Patch to the Future: Unsupervised Visual Prediction

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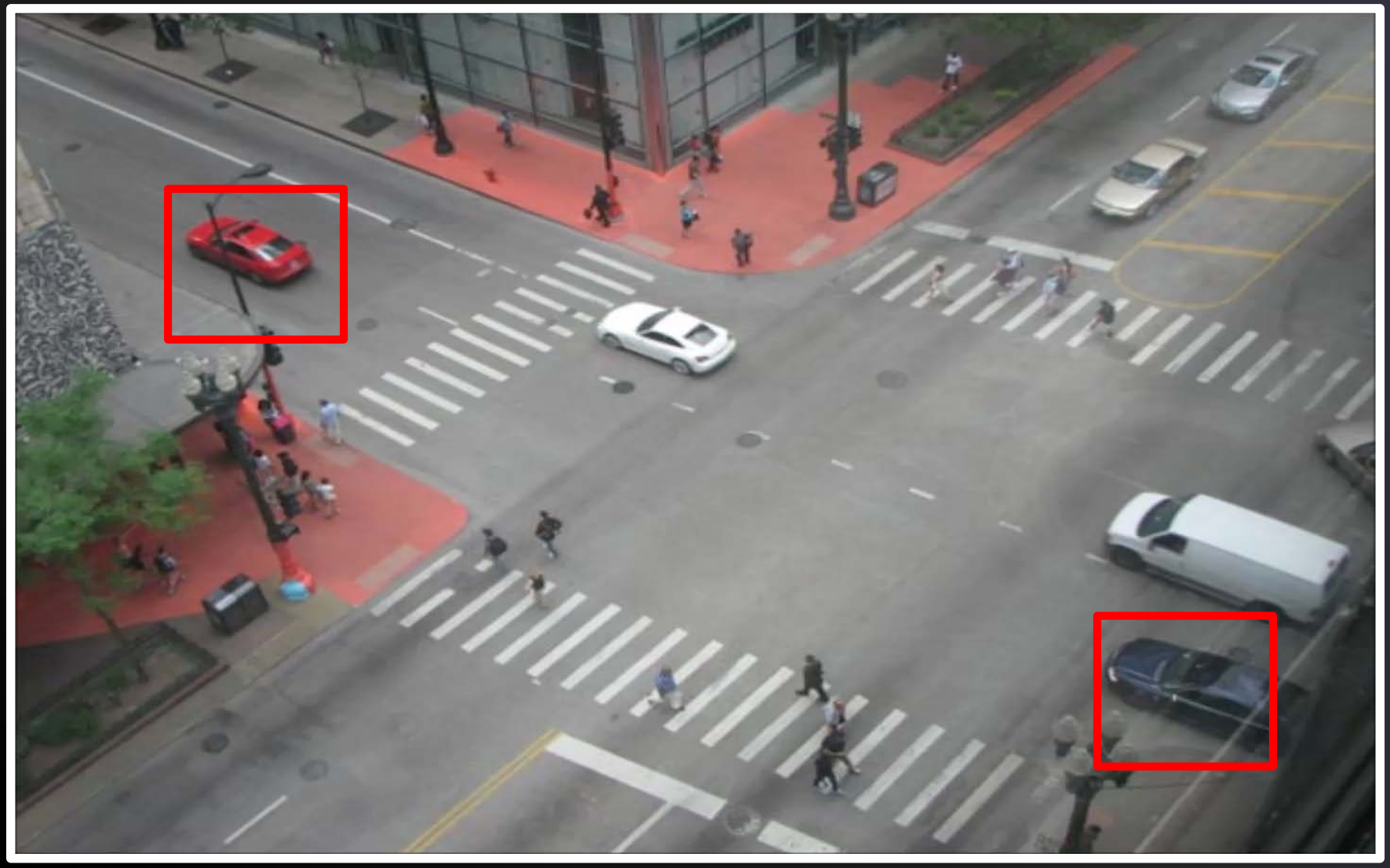
Visual Prediction



Goal

Both the *what* and the *how*

Goal

Both the *what* and the *how*

Goal

Both the *what* and the *how*

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Both the *what* and the *how*

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Both the *what* and the *how*

Goal

Both the *what* and the *how*

Background

Data-Driven

Yuen et al. 2010

Background

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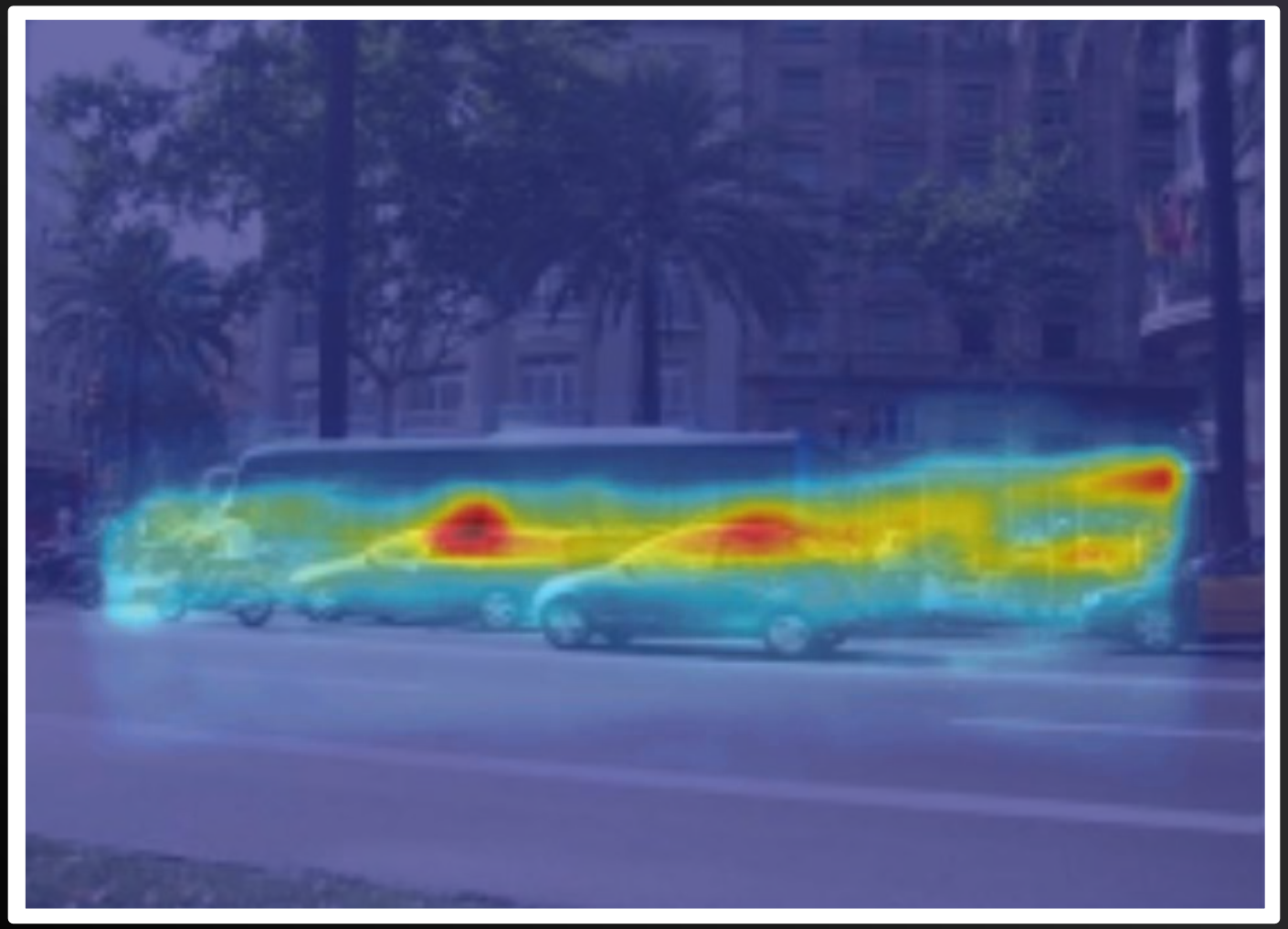
Yuen et al. 2010

Background

Data-Driven



Yuen et al. 2010

Background

Agent-Centric

Kitani et al. 2012, Koppula et al. 2013, etc.

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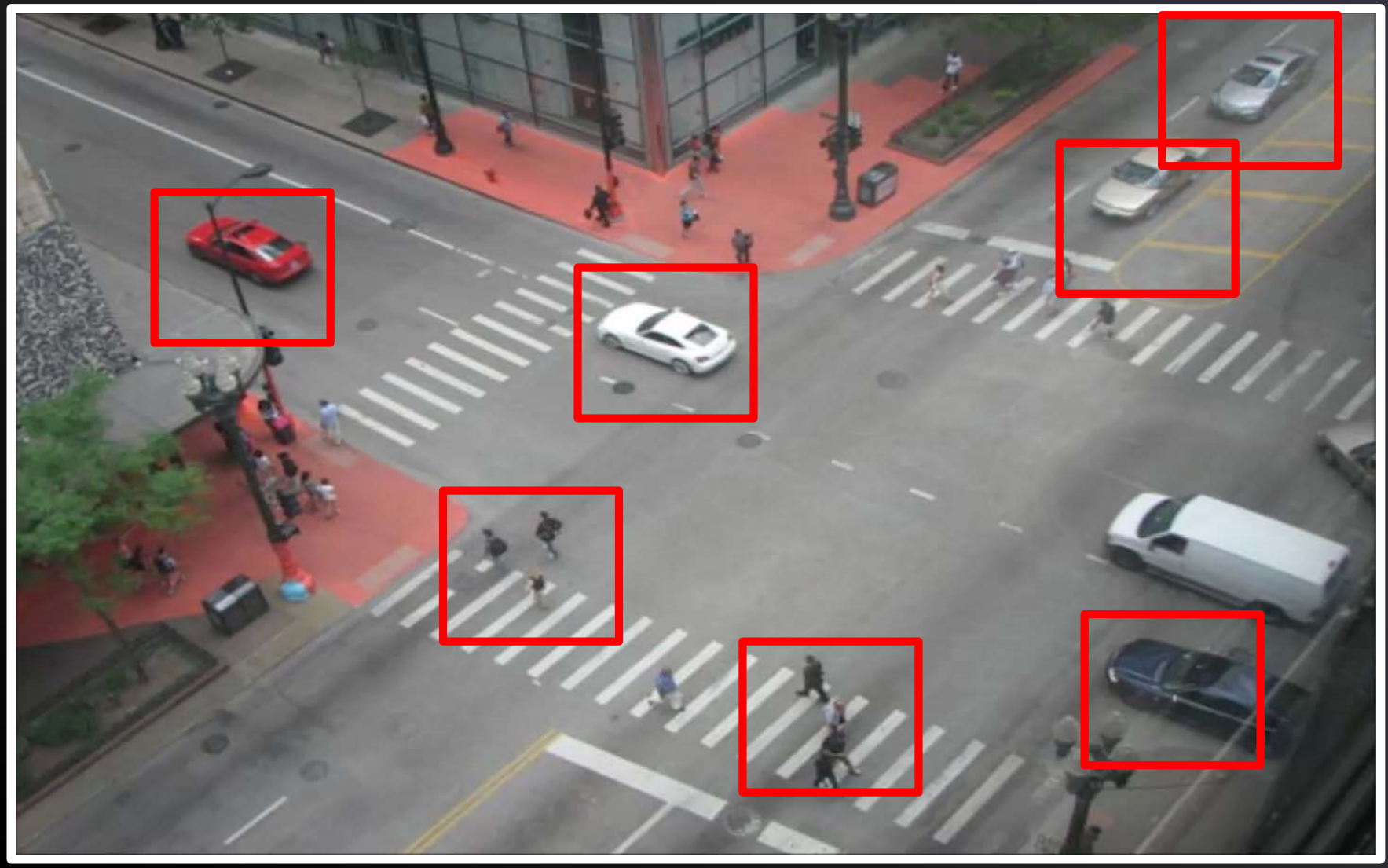
Agent-Centric

Kitani et al. 2012, Koppula et al. 2013, etc.

