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ROLE OF ARTIFICIAL INTELLIGENCE IN AUTOMATED DRIVING SYSTEMS

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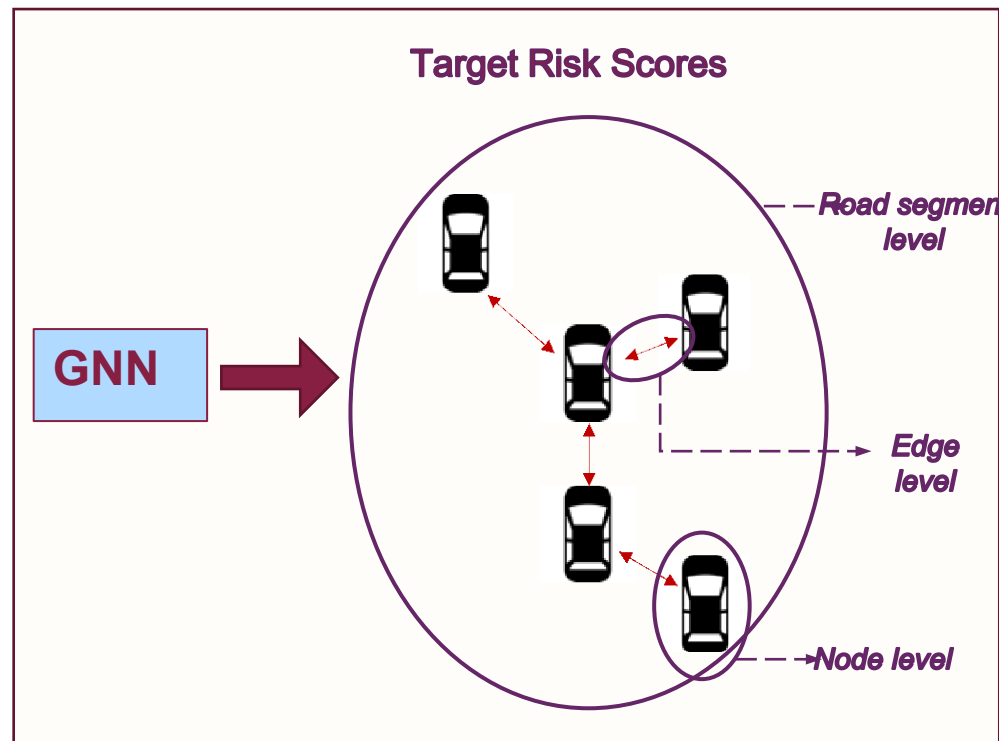
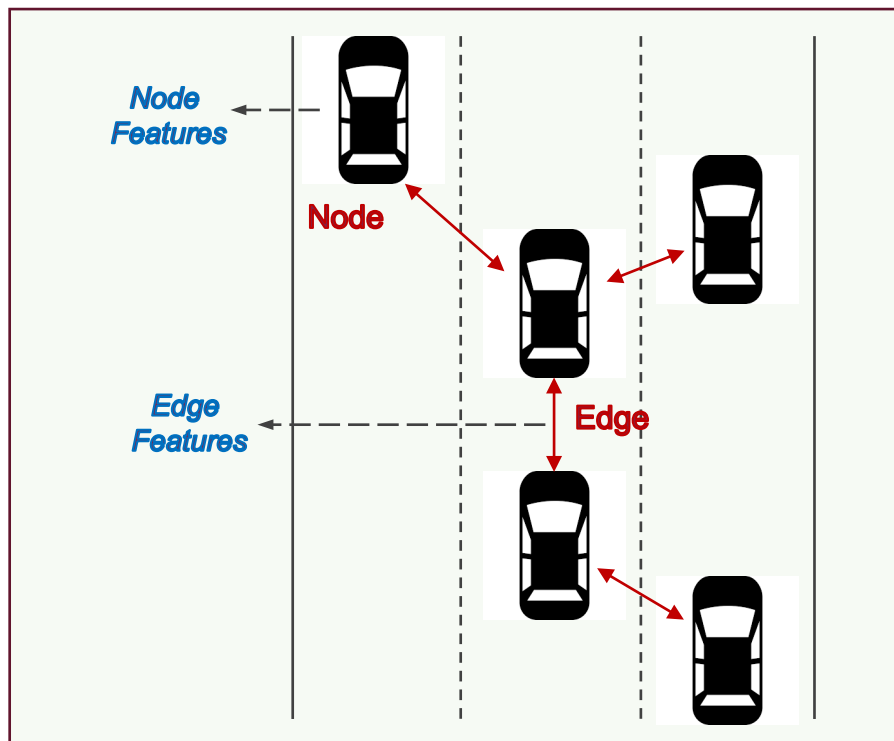
ABOUT ME

