

Visualizing and Enhancing Environment-Aware Pedestrian Trajectory Prediction for Autonomous Driving

By: Michael Gerovitch
(Mentor Dr. Igor Gilitschenski)



Content

- Motivation
- Related work
- Problem
- My approach
 - Data loader
 - Network architecture
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Motivation

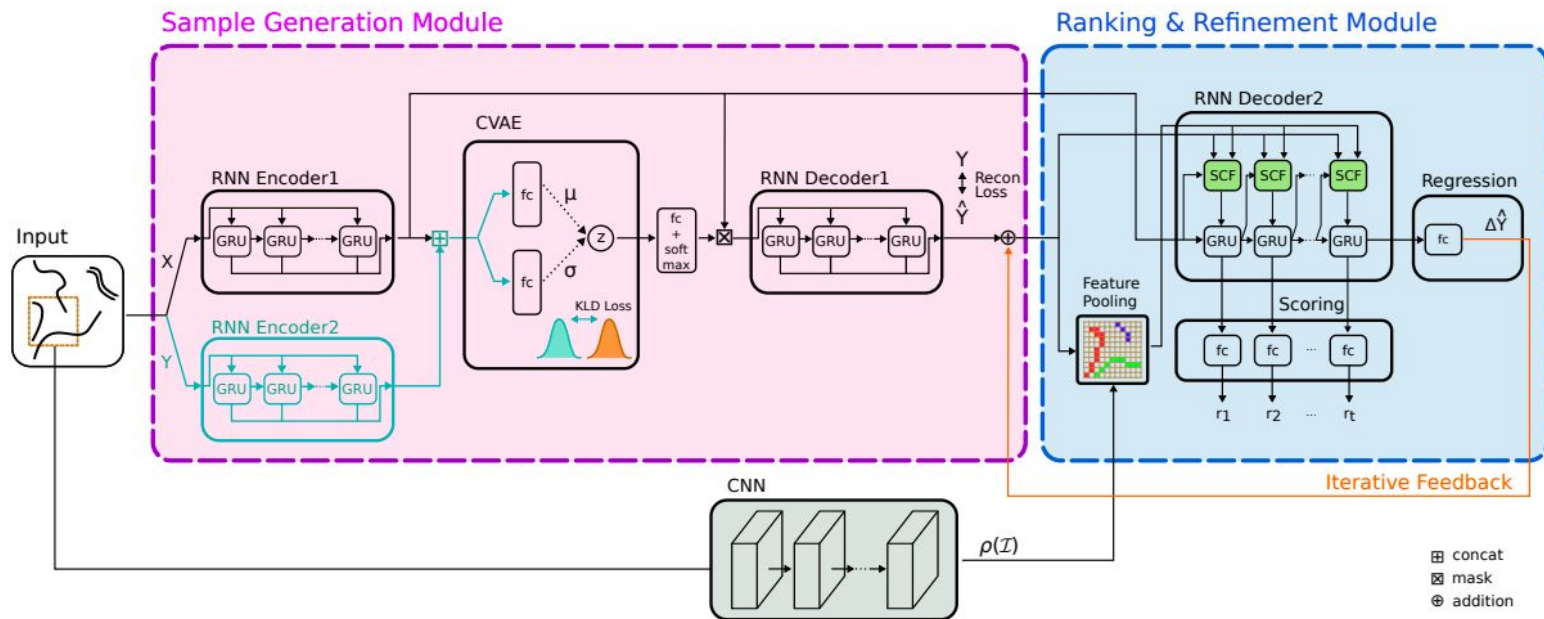
- Autonomous driving is growing!
- Concerns
 - Pedestrian safety
 - Efficient/safe driving



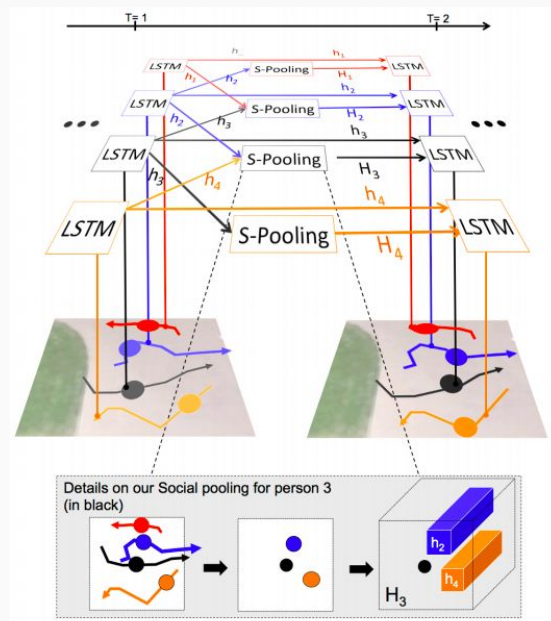
Related Work: Multimodal Future Prediction