Our Approach

Data-Driven



Our Approach

Data-Driven + Agent-Centric

Our Approach

Unsupervised

Limitations

Domain-Dependent

Train

Test

Limitations

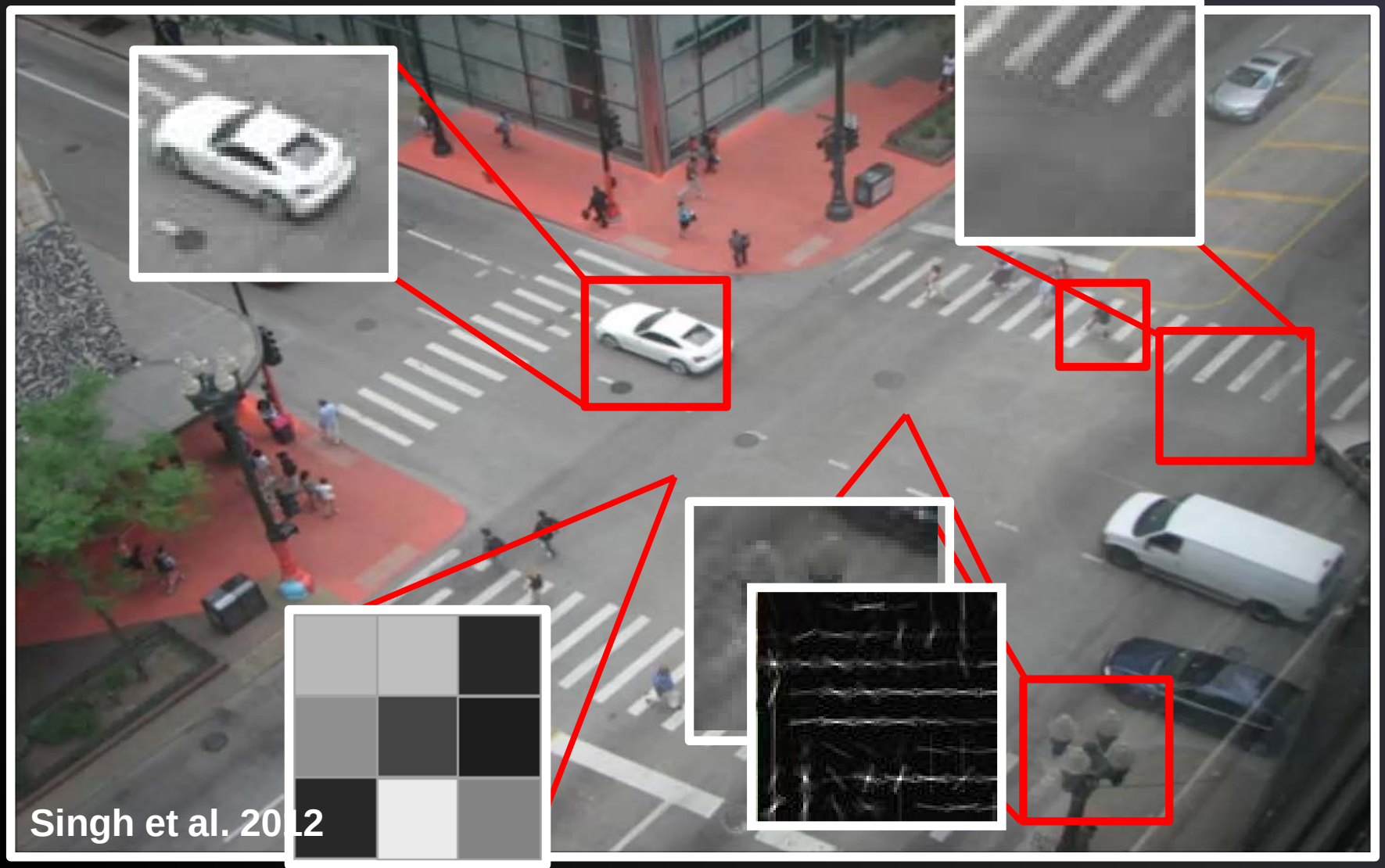
Goal-Driven

Limitations

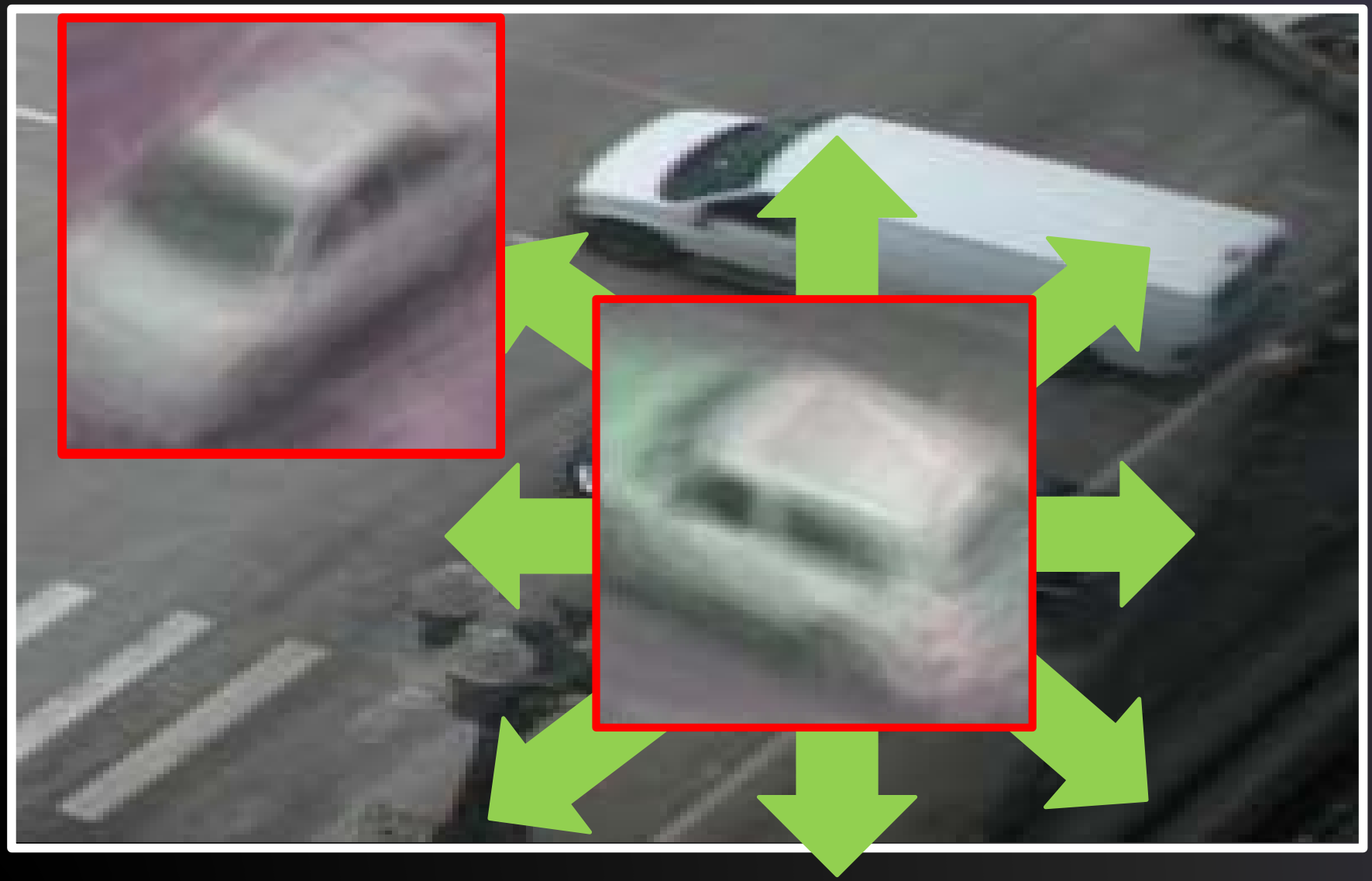
No Inter-Element Prediction

Overview

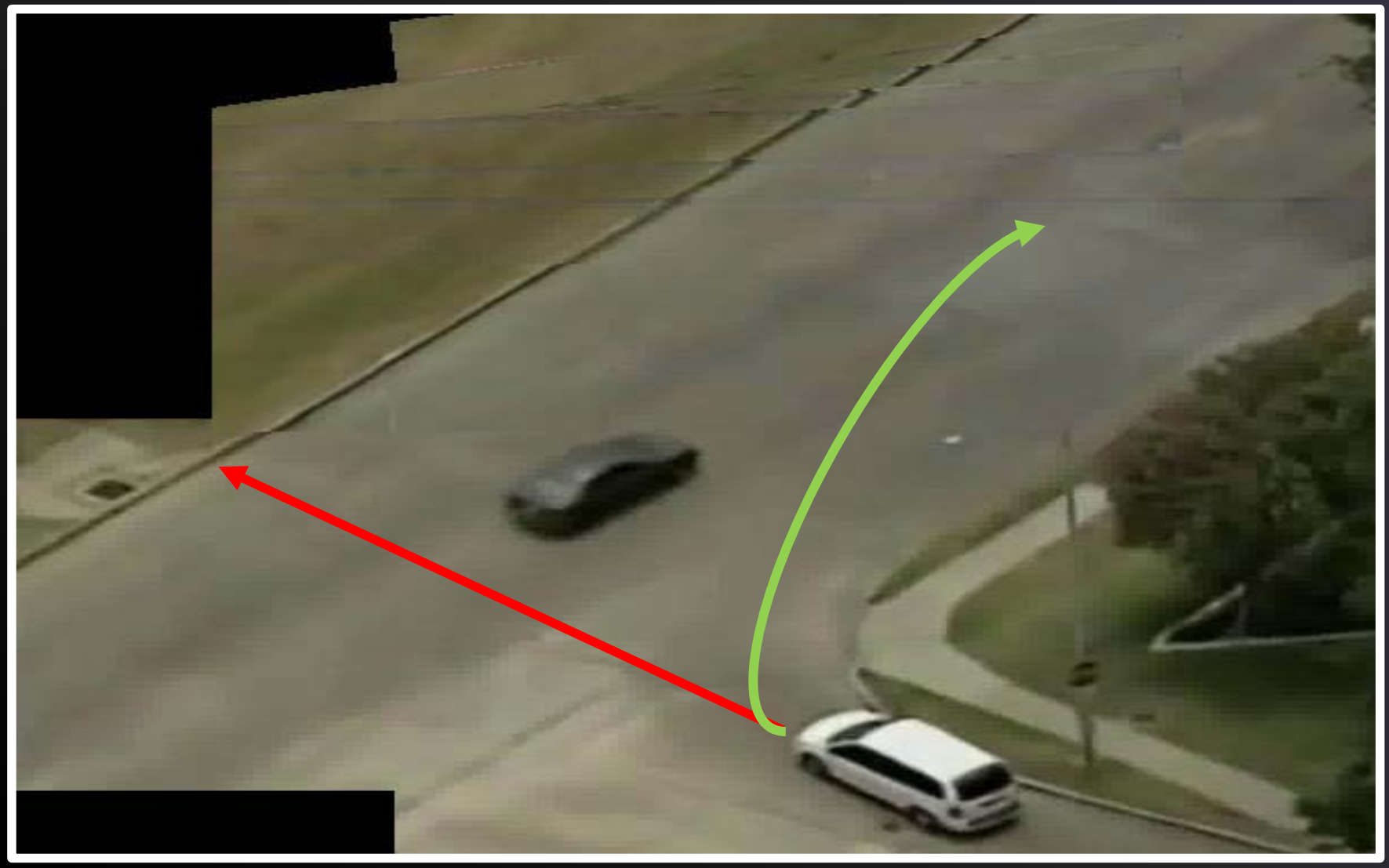
Representation



Action Space



Scene Interaction



Scene Interaction

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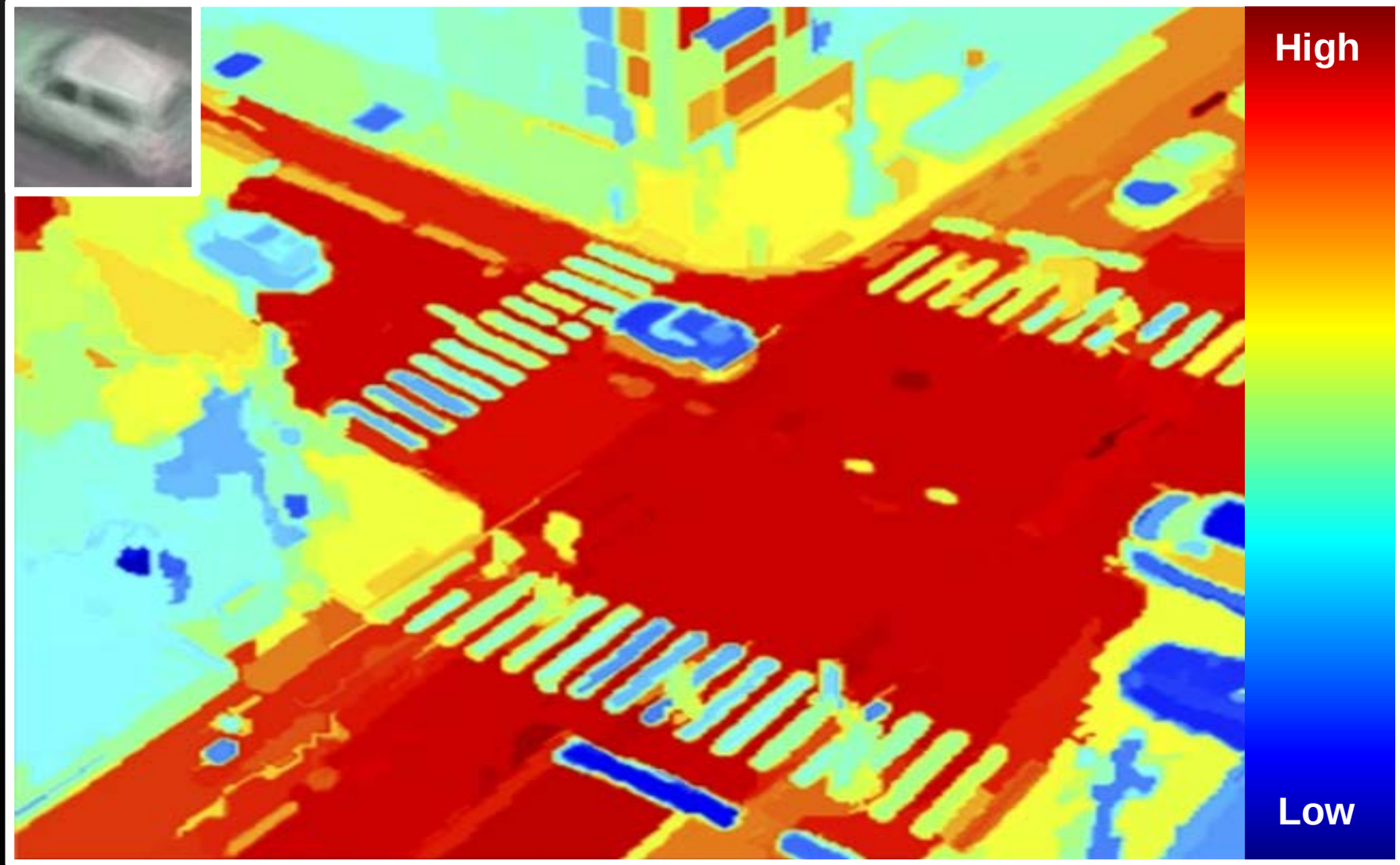


