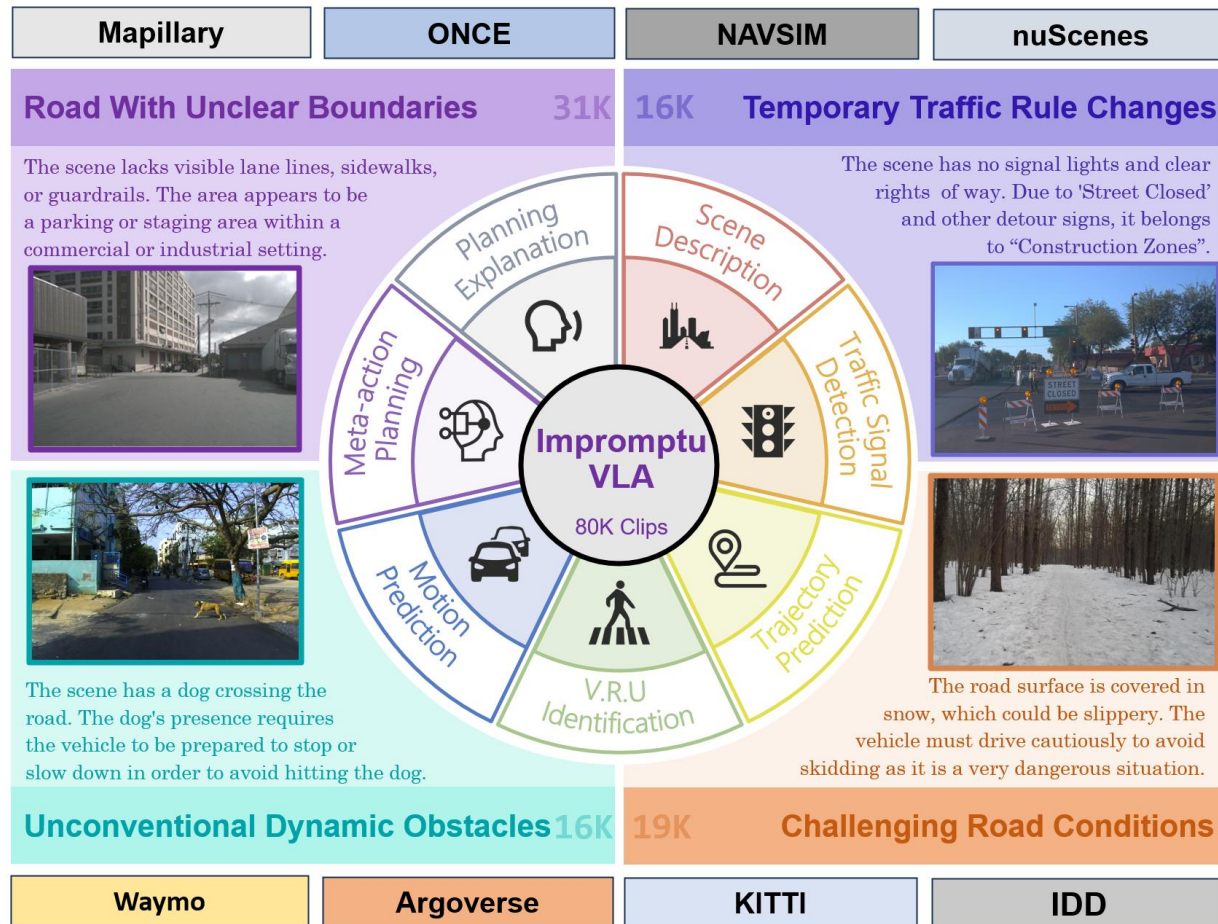


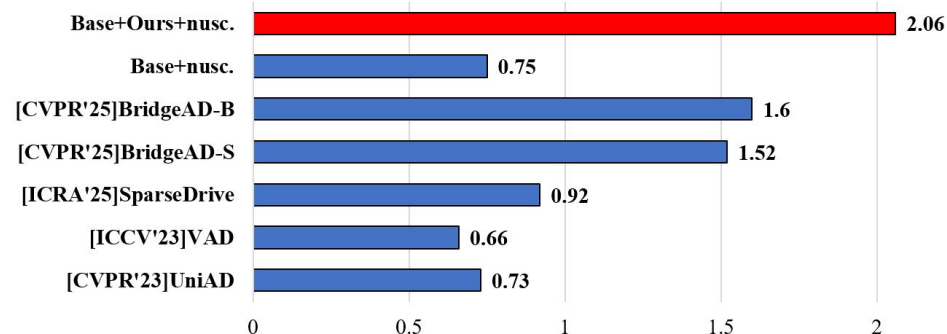
Impromptu VLA: Open Weights and Open Data for Driving