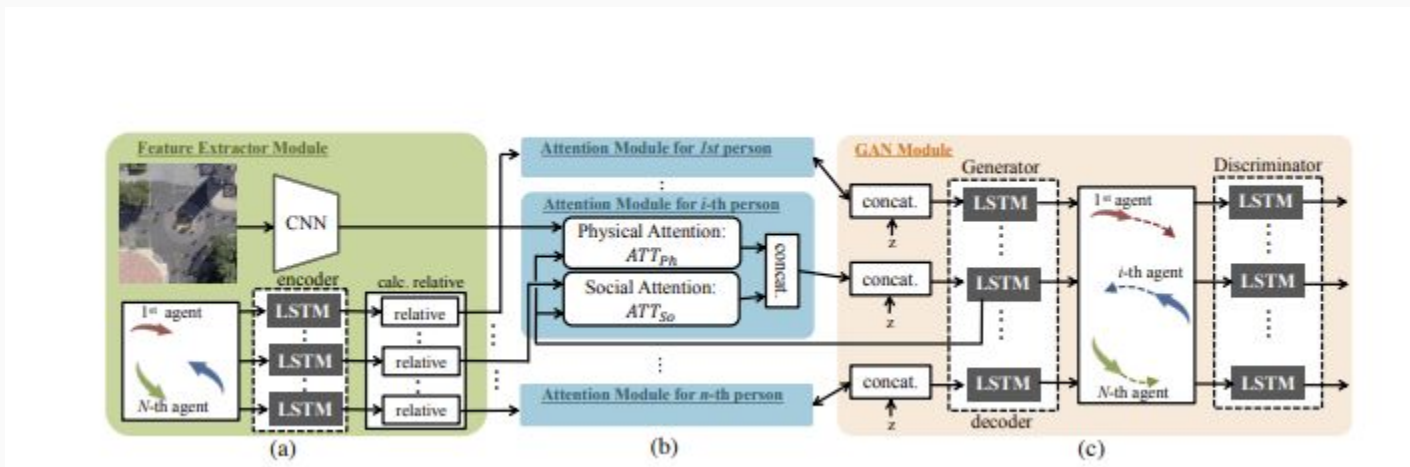
Related Work (cont.): DESIRE



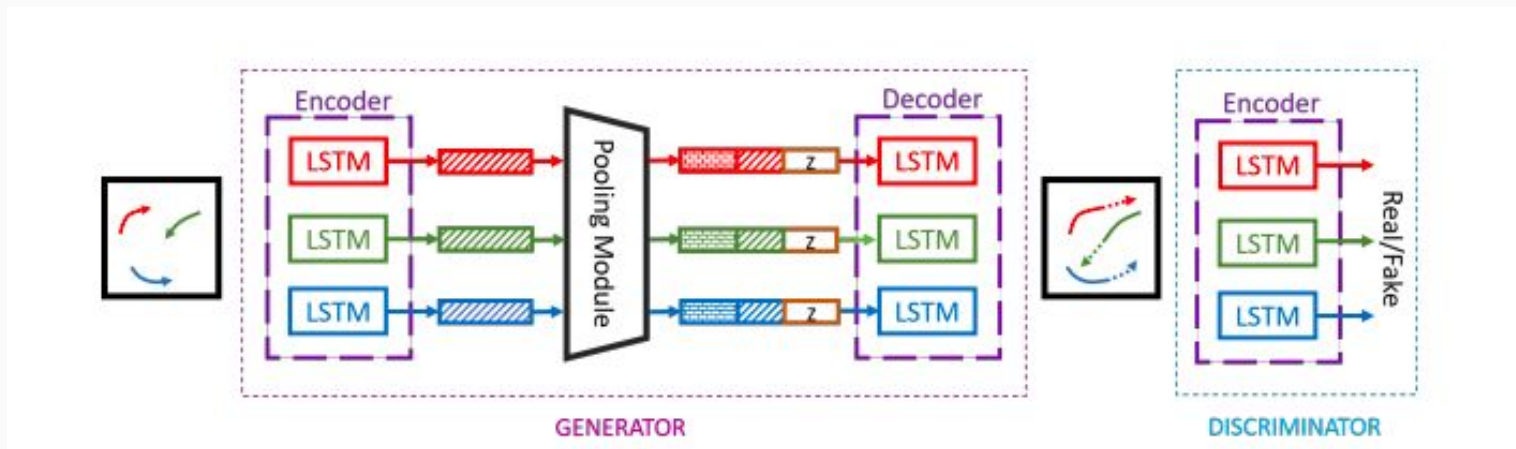
Related Work (cont.): Social LSTM



Related Work (cont.): SoPhie GAN

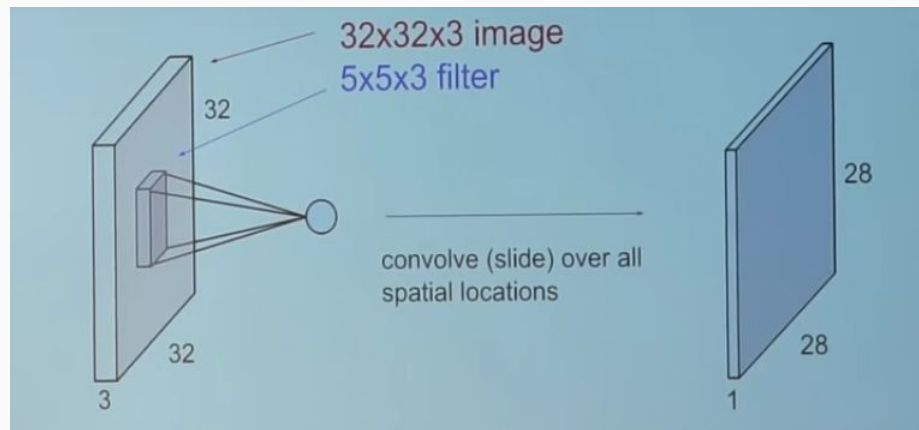


Related Work (cont.): Social GAN



Problem

- Complex architectures
 - CNN/RNN