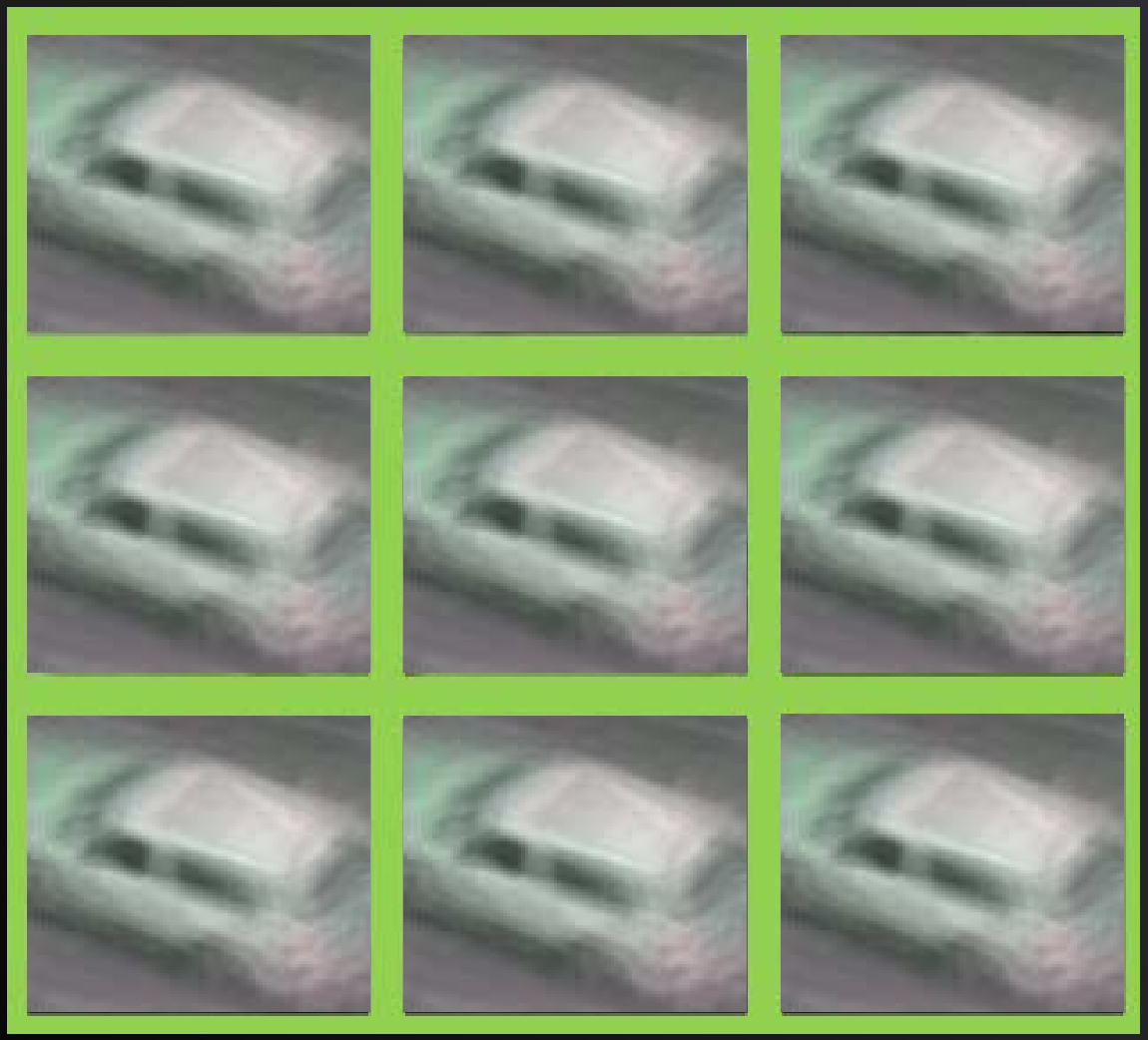
Expected Reward

P(Transition)

Reward(X,Y,C)

E(Reward) = P(T) * R

Planning



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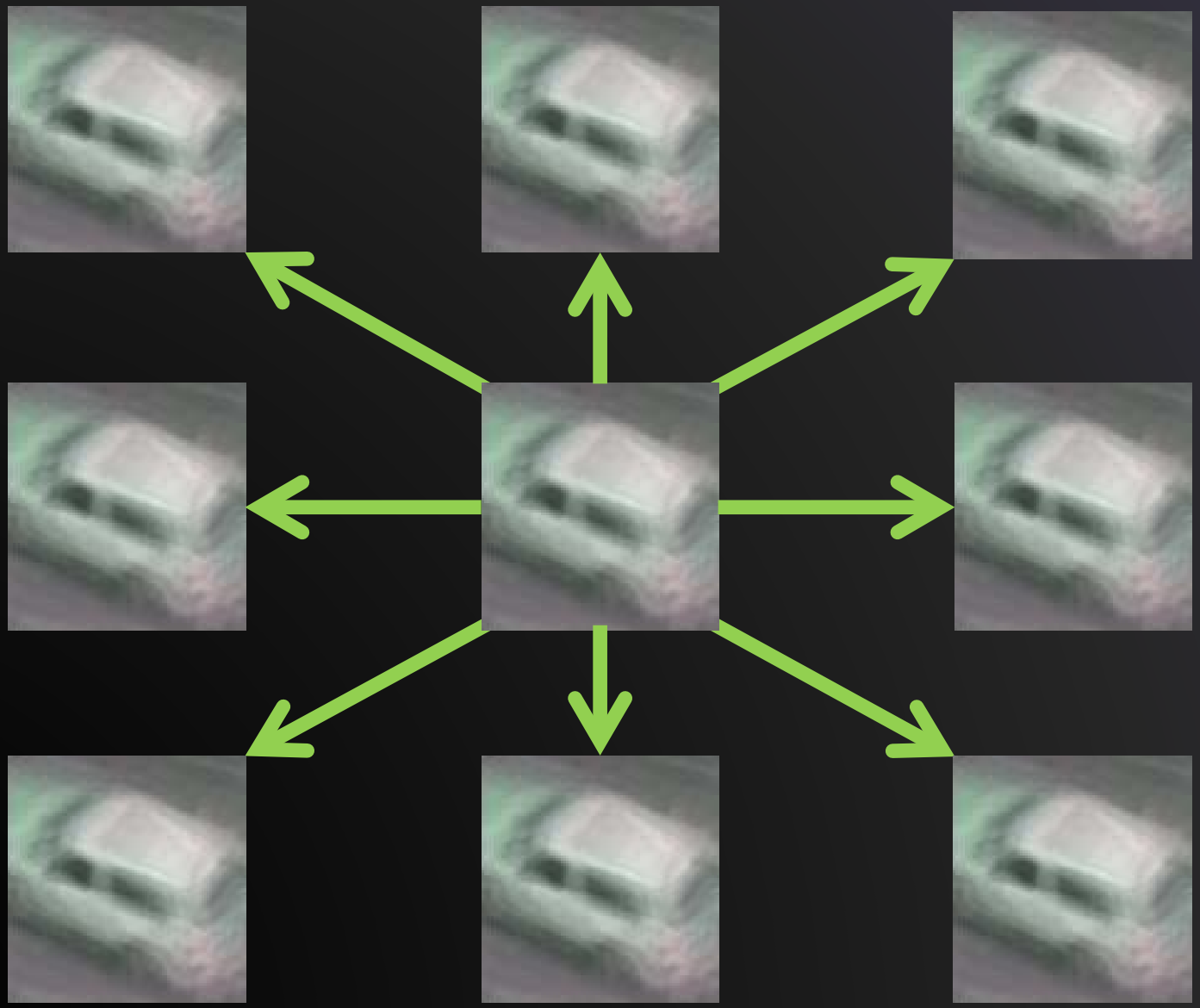

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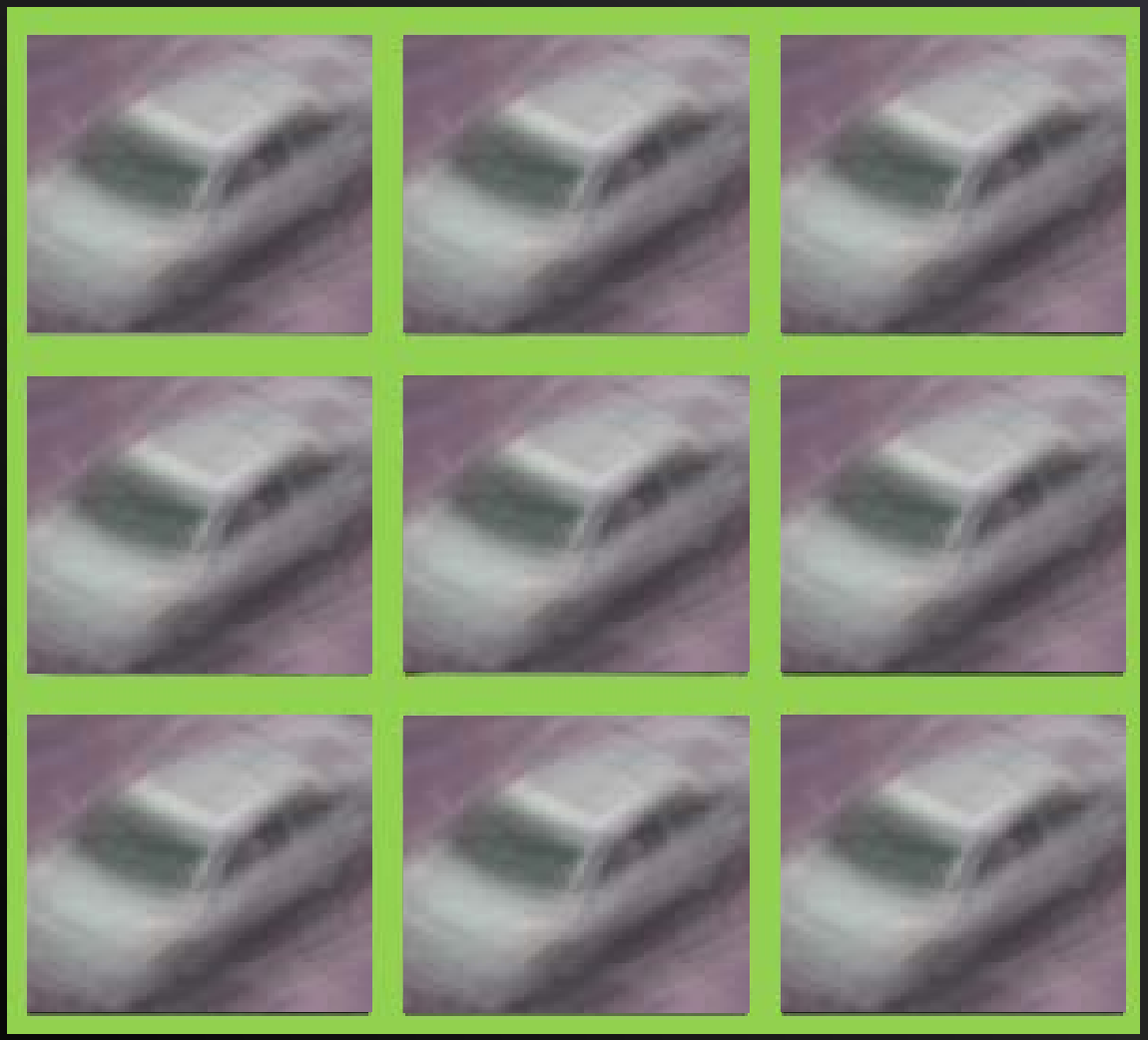

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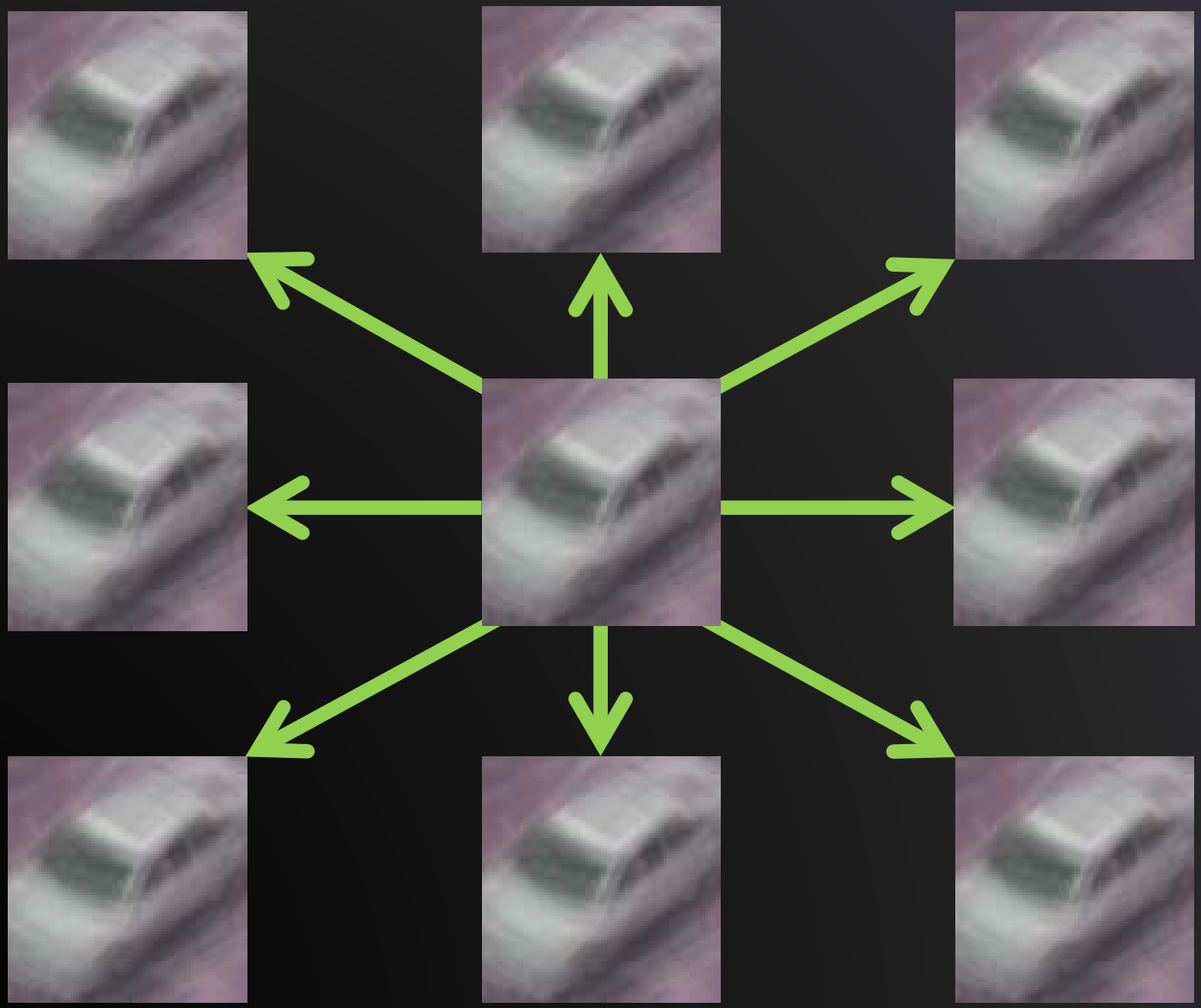

