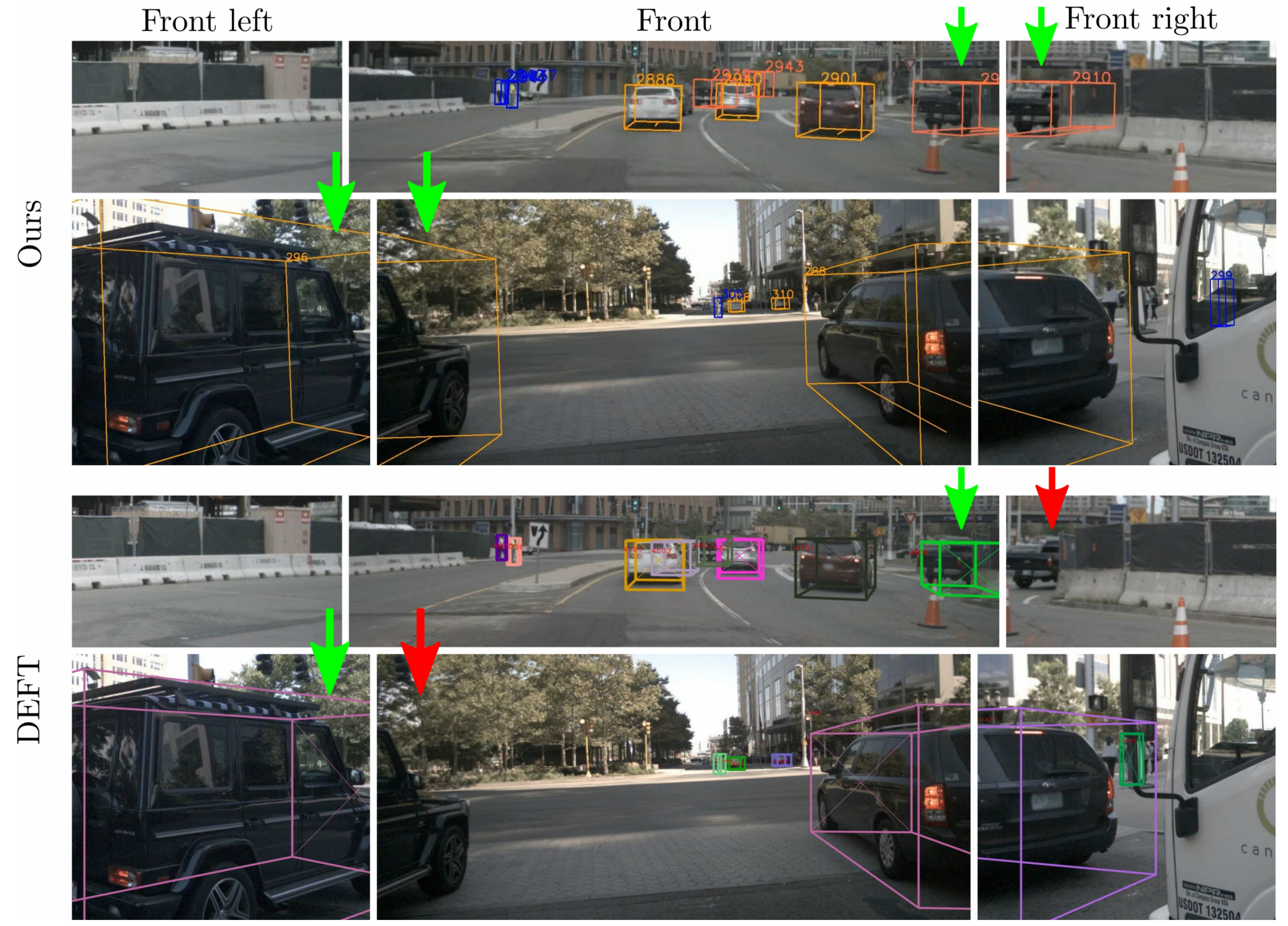


A single graph is constructed and maintained across time, whose input node features as the concatenation of embedding features with camera and location encoding.

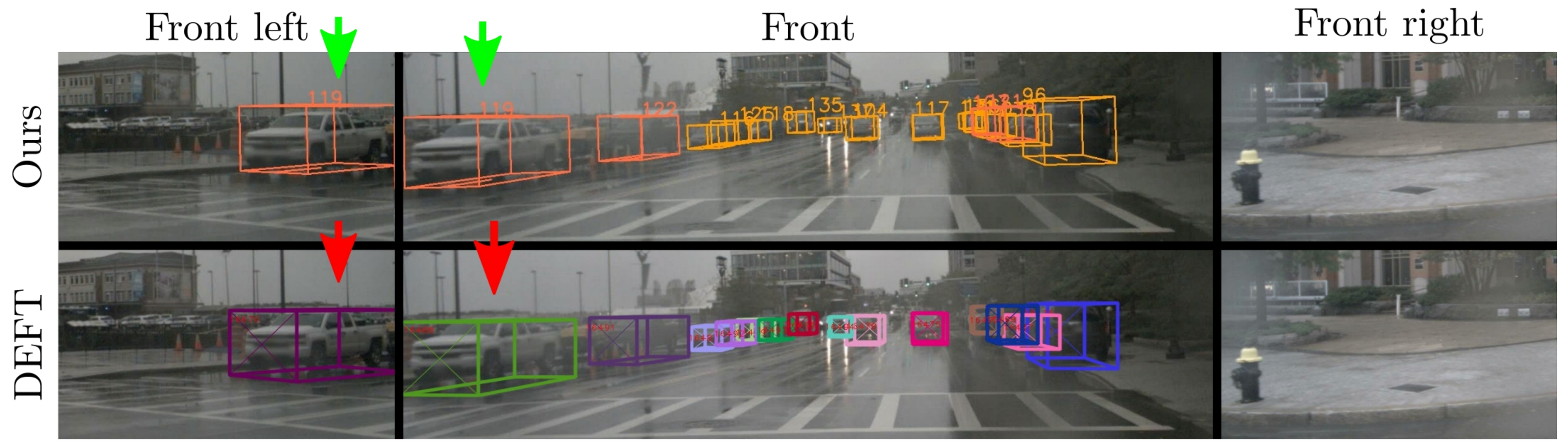
4. Auto-Regressive Graph Transformer Networks



5. Quantitative and Qualitative Results



Our proposed method (top) can recover a false negative detection case



Our proposed method can recognize a positive tracking case

Method	Glo. Assoc.	AMOTA	MT ↑	ML ↓	IDS ↓	FRAG ↓
MonoDIS [29]	✗	0.045	395	3961	6872	3229
CenterTrack [42]	✗	0.068	524	4378	2673	1882
DEFT [5]	✗	0.213	1591	2552	5560	2721
QD-3DT [15]	✗	**0.242**	1600	2307	5646	2592
Ours	✓	0.240	**1643**	**2162**	**1362**	**1462**

Comparison of 3D tracking performance on the nuScenes validation set

6. Acknowledgment

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