Vision-Language-Action Models

Overview

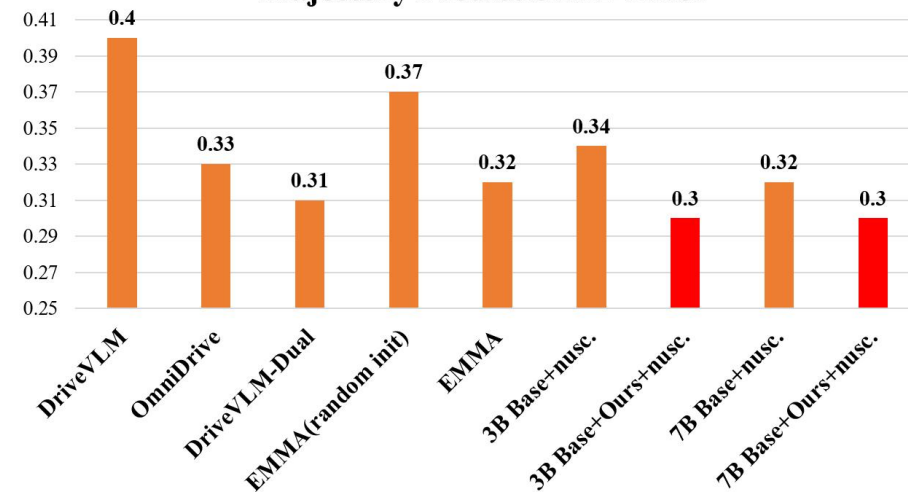
Impromptu Driving Vision-Language-Action Models