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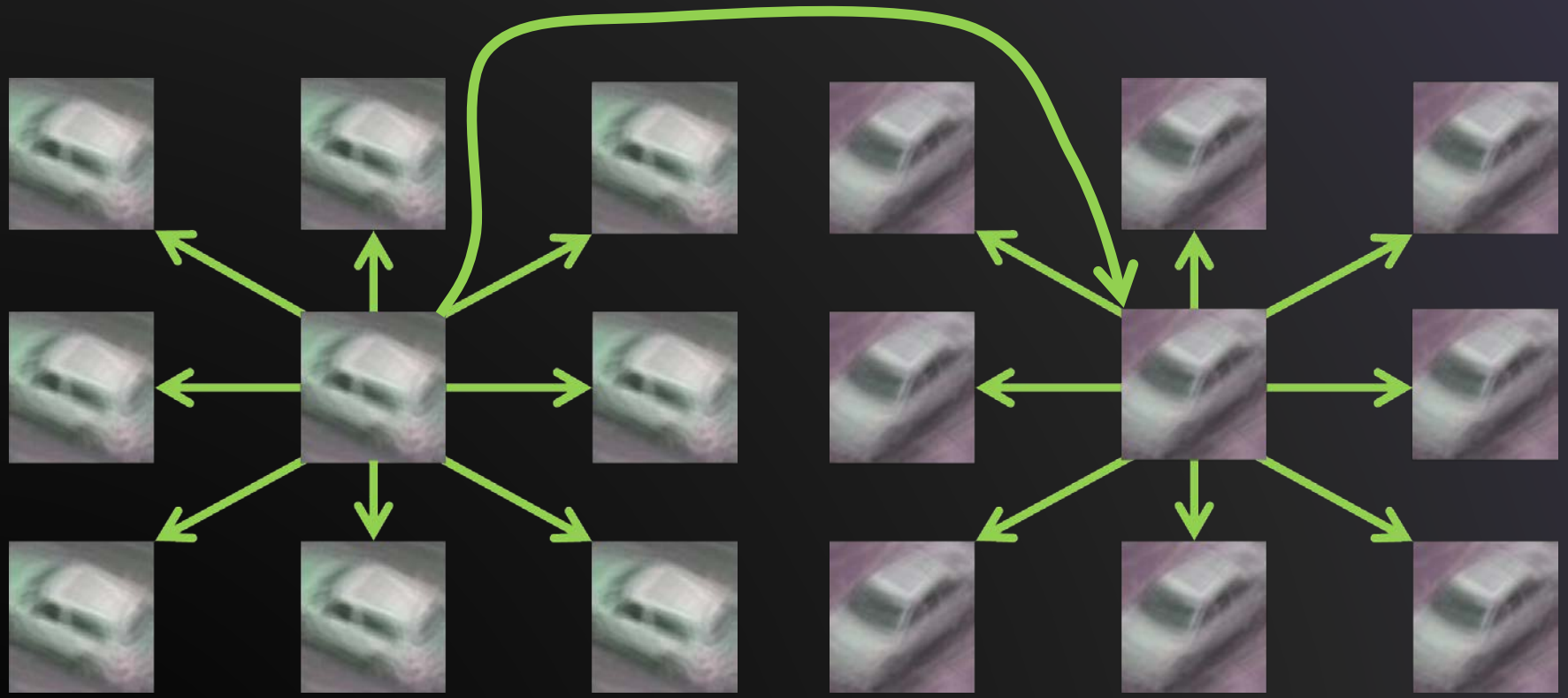

Planning

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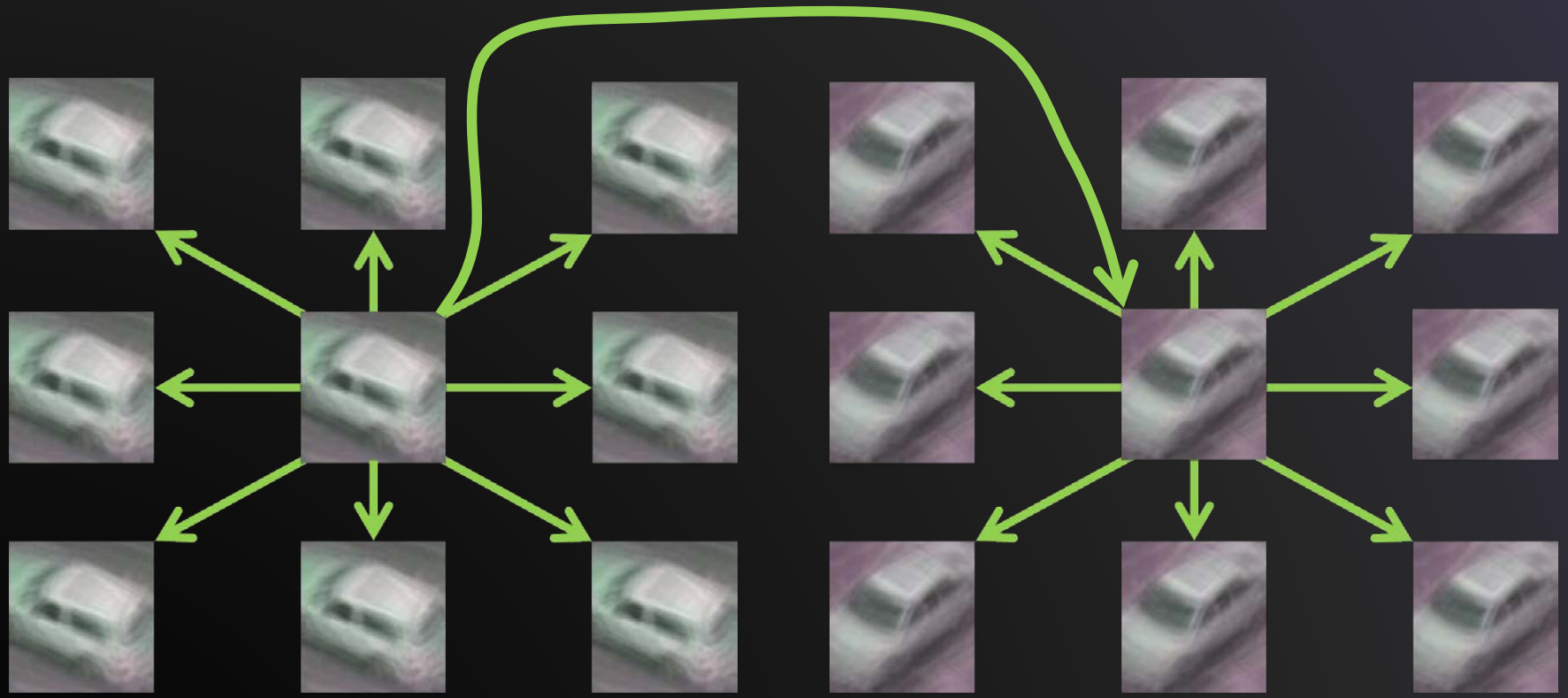

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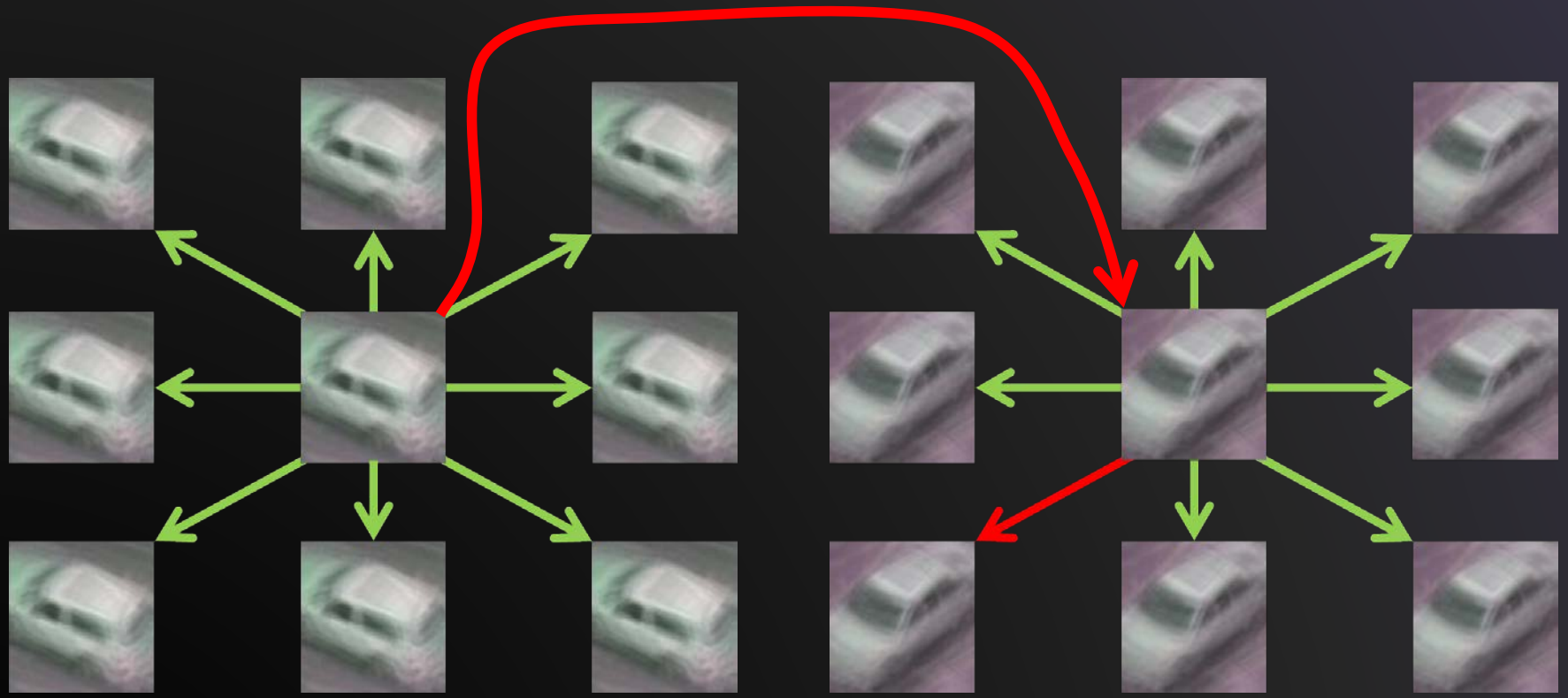

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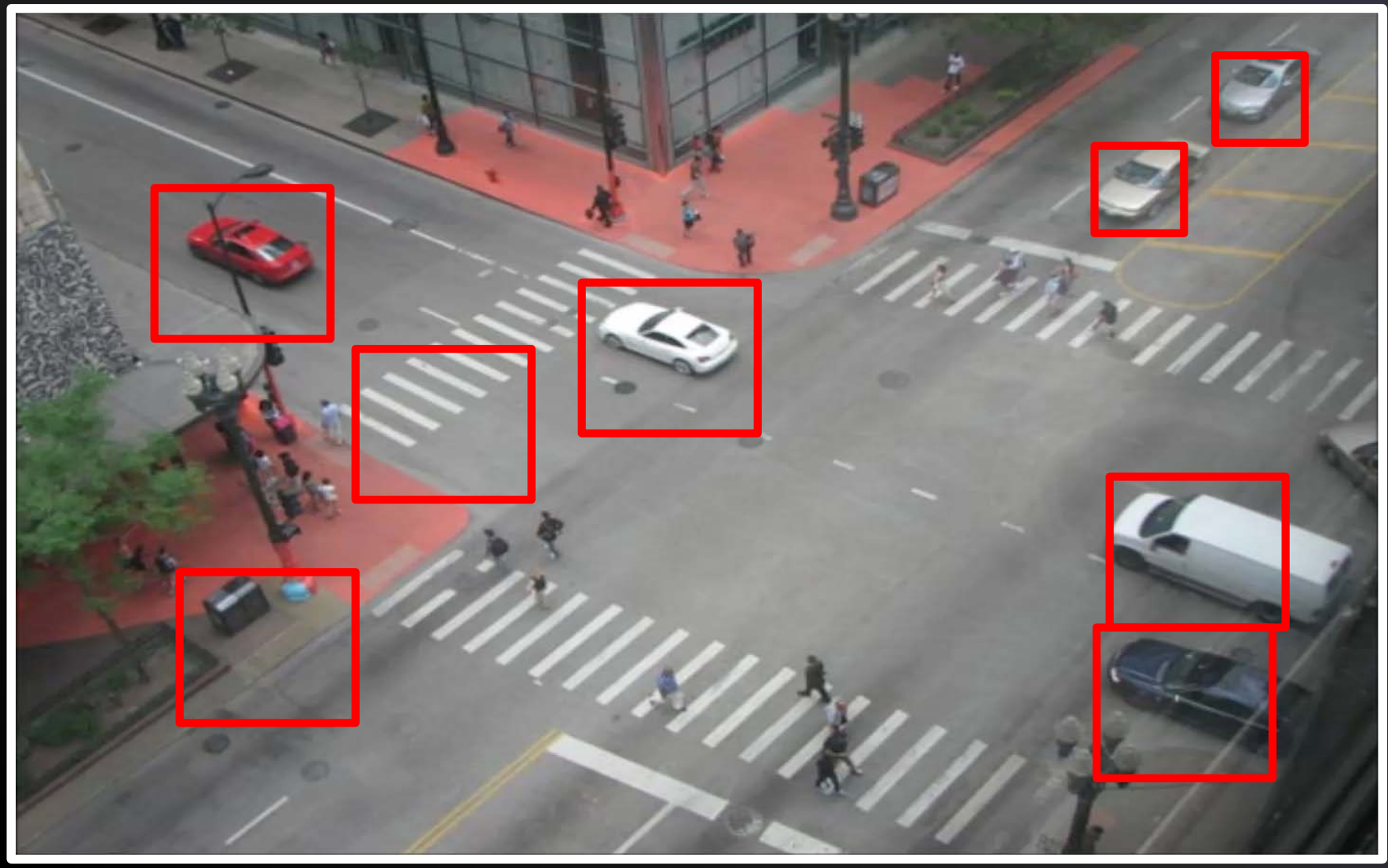