TRAFFIC MONITORING





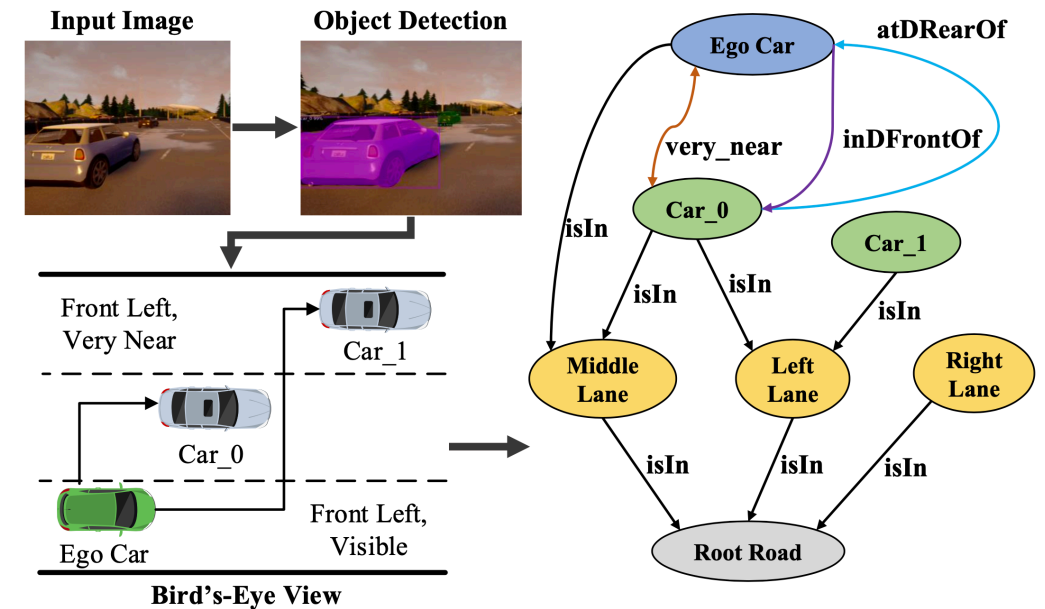
Traffic as graph



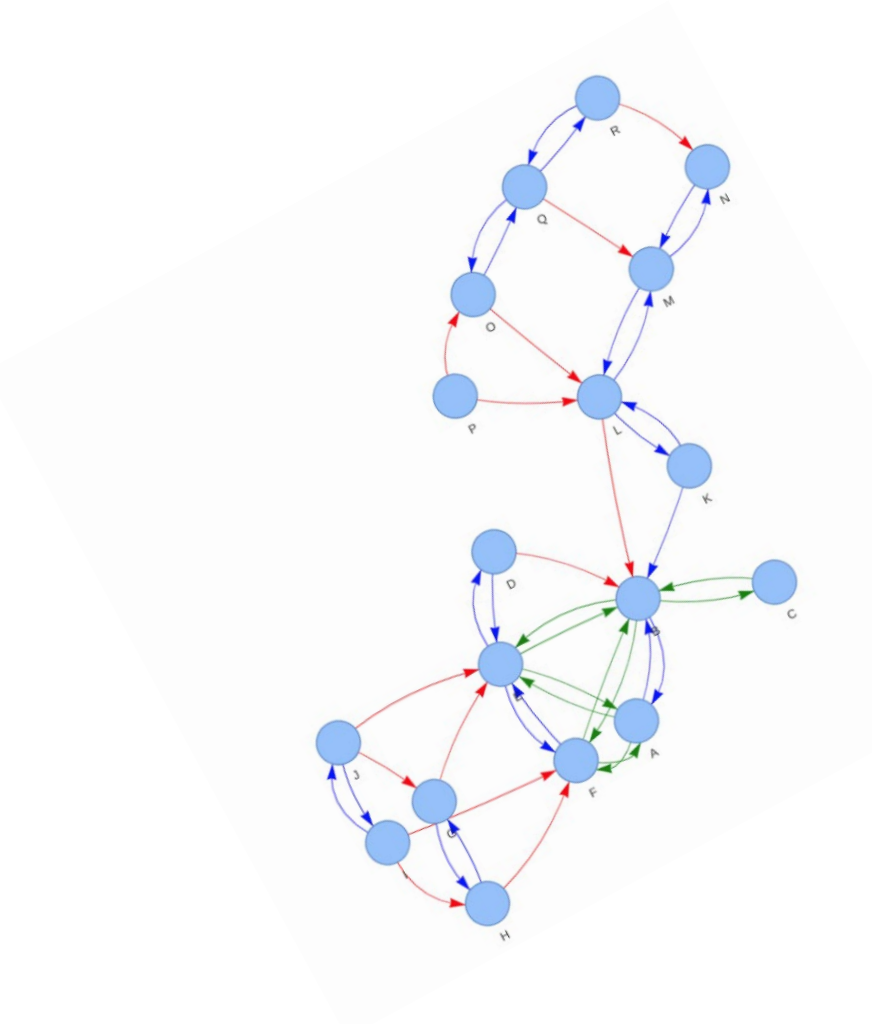
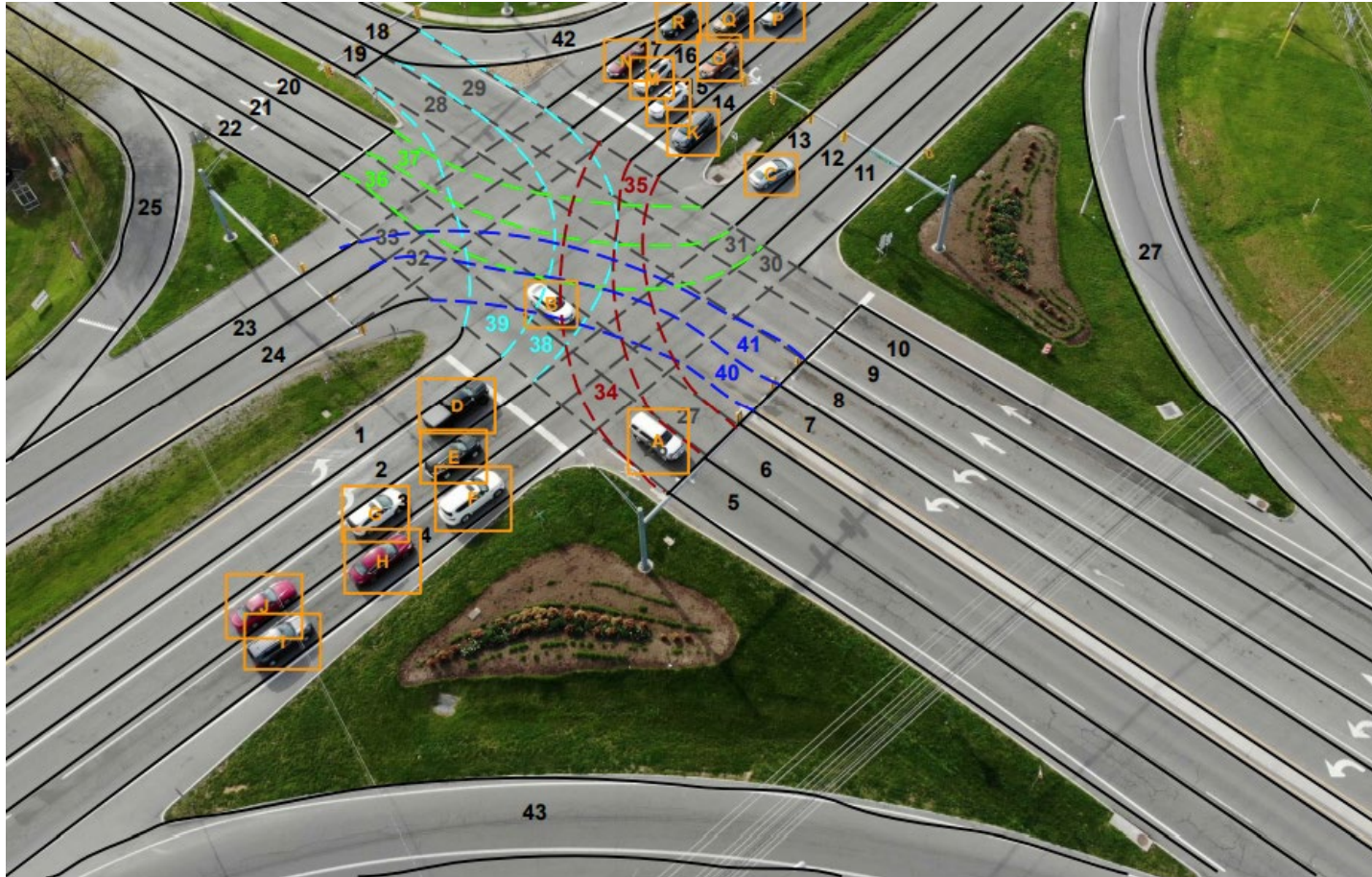
The power of graph and GNN

- We can integrate information from all vehicles, VRUs, and infrastructure
- Graph theory is a matured field
 - Encodes structural complexity and dependancies
- Graph neural network has revolutionized how we can process graph at scale
 - Information fusion
 - Information propagation
 - Transferability

Malawade, A. V., Yu, S. Y., Hsu, B., Muthirayan, D., Khargonekar, P. P., & Al Faruque, M. A. (2022). Spatiotemporal scene-graph embedding for autonomous vehicle collision prediction. *IEEE Internet of Things Journal*, 9(12), 9379-9388.



Graph representation of intersection



Classification based on PET metric violations

Combining all data and training the models for predicting safe/unsafe based on the PET metric violations.

Trained model can be used to make predictions on new scenarios.

	Graph Attention [10]	Graph Conv [11]
Accuracy	72.9%	79.85%

Pred\GT	P	N
P	0.804	0.231
N	0.196	0.769

[10] Yunsheng Shi, Zhengjie Huang, Shikun Feng, Hui Zhong, Wenjin Wang, and Yu Sun. Masked label prediction: Unified message passing model for semi-supervised classification. arXiv preprint arXiv:2009.03509, 2020.

[11] Weihua Hu, Bowen Liu, Joseph Gomes, Marinka Zitnik, Percy Liang, Vijay Pande, and Jure Leskovec. Strategies for pre-training graph neural networks. arXiv preprint arXiv:1905.12265, 2019.

Thank you!

Questions?

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