- Location-awareness
 - Location bias map
- Versatility
 - Multiple agents



Trajectory Inference Library (TraIL)

- ❖ Multiple approaches
- ❖ Same datasets
- ❖ DESIRE, SoPhie, Behavior CNN

Our Datasets (2 environments)

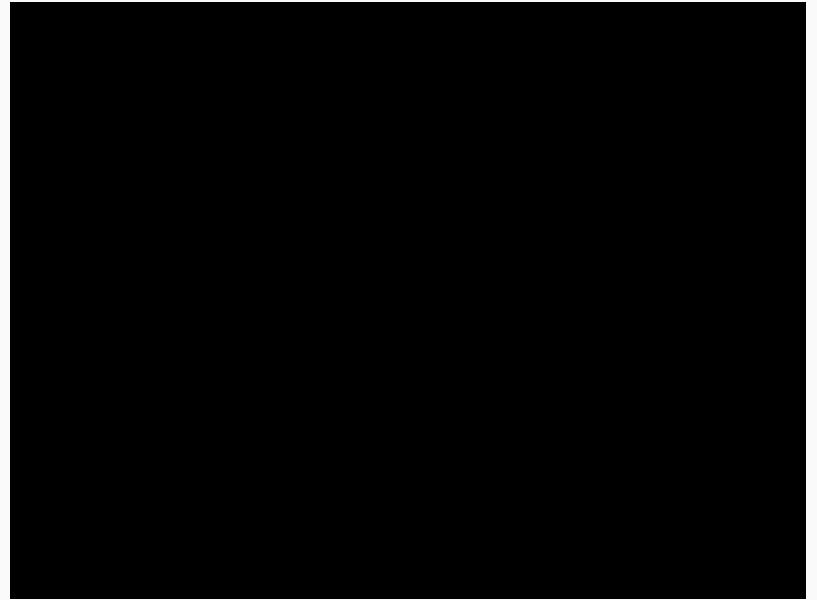
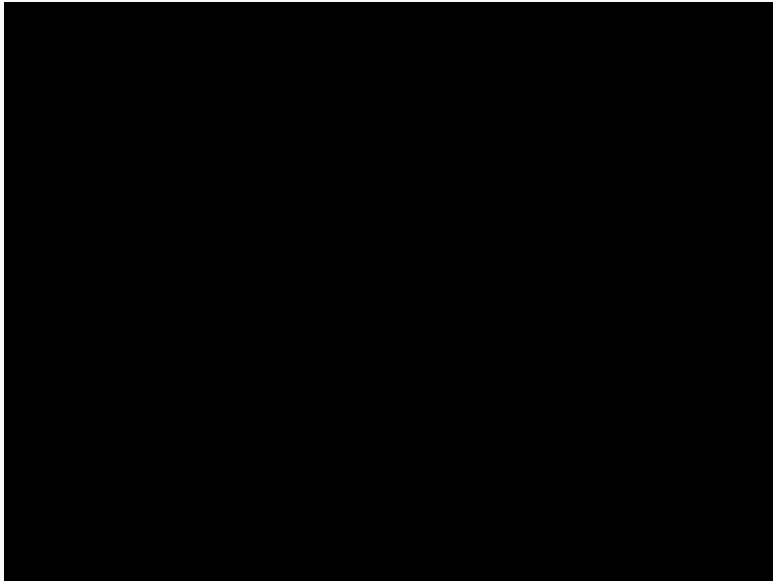