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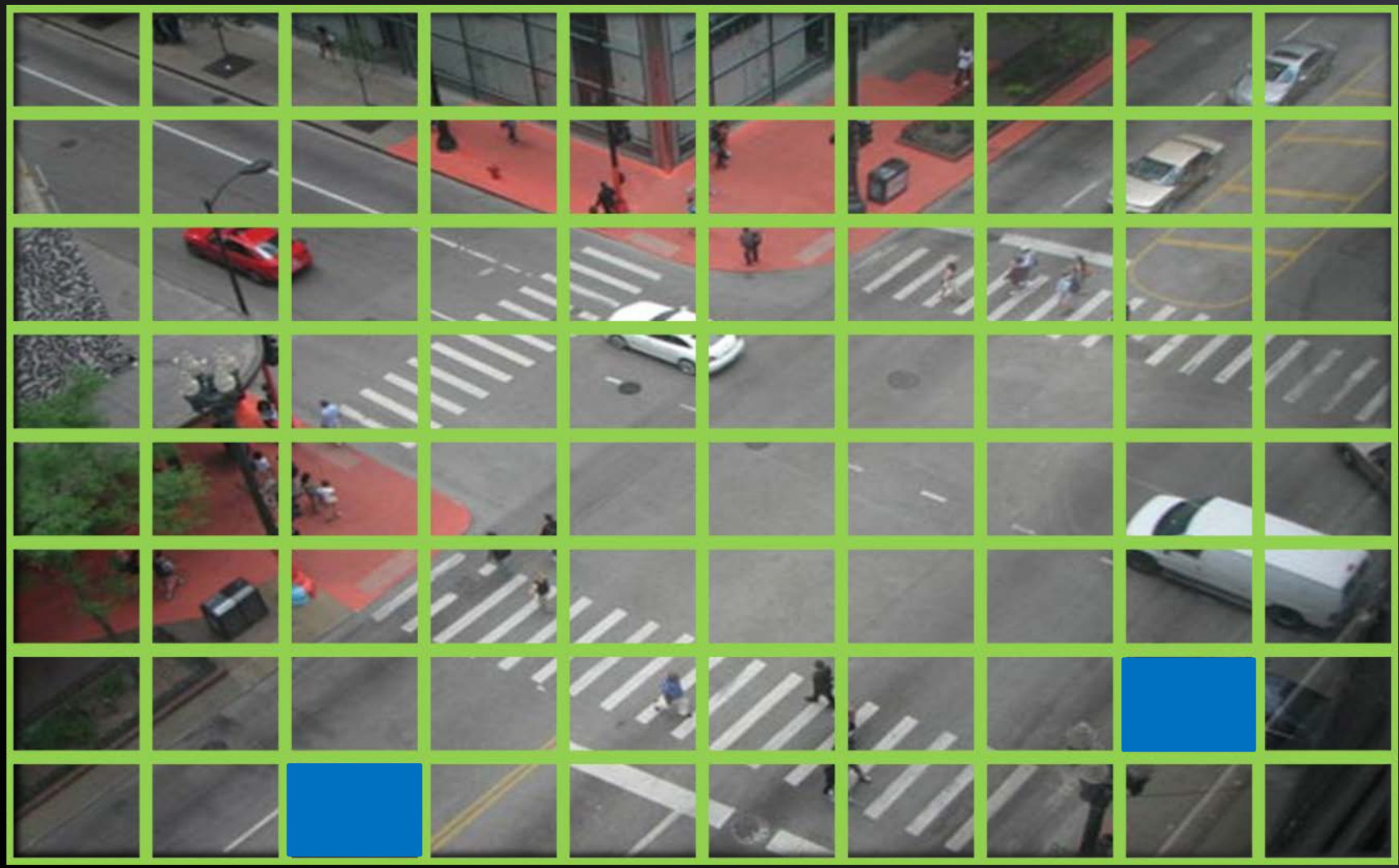

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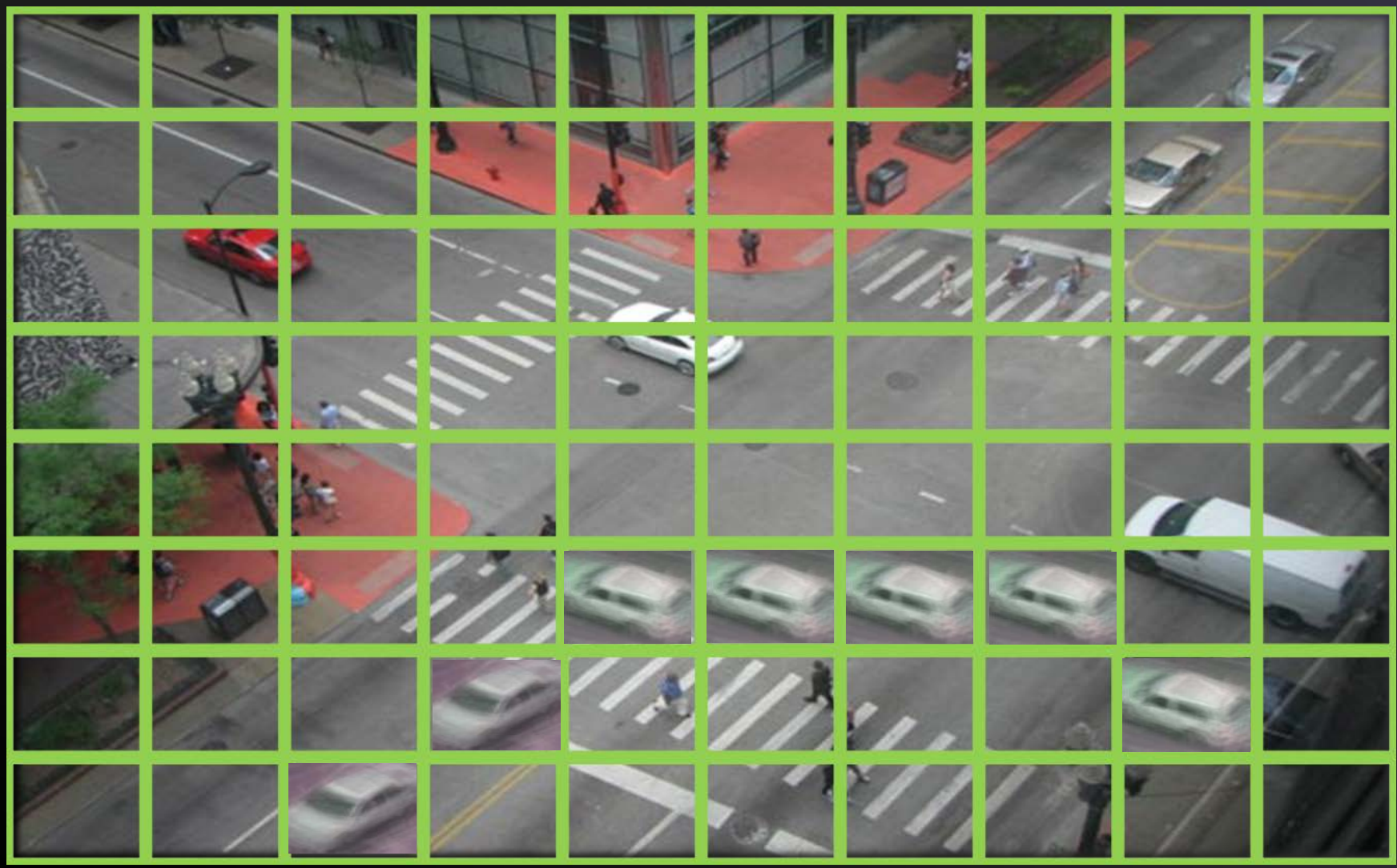

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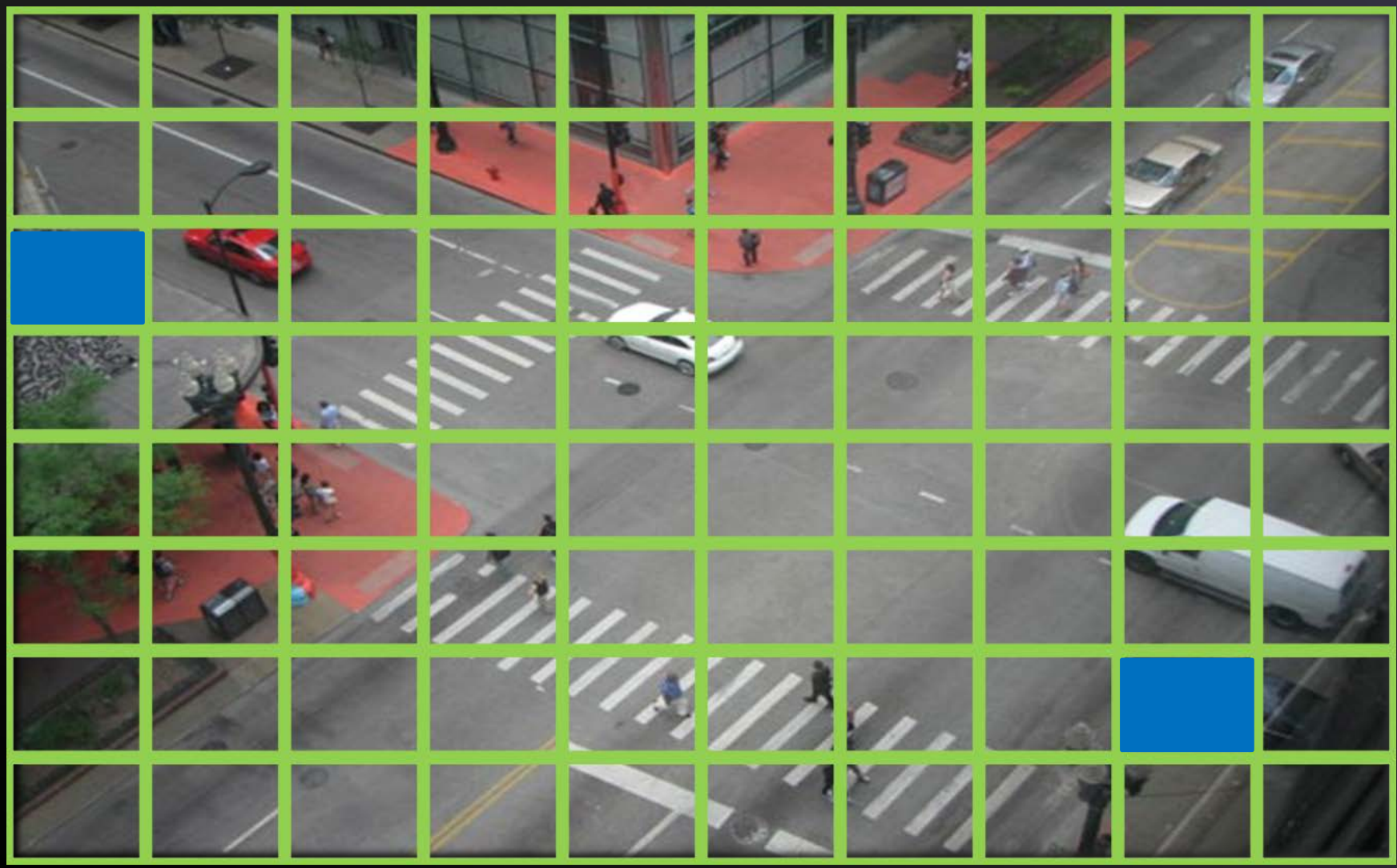

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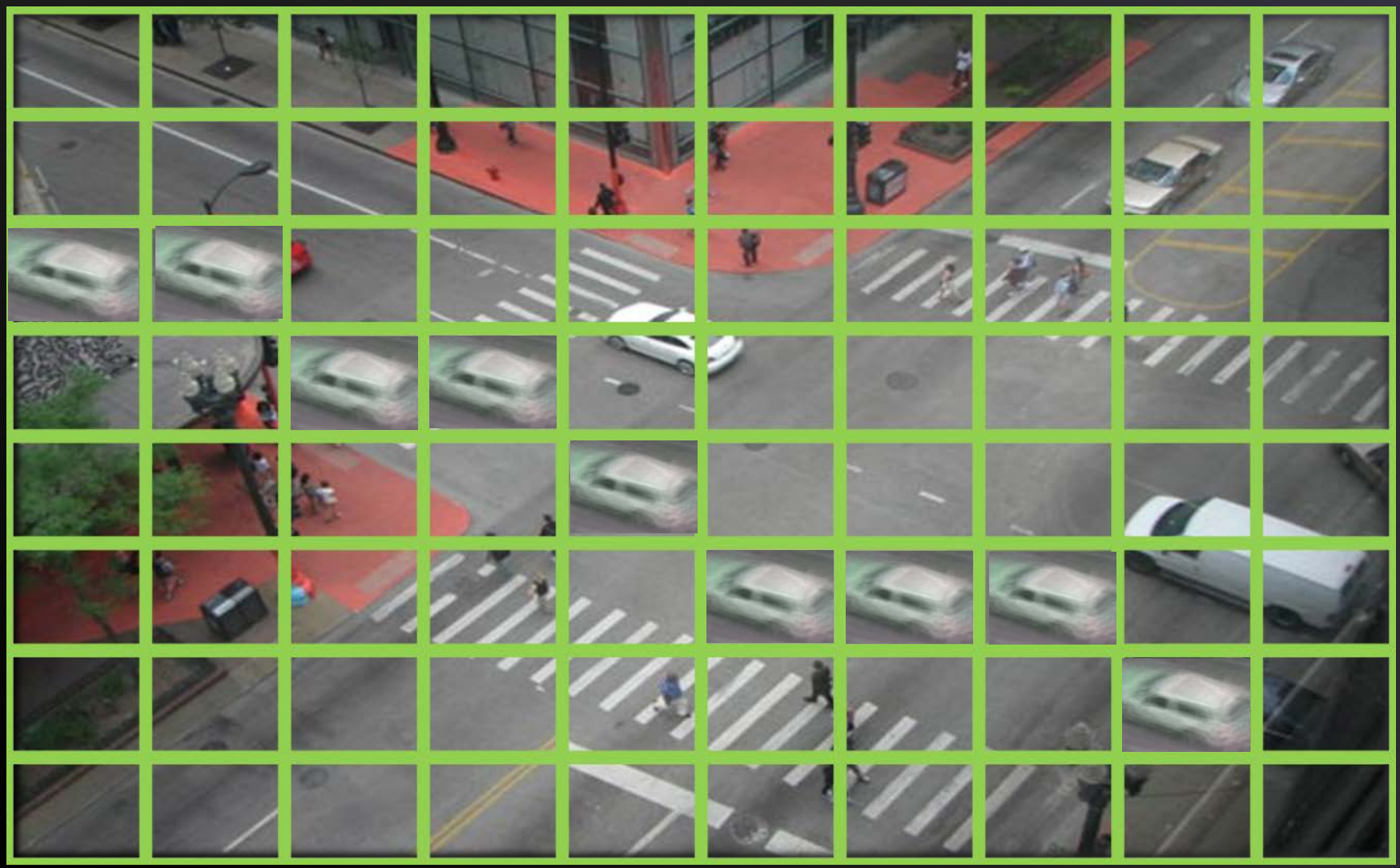

