



16TH EUROPEAN CONFERENCE ON
COMPUTER VISION

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End-to-End 3D Multi-Object Tracking and Trajectory Forecasting

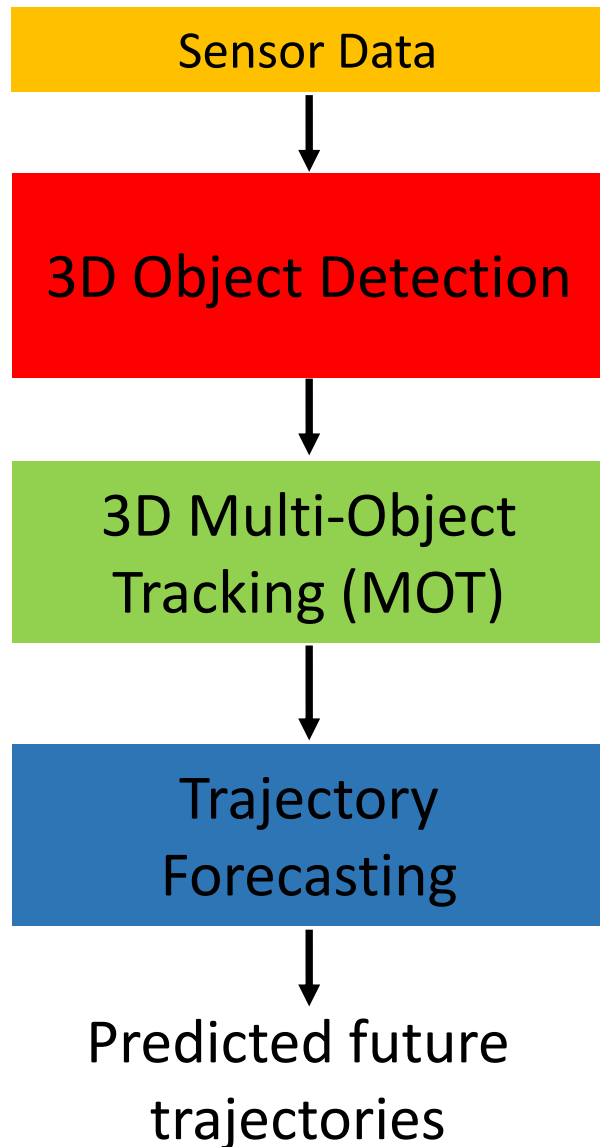
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European Conference on Computer Vision (ECCV) Workshops

* denotes equal contributions



Limitation of the Prior Work



Limitations

1. 3D MOT and trajectory forecasting modules are separately trained without joint optimization
→ Sub-optimal performance and slow inference speed
2. Errors from 3D MOT results will directly influence the trajectory forecasting module due to the sequential pipeline
→ Errors in the upstream module cannot be corrected

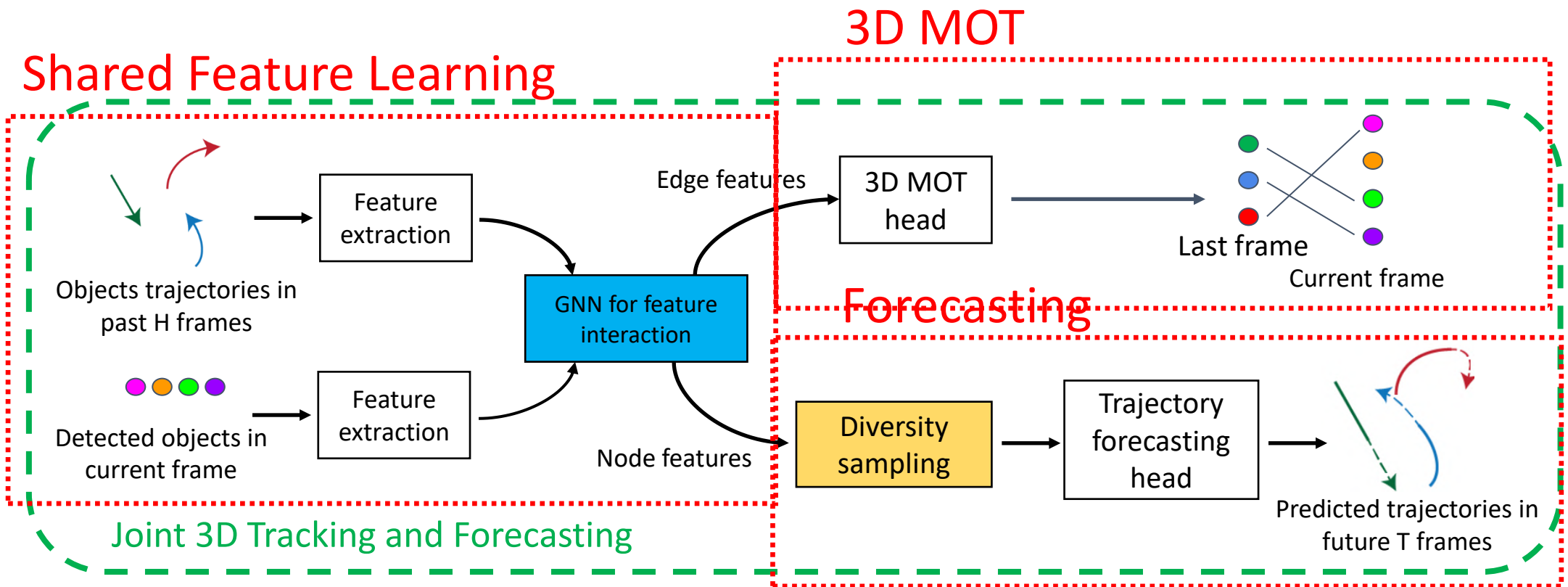


Our Contributions

1. An End-to-End MOT and trajectory forecasting framework that runs in parallel
 - Enable joint optimization
 - Prevent errors in 3D MOT from affecting forecasting



Our Approach



Ablation Study



Joint 3D MOT and Trajectory Forecasting

- Is it useful to do joint optimization?
- Add joint optimization with forecasting improves performance on tracking

Metrics	w/o forecasting
sAMOTA (%)↑	91.31
AMOTA(%)↑	43.68
AMOTP(%)↑	76.94
MOTA(%)↑	83.51
MOTP(%)↑	78.11
IDS↓	5

3D MOT evaluation without forecasting module

Improvement on 5 out of 6 entries!



Joint 3D MOT and Trajectory Forecasting

- Is it useful to do joint optimization?
- Add joint optimization with forecasting improves performance on tracking
- Add joint optimization with 3D MOT improves performance on forecasting

Datasets	Metrics	w/o MOT+DSF	
KITTI-1.0s	ADE↓	0.663	Forecast 3D MOT
	FDE↓	1.121	
	ASD↑	1.796	
	FSD↑	3.168	
KITTI-3.0s	ADE↓	1.729	
	FDE↓	3.086	
	ASD↑	3.196	
	FSD↑	5.776	

Performance improved
after adding MOT!

Performance improved
after adding MOT!



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