SLEDGE: Synthesizing Driving Environments with Generative Models

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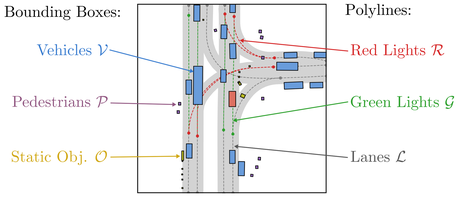
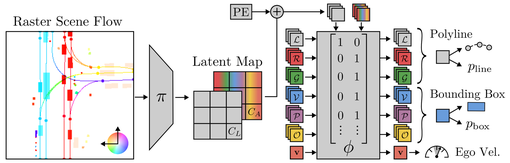
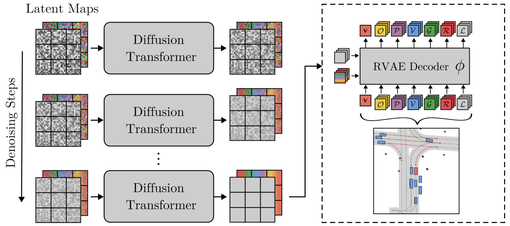
Driving simulation needs vectorized representations.



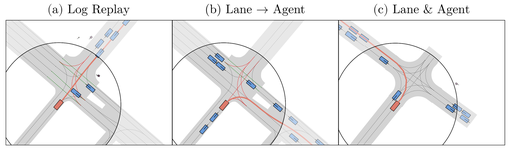
We encode them using a Raster to Vector Autoencoder.



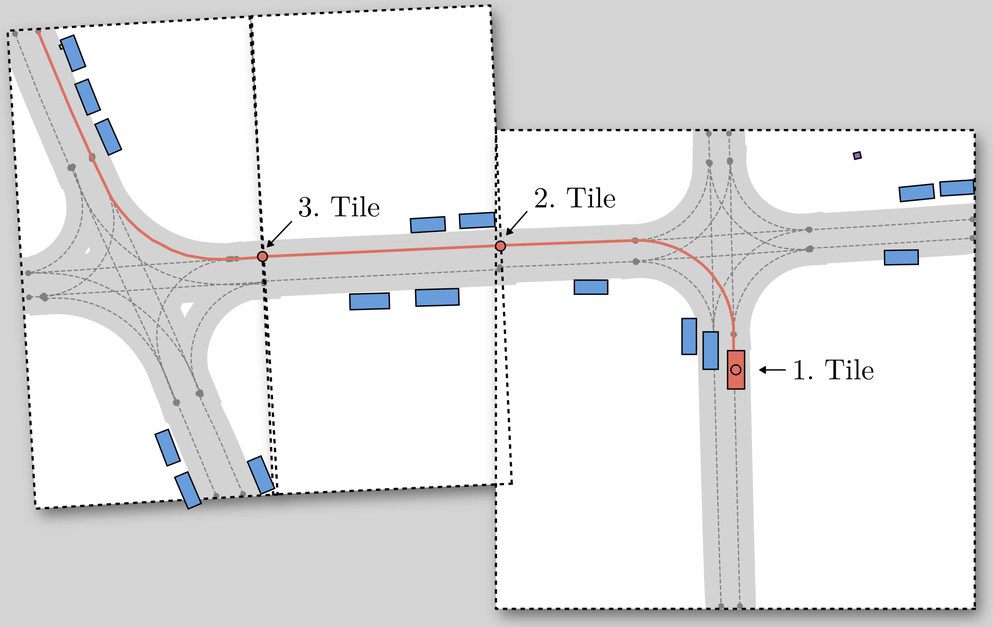
Generating them is then possible via a latent Diffusion Transformer (DiT) and DETR-style decoder.



Finally, we build interactive simulation environments with the generated logs and rule-based traffic.

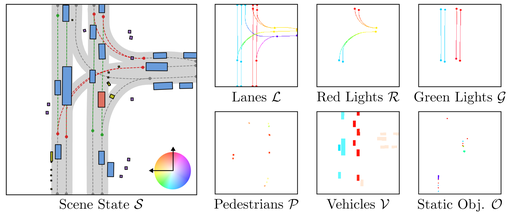


Our **generative simulator** requires 500× **less storage** than a dataset of traffic logs.

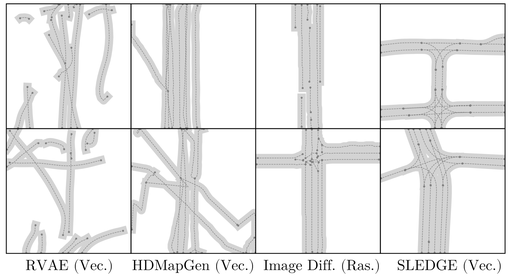


It enables **controllable**, **long-term** simulations.

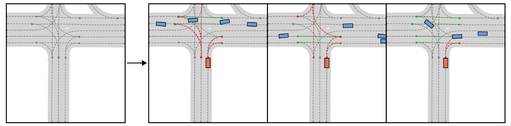
Our raster representation encodes each entity type's attributes as a 2-channel Bird's Eye View flow map.



We achieve state-of-the-art map generation results.



We can control traffic density by resampling agents.



Our long routes expose failures in planning algorithms.

	Lane -> Agent		Lane & Agents	
Method	100m	500m	100m	500m
Log Replay	6	26	-	-
SLEDGE	7	25	22	39
SLEDGE + Traffic	11	39	20	44
SLEDGE + Turns	14	28	29	45

Check out our video and code!

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