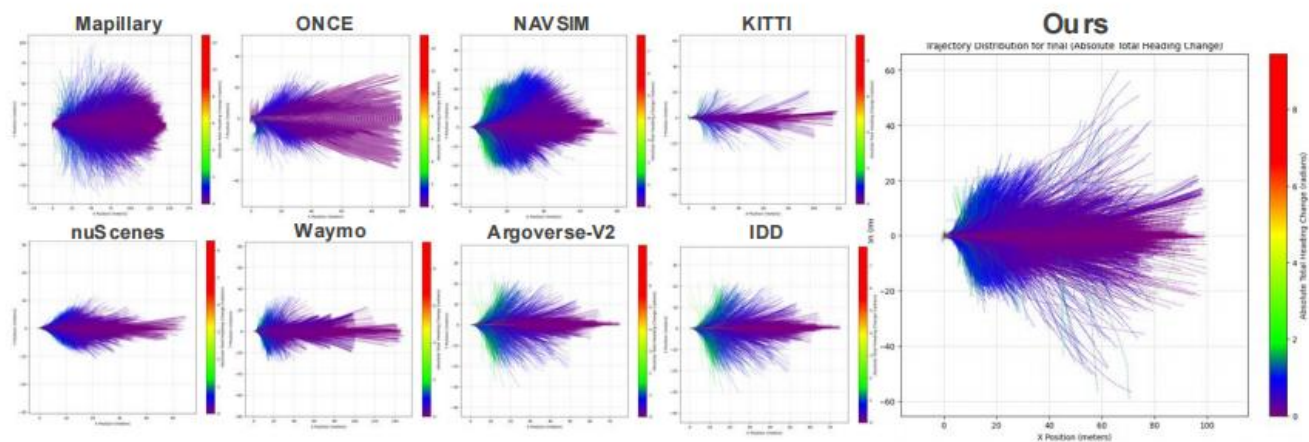
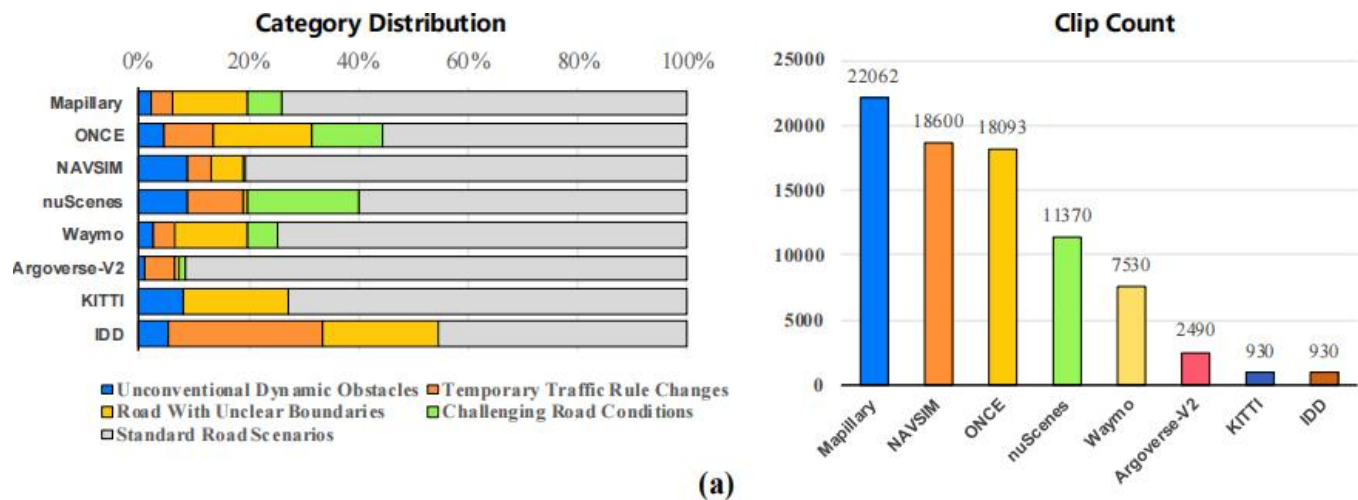
NeuroNCAP Score