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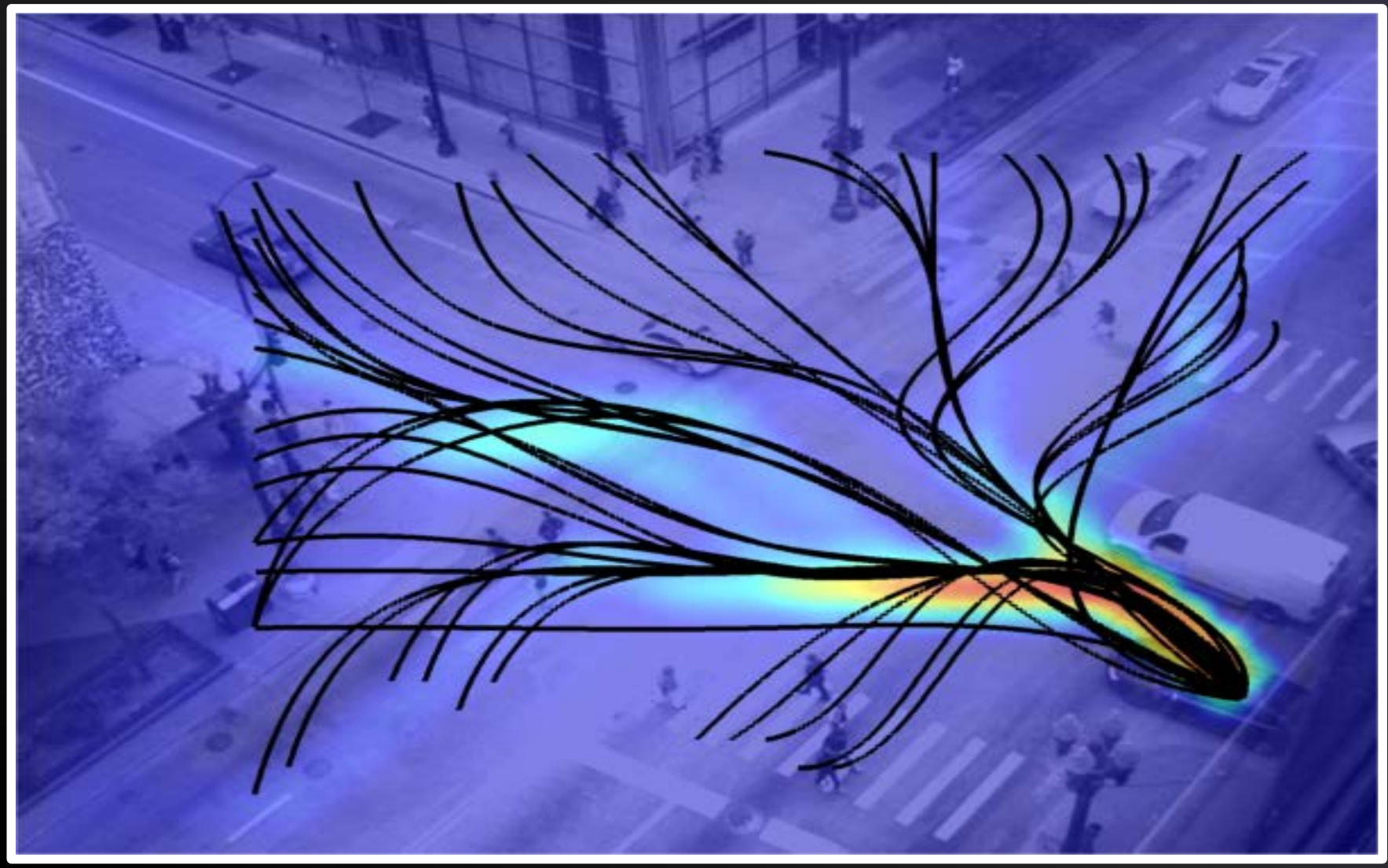
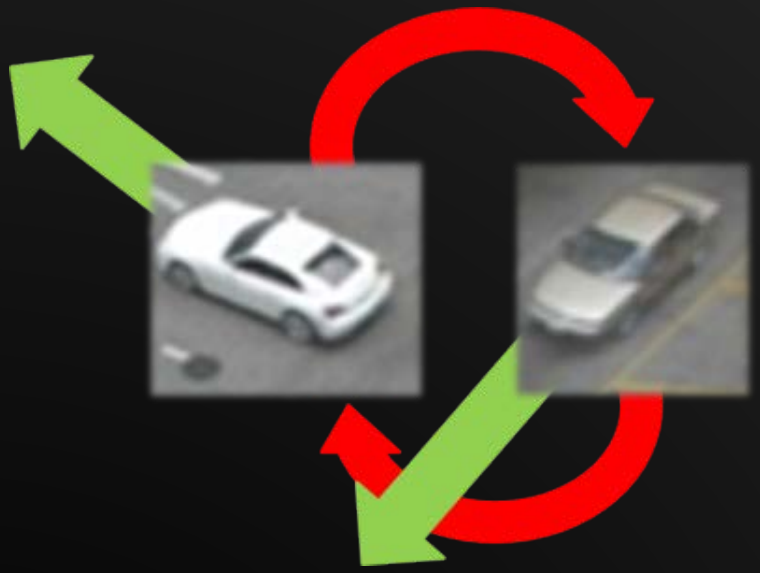
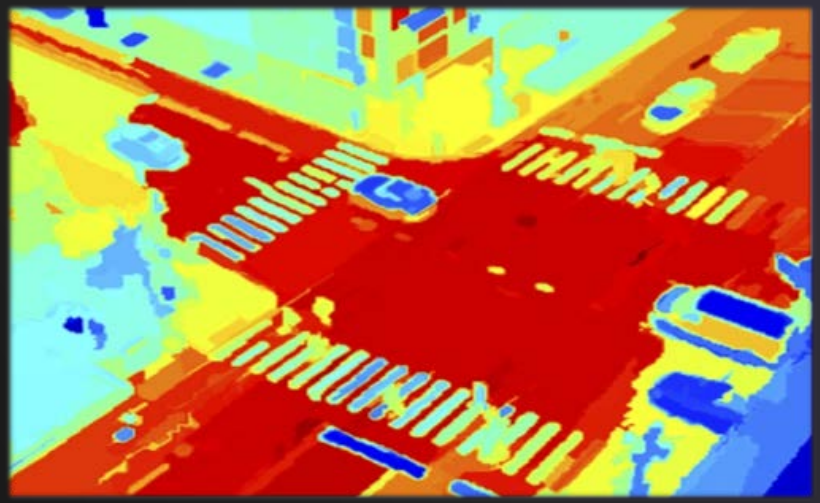


Training

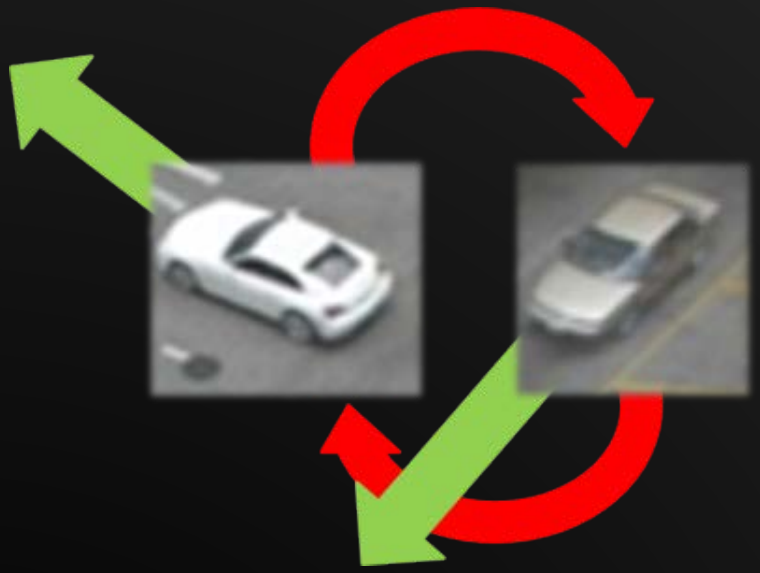


Transitions



Scene Interaction

Training



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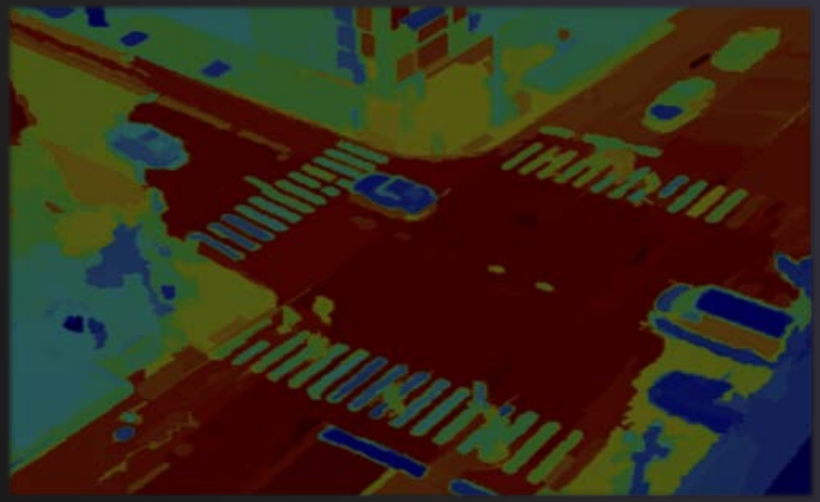
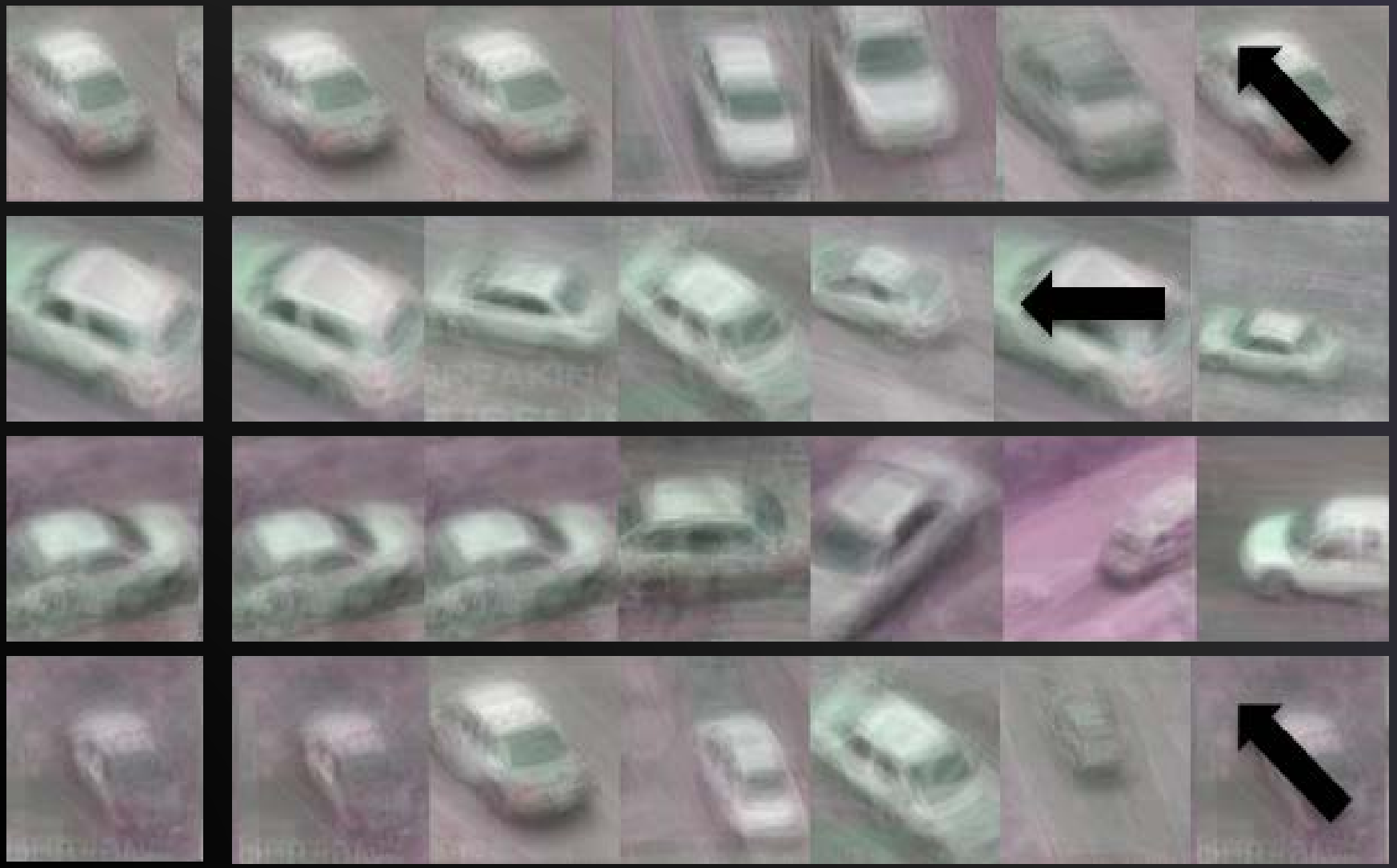


