Jiachen Li

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Research Interests

My research interests lie in the intersection of machine learning, pattern recognition, reinforcement learning, computer vision, control and optimization approaches and their applications to relational reasoning, motion prediction, sequential decision making and state estimation for intelligent systems (e.g. autonomous vehicles, robots).

- **Fields**: Robotics, Machine Learning, Pattern Recognition, Computer Vision, Control and Optimization
- **Topics**: Graph Neural Networks, Relational Reasoning, Continual Learning, Generative Modeling, Reinforcement Learning, Trajectory/Motion Prediction, Sequential Decision Making, Autonomous Driving, Behavior Recognition

Education

University of California, Berkeley — **Berkeley, CA, USA**
Ph.D. in Mechanical Engineering (Robotics) — *08/2016 – Present*
– Academic advisor: Prof. Masayoshi Tomizuka
– Specialization: machine learning, graph neural network, relational reasoning, prediction, decision making

Harbin Institute of Technology — **Harbin, China**
B. Eng. in Automation (Honors School) — *08/2012 – 07/2016*
– Academic advisors: Prof. Huijun Gao and Prof. Shen Yin
– Thesis: Partial Least Squares and Its Application to Process Control

Research Experience

University of California, Berkeley — **Berkeley, CA, USA**
Graduate Student Researcher — *08/2016 - Present*
Mechanical Systems Control (MSC) Laboratory & Berkeley DeepDrive (BDD)

Harbin Institute of Technology — **Harbin, China**
Research Assistant — *03/2014 - 06/2016*
Research Institute of Intelligent Control and System

Work Experience

Honda Research Institute — **San Jose, CA, USA**
Research Intern — *09/2019 - Present*
Machine Learning and Computer Vision Team, Scene Understanding

Toyota Research Institute — **Los Altos, CA, USA**
Research Intern — *06/2019 - 08/2019*
Machine Learning and Planning Teams, Behavior Prediction

Publications

Preprints / Under Review

[7] **J. Li**, H. Ma, Z. Zhang, J. Li and M. Tomizuka, "Spatio-Temporal Graph Dual-Attention Network for Multi-Agent Prediction and Tracking", submitted to *IEEE Transactions on Intelligent Transportation Systems*, under review.

[6] H. Ma*, Y. Sun*, **J. Li**, L. Rong and M. Tomizuka, "CIA-TP: Continual Interaction-Aware Trajectory Prediction across Different Scenarios", submitted to *IEEE Transactions on Intelligent Transportation Systems*, under review.

[5] C. Gong, X. Zhou, Z. Li, **J. Li**, J. Gong and J. Zhou, "Orientation-Aware Planning for Parallel Task Execution of Omni-Directional Mobile Robot", submitted to *IEEE Robotics and Automation Letters*, under review.

[4] **J. Li**, F. Yang, H. Ma, S. Malla, M. Tomizuka and C. Choi, "RAIN: Reinforced Hybrid Attention Inference Network for Motion Forecasting", submitted to *CVPR 2021*, under review.

[3] C. Choi, J. H. Choi, **J. Li** and S. Malla, "Shared Cross-Modal Trajectory Prediction for Autonomous Driving", submitted to *CVPR 2021*, under review.

[2] X. Ma, **J. Li**, M. J. Kochenderfer, D. Isele and K. Fujimura, "Reinforcement Learning for Autonomous Driving with Latent State Inference and Spatial-Temporal Relationships", submitted to *ICRA 2021*, under review.

[1] D. Cao*, **J. Li***, H. Ma and M. Tomizuka, "Spectral Temporal Graph Neural Network for Trajectory Prediction", submitted to *ICRA 2021*, under review.

Journal Publications

[4] **J. Li**, W. Zhan, Y. Hu and M. Tomizuka, "Generic Tracking and Prediction Framework and Its Application in Autonomous Driving", *IEEE Transactions on Intelligent Transportation Systems*, 21(9), 3634-3649, 2020. (**Impact Factor: 6.319**)

[3] **J. Li**, C. Duan and Z. Fei, "A Novel Variable Selection Approach for Redundant Information Elimination Purpose of Process Control", *IEEE Transactions on Industrial Electronics*, 63(3), 1737-1744, 2016. (**Impact Factor: 7.515**)

[2] C. Duan, Z. Fei and **J. Li**, "A Variable Selection Aided Residual Generator Design Approach for Process Control and Monitoring", *Neurocomputing*, 171, 1013-1020, 2016. (**Impact Factor: 5.190**)

[1] S. Shi, Z. Fei and **J. Li**, "Finite-time Hinf Control of Switched Systems with Mode-dependent Average Dwell Time", *Journal of the Franklin Institute*, 353(1), 221-234, 2016. (**Impact Factor: 4.036**)

Conference Publications

[9] **J. Li***, F. Yang*, M. Tomizuka and C. Choi, "EvolveGraph: Multi-Agent Trajectory Prediction with Dynamic Relational Reasoning", in *Advances in Neural Information Processing Systems (NeurIPS)*, 2020.

[8] **J. Li**, H. Ma, and M. Tomizuka, "Conditional Generative Neural System for Probabilistic Trajectory Prediction", in *2019 IEEE Conference on Robotics and Systems (IROS) (Oral)*, 2019.

[7] **J. Li***, H. Ma* and M. Tomizuka, "Interaction-aware Multi-agent Tracking and Probabilistic Behavior Prediction via Adversarial Learning", in *2019 IEEE Conference on Robotics and Automation (ICRA)*, 2019.

[6] **J. Li**, H. Ma, W. Zhan and M. Tomizuka, "Coordination and Trajectory Prediction for Vehicle Interactions via Bayesian Generative Modeling", in *2019 IEEE Intelligent Vehicles Symposium (IV)*, 2019.