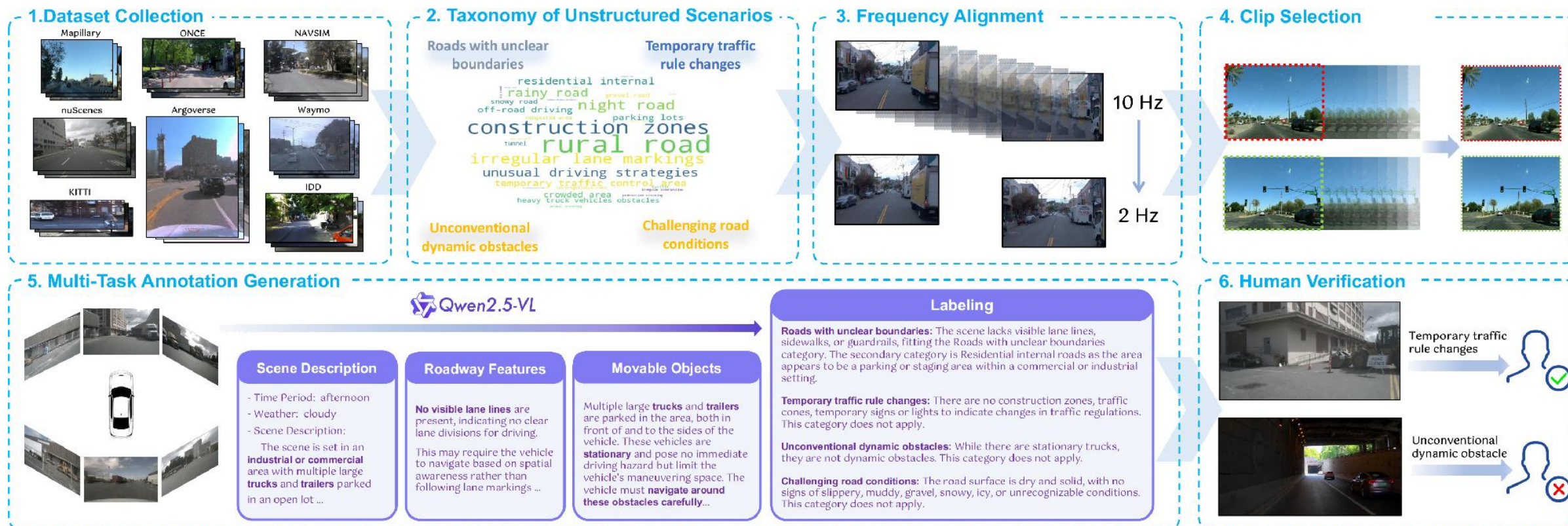
Trajectory Prediction L2 Error



Impromptu VLA Dataset



Data Processing and Annotation Pipeline



Method	L2 Error (m) ↓			
	1s	2s	3s	Avg.
<i>Ours and Key Competitors (Specialized Driving Models)</i>				
DriveVLM ³ [58]	0.18	0.34	0.68	0.40
OmniDrive ³ [61]	<u>0.14</u>	0.29	0.55	0.33
DriveVLM-Dual ³ [58]	0.15	0.29	0.48	<u>0.31</u>
EMMA (random init) [25] ³	0.15	0.33	0.63	0.37
EMMA [25] ³	<u>0.14</u>	0.29	0.54	0.32
EMMA+ ³ [25]	0.13	0.27	0.48	0.29
3B Base+nuScenes	<u>0.14</u>	0.30	0.58	0.34
3B Base+Impromptu+nuScenes	0.13	0.27	0.52	0.30
7B Base+nuScenes	0.13	<u>0.28</u>	0.55	0.32
7B Base+Impromptu+nuScenes	0.13	0.27	<u>0.51</u>	0.30

Source	Method	NeuroNCAP Score ↑				Collision rate (%) ↓			
		Avg.	Stat.	Frontal	Side	Avg.	Stat.	Frontal	Side
CVPR 2023	UniAD ²	0.73	0.84	0.10	1.26	88.6	87.8	98.4	<u>79.6</u>
ICCV 2023	VAD ²	<u>0.66</u>	0.47	0.04	<u>1.45</u>	92.5	96.2	99.6	81.6
ICRA 2025	SparseDrive ¹	0.92	-	-	-	93.9	-	-	-
CVPR 2025	BridgeAD-S ¹	1.52	-	-	-	76.2	-	-	-
CVPR 2025	BridgeAD-B ¹	1.60	-	-	-	<u>72.6</u>	-	-	-
-	Base+nuScenes	0.75	<u>0.99</u>	<u>0.55</u>	0.70	90.0	<u>88.6</u>	<u>93.2</u>	88.0
-	Base+Impromptu+nuScenes	2.06	2.55	1.86	1.78	65.1	54.8	72.8	67.6

Conclusion

- Impromptu VLA Dataset address the critical data scarcity for autonomous driving in unstructured environments.
- Defines a taxonomy for unstructured driving scenarios
- Pushing forward the boundaries of existing end-to-end autonomous driving benchmarks in open-loop and closed-loop evaluation.
- We've released the code & dataset to encourage research on Impromptu VLA models for autonomous driving in unstructured scenarios.