[Collected from ETH main building, Zurich, by Stefano Pellegrini and Andreas Ess in 2009]

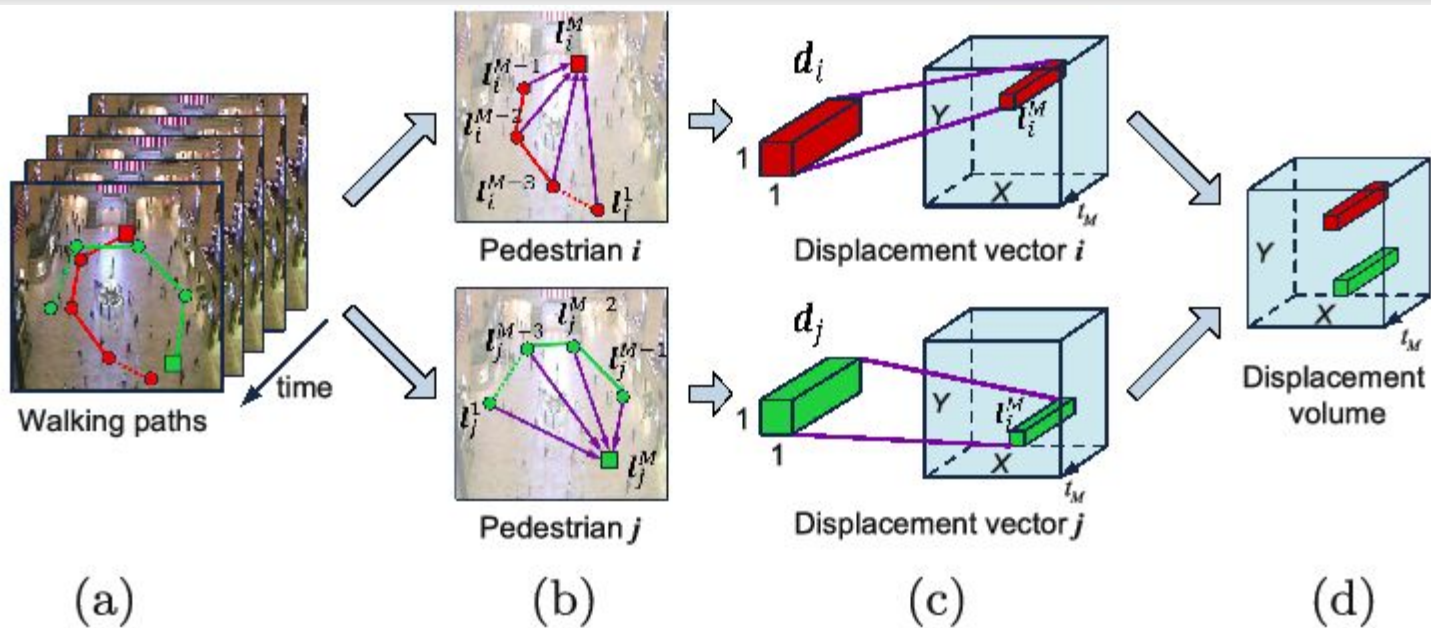


[Collected from hotel in Bahnhofstr, Zurich, by Stefano Pellegrini and Andreas Ess in 2009]