[5] H. Ma, **J. Li**, W. Zhan and M. Tomizuka, "Wasserstein Generative Learning with Kinematic Constraints for Probabilistic Interactive Driving Behavior Prediction", in *2019 IEEE Intelligent Vehicles Symposium (IV)*, 2019.

[4] **J. Li**, H. Ma, W. Zhan and M. Tomizuka, "Generic Probabilistic Interactive Situation Recognition and Prediction: From Virtual to Real", in *2018 IEEE International Conference on Intelligent Transportation*

Systems (ITSC) (Oral), 2018.

[3] **J. Li**, W. Zhan and M. Tomizuka, "Generic Vehicle Tracking Framework Capable of Handling Occlusions Based on Modified Mixture Particle Filter", in *2018 IEEE Intelligent Vehicles Symposium (IV) (Oral)*, 936-942, 2018.

[2] W. Zhan, L. Sun, Y. Hu, **J. Li** and M. Tomizuka, "Towards a Fatality-Aware Benchmark of Probabilistic Reaction Prediction in Highly Interactive Driving Scenarios", in *2018 IEEE International Conference on Intelligent Transportation Systems (ITSC) (Oral)*, 2018.

[1] W. Zhan, **J. Li**, Y. Hu and M. Tomizuka, "Safe and Feasible Motion Generation for Autonomous Driving via Constrained Policy Net", in *Industrial Electronics Society, IECON 2017-43rd Annual Conference of the IEEE*, 4588-4593, 2017.

Workshop Publications

[2] **J. Li***, F. Yang*, M. Tomizuka and C. Choi, "EvolveGraph: Multi-Agent Trajectory Prediction with Dynamic Relational Reasoning", in *NeurIPS Workshop on Machine Learning for Autonomous Driving*, 2020.

[1] **J. Li**, H. Ma, Z. Zhang and M. Tomizuka,"A^2-GNN: Interaction-Aware Trajectory Prediction via Graph Double-Attention Network", *RSS Workshop on Interaction and Decision-Making in Autonomous Driving*, 2020.

Patent Applications

[4] **J. Li** and C. Choi, "System and Method for Motion Forecasting with Reinforced Hybrid Attention Inference Network", application in process, 2020.

[3] **J. Li** and C. Choi, "System and Method for Trajectory Prediction with Evolving Interaction Graphs", application in process, 2020.

[2] X. Ma, **J. Li**, M. J. Kochenderfer, D. Isele and K. Fujimura, "System and Method of Reinforcement Learning for Autonomous Driving with Latent State Inference and Spatial-Temporal Relationships", application in process, 2020.

[1] B. Wulfe, J. Ge and **J. Li**, "Systems and Methods for Hybrid Prediction Framework with Inductive Bias", application in process, 2019.

Selected Awards and Honors

- Top Reviewer for ICML 2020 *2020*
- UC Berkeley Graduate Student Travel Grant *2018, 2019*
- Top Ten Outstanding Graduate at Harbin Institute of Technology *2016*
- Chunhui Innovation Fellowship (Top 1%) *2016*
- Suzhou Industry Fellowship *2015*
- Meritorious Winner, Mathematical/Interdisciplinary Contest in Modeling *2015*
- China Renmin Scholarship *2013, 2014, 2015, 2016*

Invited Talks and Oral Presentations

- A^2-GNN: Interaction-Aware Trajectory Prediction, *RSS 2020 Workshop* *07/2020*
- Conditional Generative Neural System for Trajectory Prediction, *IROS 2019* *11/2019*
- Incorporating Relational Reasoning in Multi-agent Trajectory Prediction, *IROS 2019 Workshop* *11/2019*
- Inductive Bias in Behavior Prediction Models, *Intelligent Control Lab, CMU* *08/2019*
- Generative Models for Probabilistic Trajectory Prediction, *IV 2019 Workshop* *06/2019*
- Probabilistic Interactive Situation Recognition and Prediction, *ITSC 2018* *11/2018*

- Generic Vehicle Tracking Framework Capable of Handling Occlusions, *IV 2018* *06/2018*

Academic Services

Journal Reviewer

- IEEE Transactions on Pattern Analysis and Machine Intelligence (T-PAMI) *2020 – Present*
- IEEE Transactions on Robotics (T-RO) *2020 – Present*
- Neural Computing and Applications (NCAA) *2020 – Present*
- IEEE Transactions on Mechatronics (T-MECH) *2019 – Present*
- IEEE Transactions on Intelligent Vehicles (T-IV) *2018 – Present*
- IEEE Transactions on Intelligent Transportation Systems (T-ITS) *2017 – Present*
- IEEE Transactions on Industrial Electronics (T-IE) *2017 – Present*

Conference Reviewer

- Adcances in Neural Information Processing Systems (NeurIPS) *2020*
- International Conference on Machine Learning (ICML) *2020, 2021*
- IEEE International Conference on Robotics and Automation (ICRA) *2019, 2020, 2021*
- IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS) *2019, 2020*
- IEEE Intelligent Vehicles Symposium (IV) *2019, 2020*
- IEEE Conference on Intelligent Transportation Systems (ITSC) *2019, 2020*

Program Committee

- Associate Editor of *IEEE Intelligent Vehicles Symposium (IV)* *2020, 2021*
- Co-organizer of Workshops at *IEEE Intelligent Vehicle Symposium (IV)* *2019, 2020*

Research Mentoring

- Undergraduate students *2019 – Present*
- Master students *2020 – Present*

Computer Skills

- **Programming**: Python, C & C++, MATLAB/Simulink
- **Deep Learning Framework**: PyTorch, TensorFlow, Caffe
- **Design and Simulation**: ROS, Multisim, AutoCAD, OrCAD