Scene Interaction

Training
Transitions

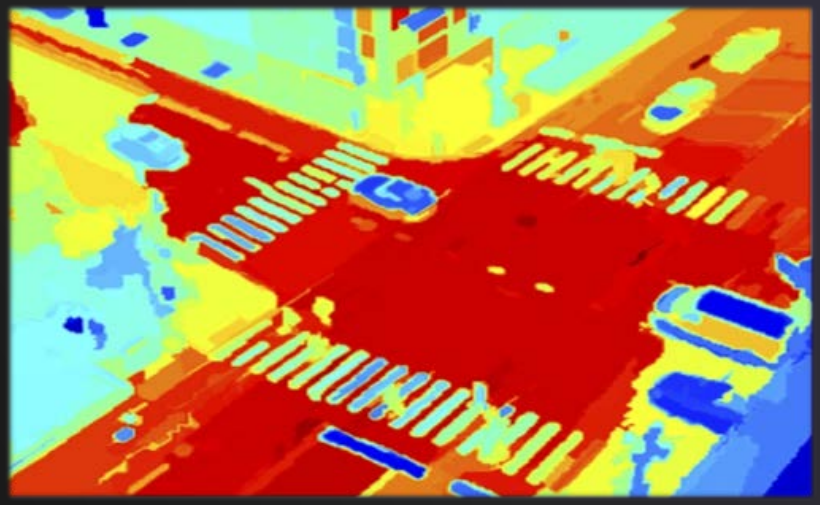
Training

Patch **Transitions**



Training

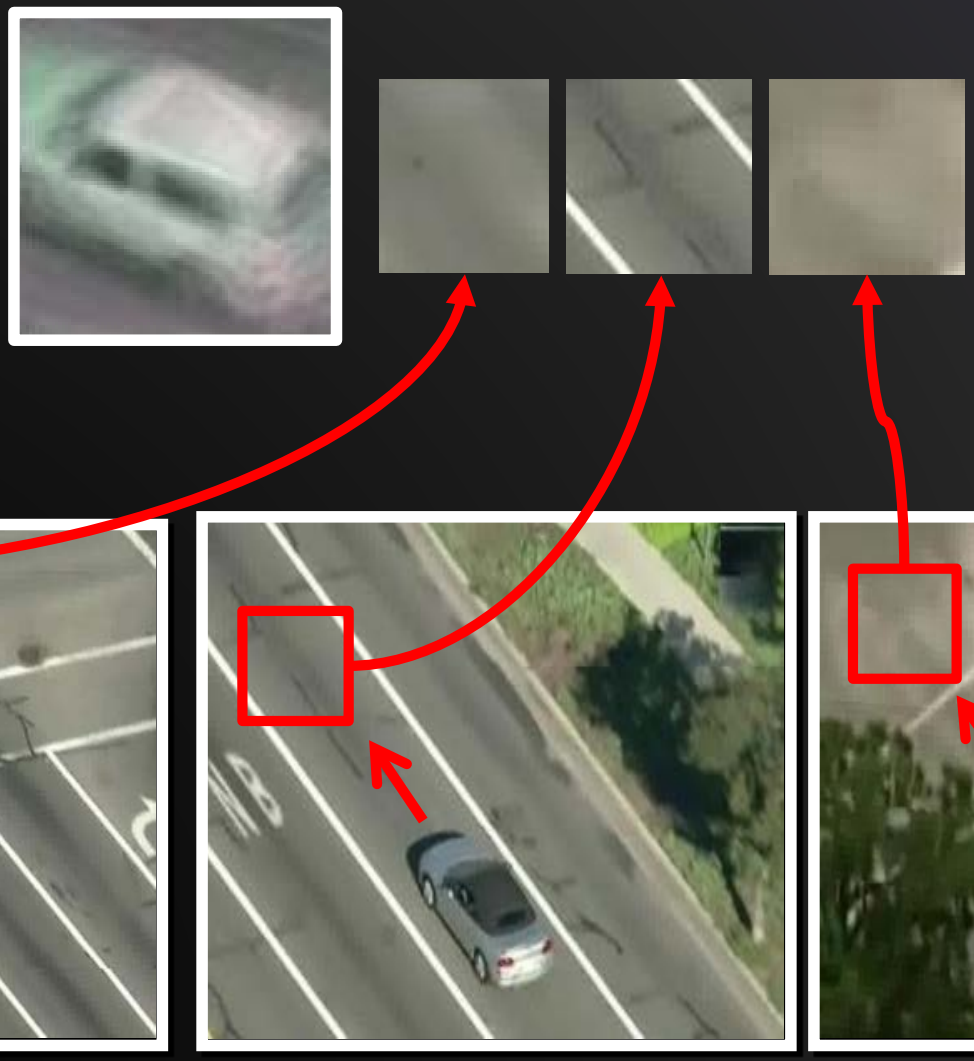
Transitions



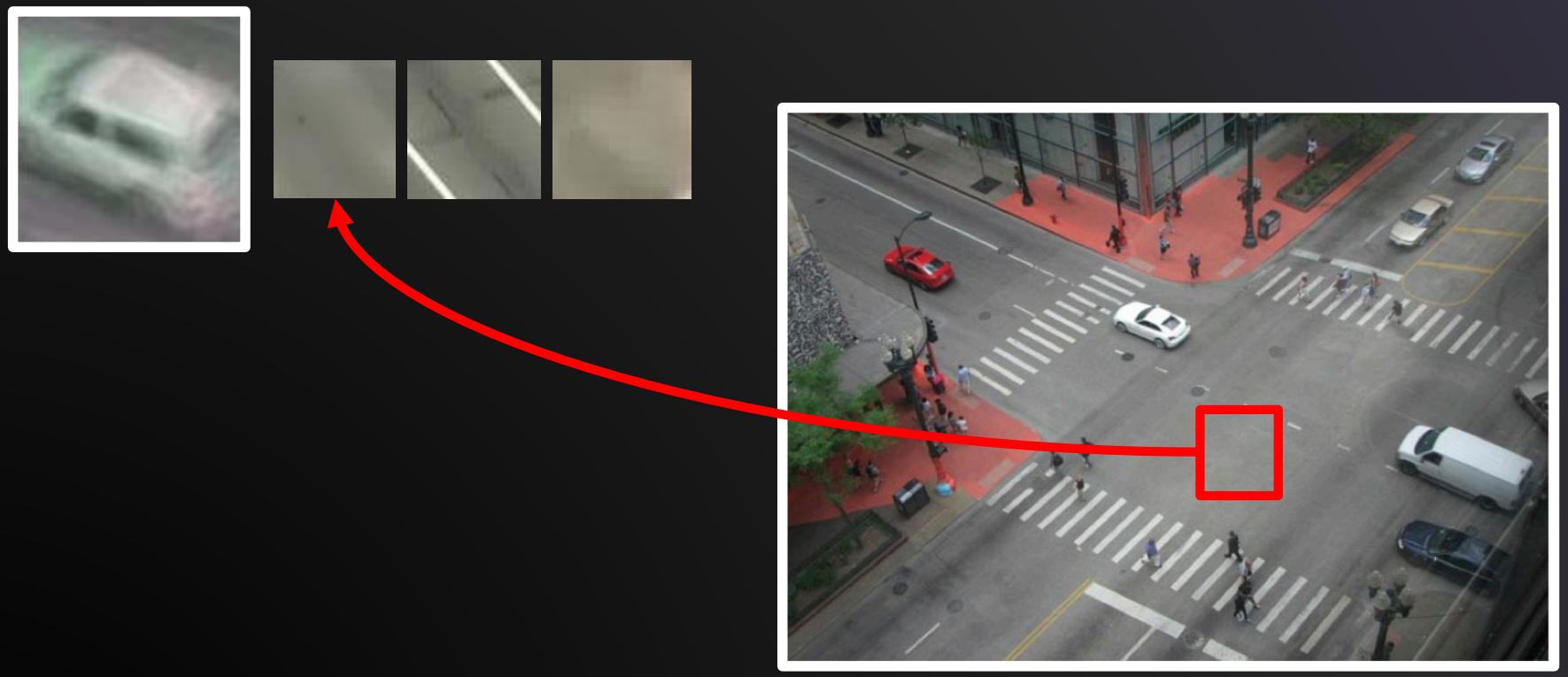
Scene Interaction

Training

Scene Interaction

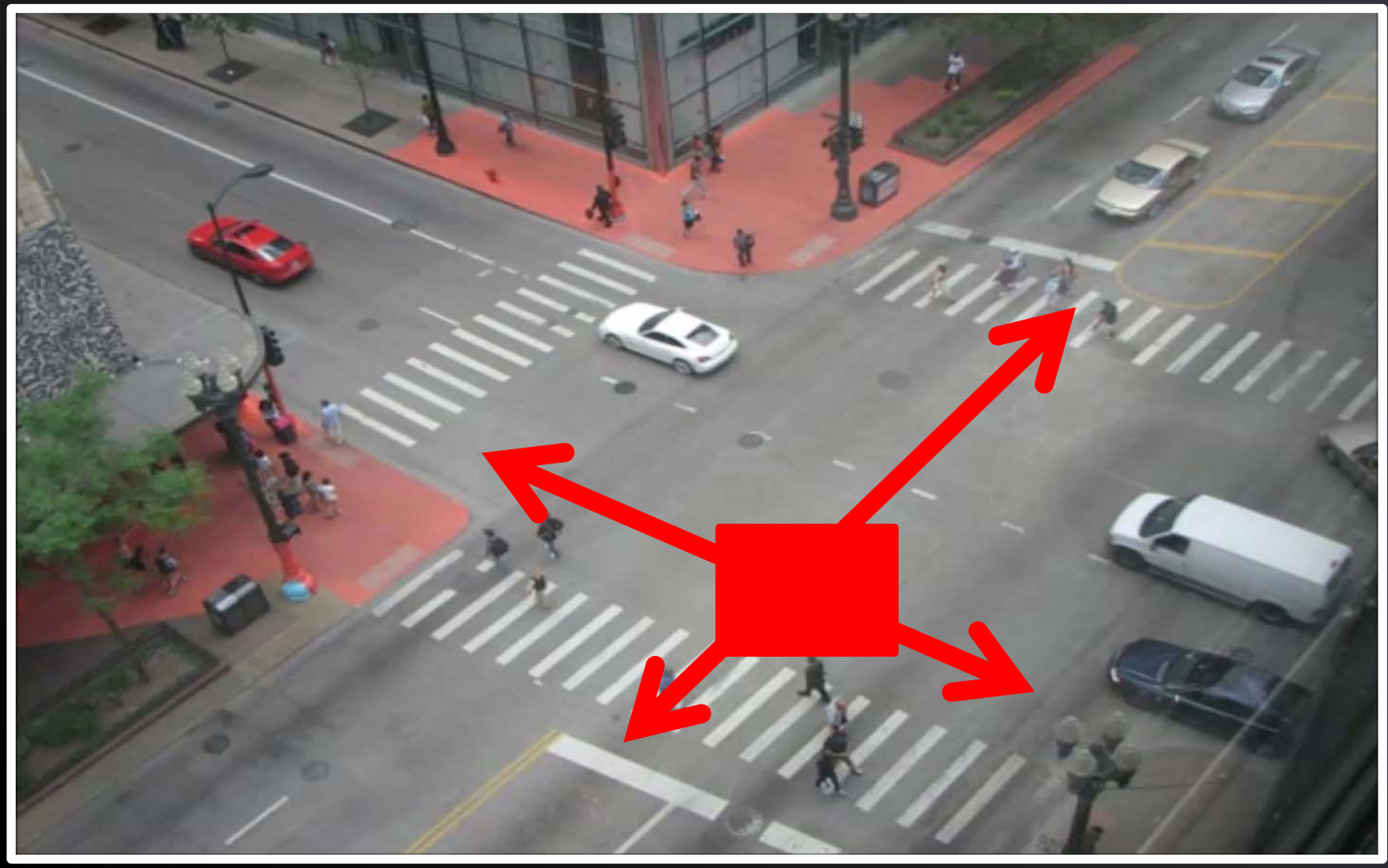


Training
Scene Interaction



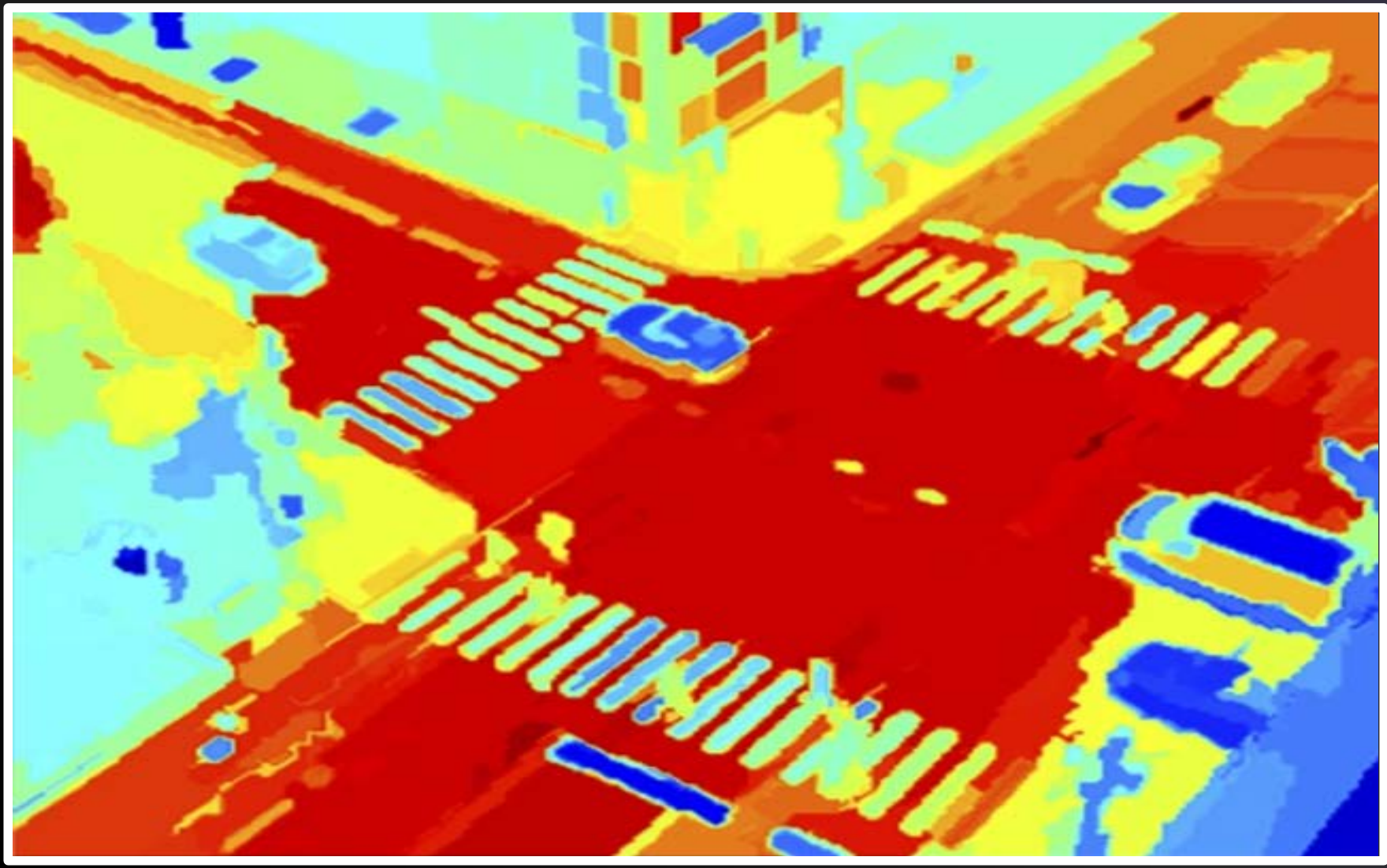
Training

Scene Interaction



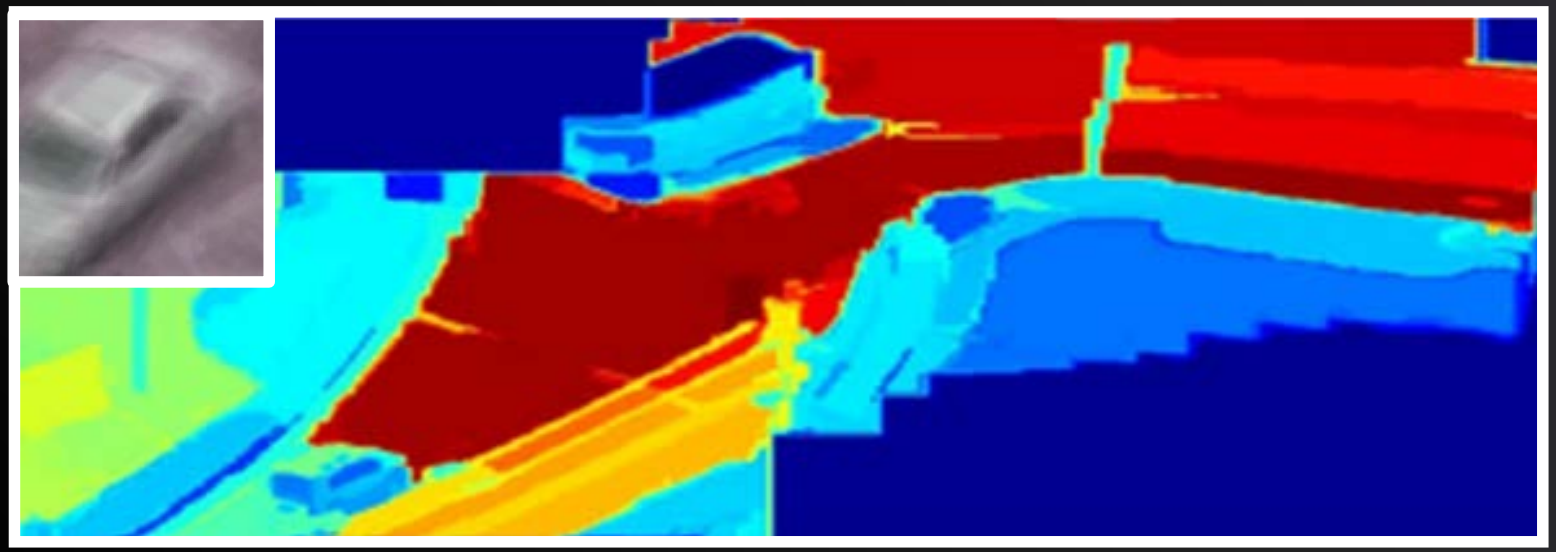
Training

Scene Interaction



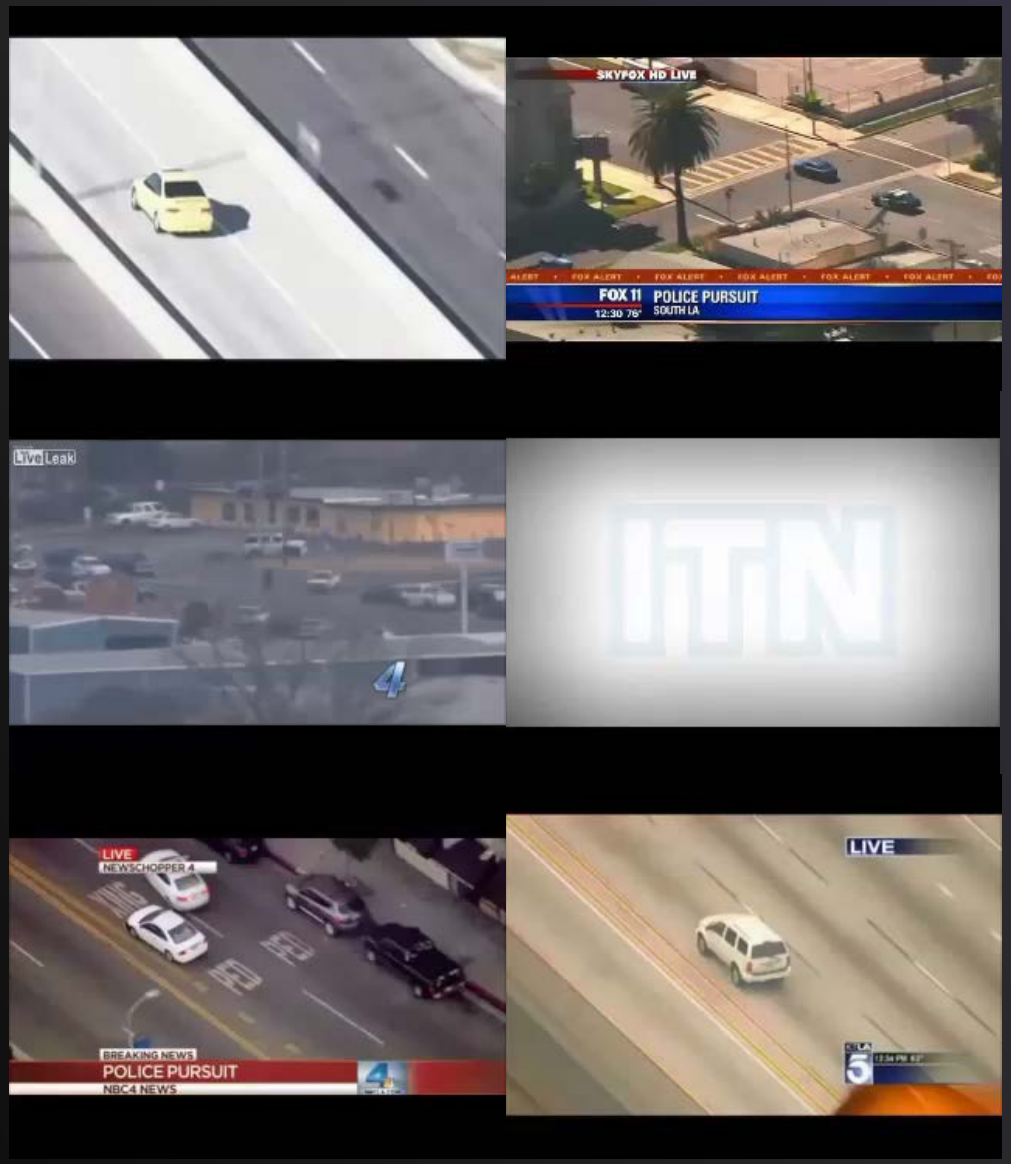
Training

Scene Interaction

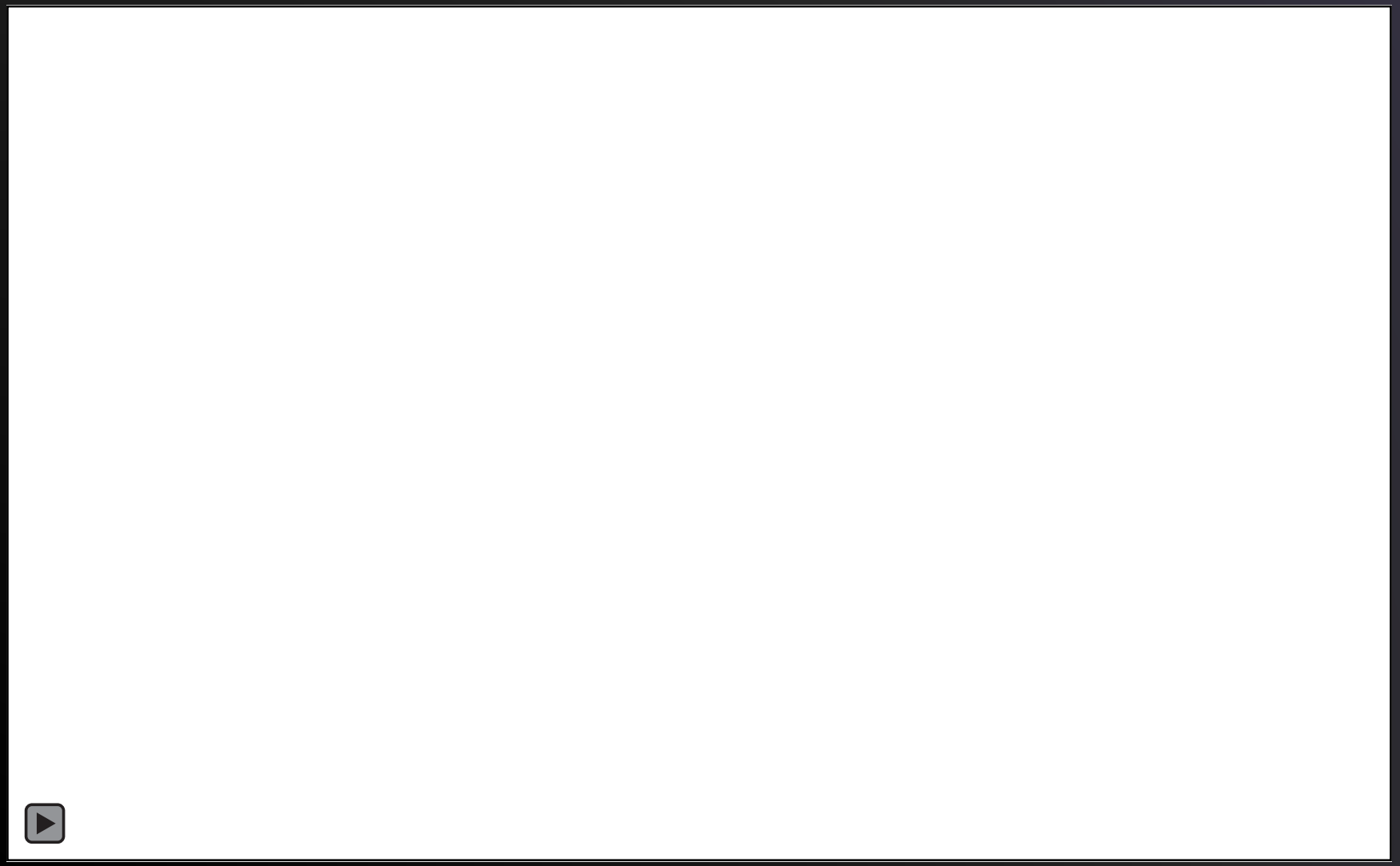


Datasets

- **183 Videos**
