

Integrating a new model into the Unitraj framework : Multimodal Motion Prediction with Stacked Transformers (mmTransformer)

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Introduction

Vehicle trajectory prediction faces challenges in scaling across data domains and handling large datasets. To face it, the Vita Lab has developped the **UniTraj** framework to standardize datasets, models, and evaluation.

Objectives

The unitraj framwork remains competitive against SOAT models, and has achieved top rank on the nuScenes trajectory prediction leaderboard.

The aim of this project is to integrate a new existing model into the Unitraj framework, and to exploit the results on the unified dataset.

Results

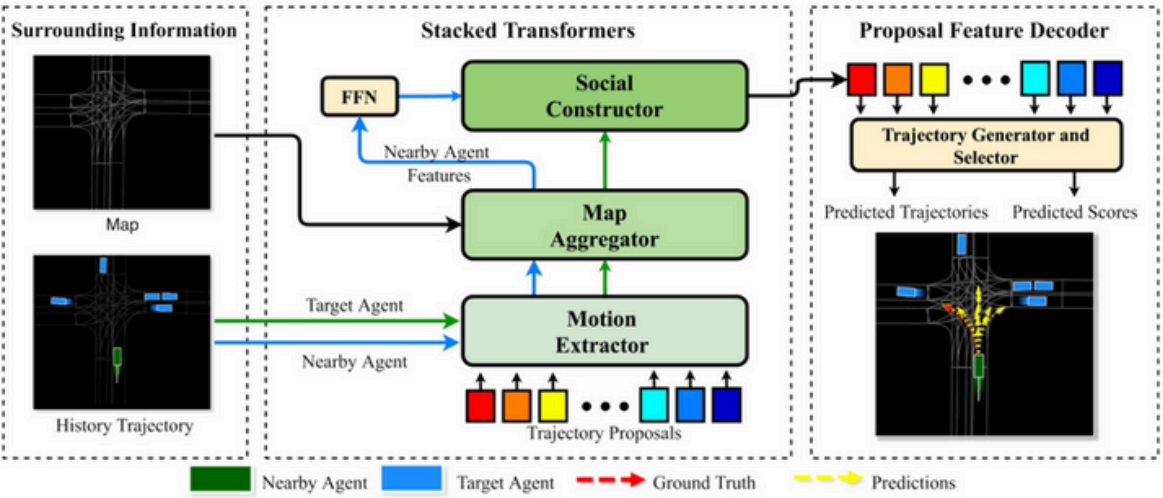
Hard dataset	minADE6	minFDE	missRate%
<i>mmTransformer (Agroverse)</i>	0.84	1.33	15.42
<i>mmTransformer (Unitraj Dataset)*</i>	1.59	3.8	62
<i>PTR (Unitraj Dataset)</i>	1.06	2.5	40

*Due to Scitas queue and the deadline, we could not train as long as we wanted to

Methodology : implementation of the training mode

- mmTransformer : Generic framework

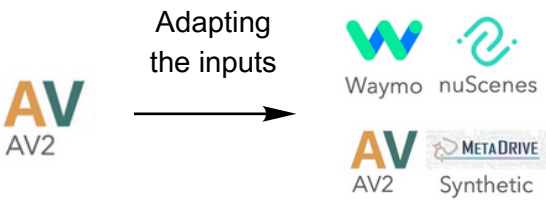
- Stacked transdormer: map the multimodality of the motion prediction
- Partition of target into different regions to ensure the diversity of solutions