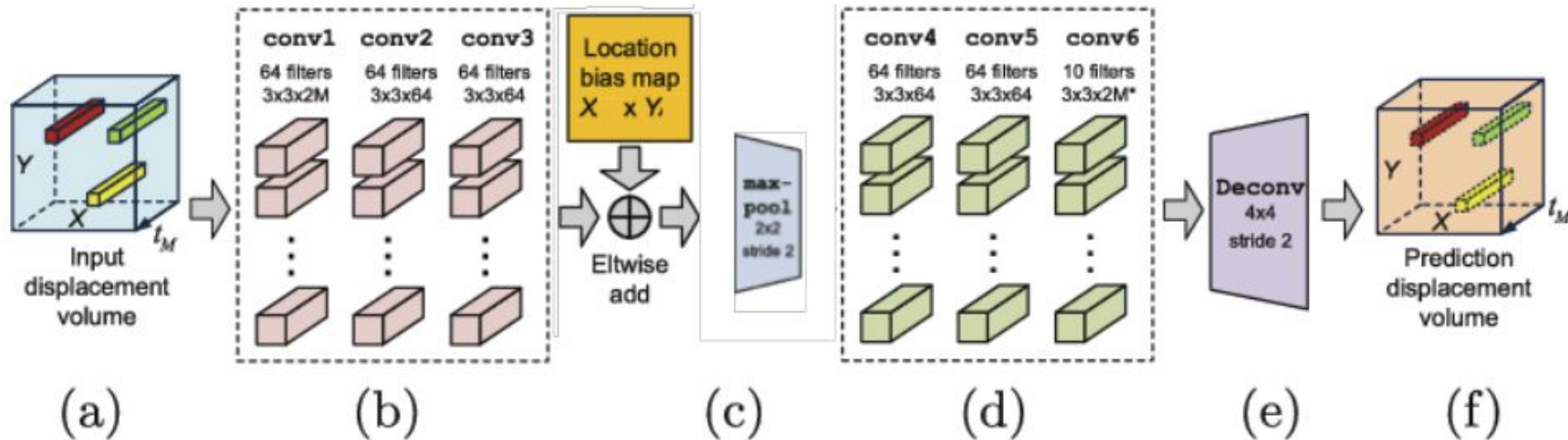
Visualizing Dataset



Data Loader



Architecture



Enhancing Training

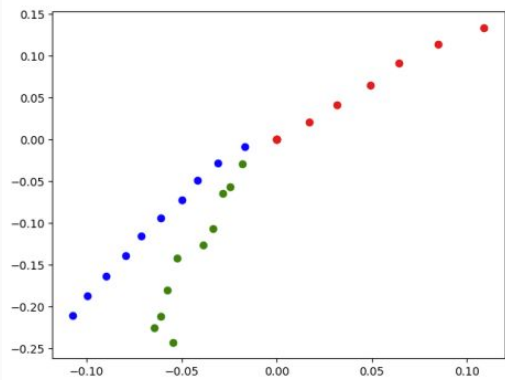
❖ Data: training, validation, evaluation

❖ Loss function

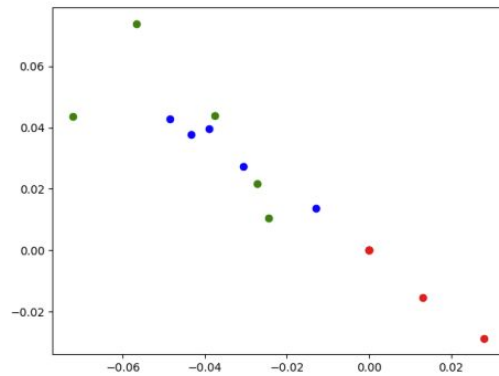
$$L = \frac{1}{N} \frac{1}{M} \sum_{n=1}^N \sum_{m=1}^M (d_n[2m]^2 - \hat{d}_n[2m]^2) + (d_n[2m+1]^2 - \hat{d}_n[2m+1]^2)$$

❖ Split training

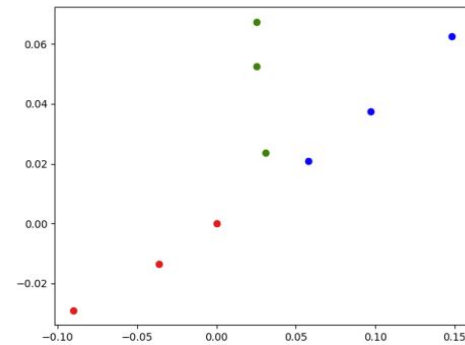
Visuals (in progress)



(a) $L = 0.0008$



(b) $L = 0.0003$



Status/Future Work

- Location bias map improvements
 - Train on multiple locations
- Train on multiple agents
 - Pedestrians, cars, cyclists, scooters
- Multimodal approach; Comparing to other methods



Special thanks to...

- My mentor: Dr. Igor Gilitschenski
- Dr. Slava Gerovitch
- MIT PRIMES + CSAIL

Thank you for listening!
Questions?