- **139 Training**
- **44 Testing**
- **~300 Minutes**

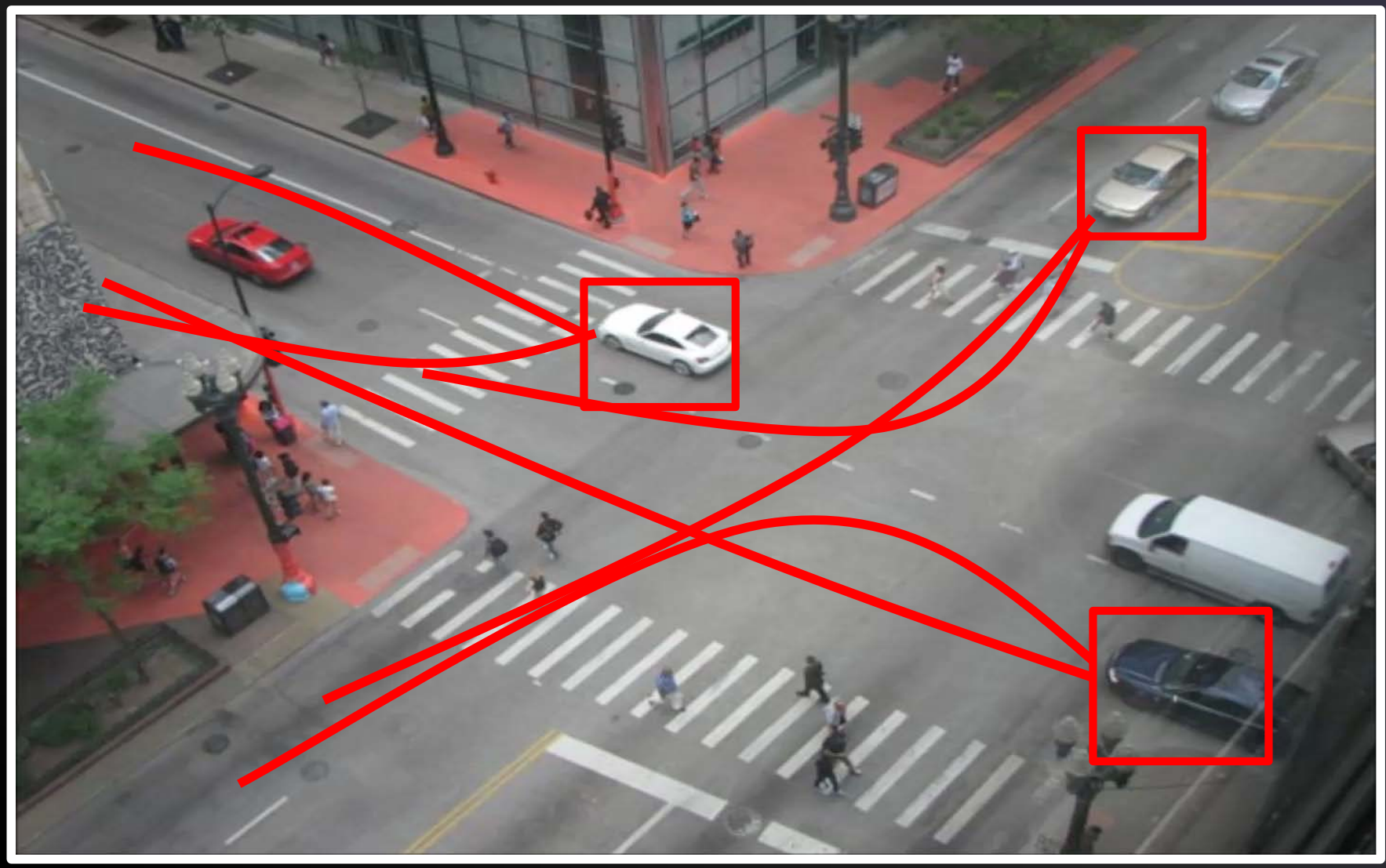


Qualitative Results



Qualitative Results

Quantitative Results



Quantitative Results

Data-Driven Active Entity

Error (Top 6)	NN + Sift-Flow	Ours
Mean	22.34	**14.38**
Median	16.68	**10.91**

Quantitative Results

Human-Chosen Active Entity

Error (Top 1)	NN+Sift-Flow	Kitani et al.	Ours
Mean	27.55	37.94	**21.55**
Median	23.77	30.23	**14.98**

VIRAT

Second Dataset

Conclusion

- Unsupervised method for prediction
- No explicit modeling of semantics
- Models appearance changes
- Code will be available!

Thank You!