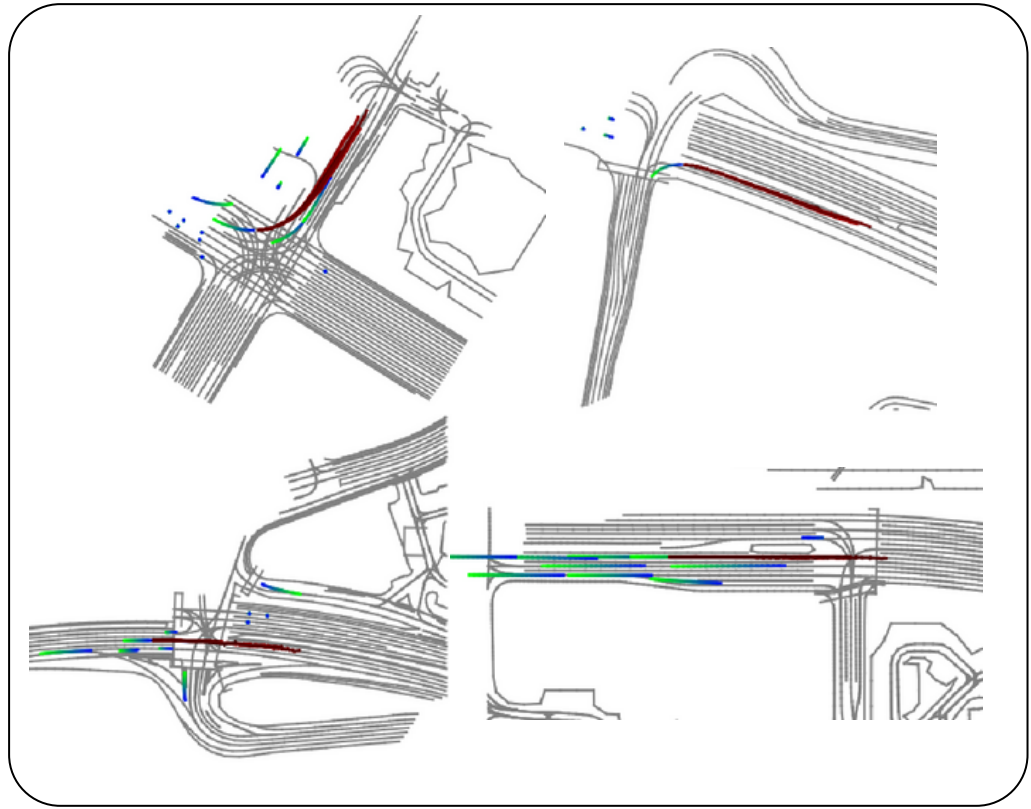
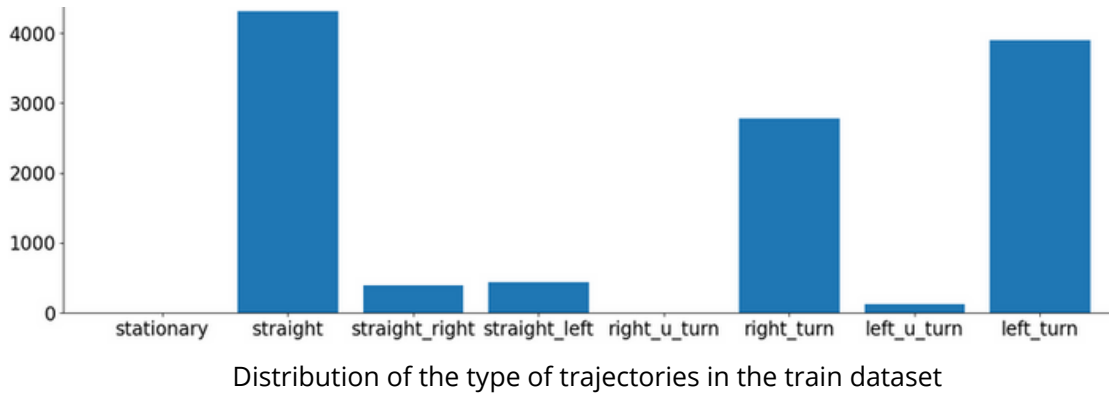
Architecture of the model provided in the paper

- Dataset

- mmTransformer** was developed for the Agroverse dataset. We adapted the code to use the unified database



- Data augmentation to compensate the uneven distribution



Some visualizations

References

[1] UniTraj: A Unified Framework for Scalable Vehicle Trajectory Prediction, Lan Feng, Mohammadhossein Bahari,Kaouther Messaoud Ben Amor, Éloi Zablocki, Matthieu Cord and Alexandre Alahi

[2] Multimodal Motion Prediction with Stacked Transformers, Yicheng Liu, Jinghuai Zhang, Liangji Fang, Qinhong Jiang,Bolei Zhou

Conclusion

This Milestone learnt us how to implement a new model into Unitraj. We were able to see the effect of state-of-the-art neural networks

Future work

- Hyperparameters tuning can be improved: we weren't able to carry out all our tests
- We've managed to implement paper loss, but we haven't had time to test it: the next step is to launch a train with it.