

# Li Ding

*“I have no special talent. I am passionately curious.” (Einstein, 1952)*

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RESEARCH INTERESTS	Deep Learning, Computer Vision, Data Science, Autonomous Vehicles
EDUCATION	<b>Massachusetts Institute of Technology</b> , Cambridge, MA                      2019.9 - present <i>Graduate Study in Electrical Engineering and Computer Science (non-degree)</i>  <b>University of Rochester</b> , Rochester, NY                      2016.6 - 2017.5 <i>M.S. in Data Science</i>  <b>Central University of Finance and Economics</b> , Beijing, China                      2012.9 - 2016.6 <i>B.S. in Statistics</i>
RESEARCH EXPERIENCE	<b>Massachusetts Institute of Technology</b> , Cambridge, MA                      2017.9 - present <i>Research Engineer</i> <ul style="list-style-type: none"><li>• Advisor: Dr. Lex Fridman and Dr. Bryan Reimer</li><li>• Work on research projects related to autonomous vehicles and human-centered AI, develop deep learning algorithms for driving scene perception and driver mental state monitoring.</li></ul> <b>University of Rochester</b> , Rochester, NY                      2017.5 - 2017.9 <i>Research Associate</i> <ul style="list-style-type: none"><li>• Advisor: Prof. Chenliang Xu</li><li>• Developed an algorithm for weakly-supervised action recognition, published in CVPR 2018.</li></ul>
PUBLICATIONS	PEER-REVIEWED <ul style="list-style-type: none"><li>• L. Fridman, <b>L. Ding</b>, B. Jenik, and B. Reimer, “Arguing Machines: Human Supervision of Black Box AI Systems That Make Life-Critical Decisions,” in <i>Proceedings of the IEEE Conference on Computer Vision and Pattern Recognition (CVPR): Workshop on Autonomous Driving</i>, 2019</li><li>• L. Fridman, D. E. Brown, M. Glazer, W. Angell, S. Dodd, B. Jenik, J. Terwilliger, A. Patsekin, J. Kindelsberger, <b>L. Ding</b>, S. Seaman, A. Mehler, A. Sipperley, A. Pettinato, B. D. Seppelt, L. Angell, B. Mehler, and B. Reimer, “MIT Advanced Vehicle Technology Study: Large-Scale Naturalistic Driving Study of Driver Behavior and Interaction with Automation,” <i>IEEE Access</i>, vol. 7, pp. 102021–102038, 2019</li><li>• <b>L. Ding</b> and C. Xu, “Weakly-Supervised Action Segmentation with Iterative Soft Boundary Assignment,” in <i>Proceedings of the IEEE Conference on Computer Vision and Pattern Recognition (CVPR)</i>, 2018.</li><li>• L. Fridman, H. Schmidt, J. Terwilliger, and <b>L. Ding</b>, “Human Interaction with Deep Reinforcement Learning Agents in Virtual Reality,” in <i>Advances in Neural Information Processing Systems (NeurIPS): Deep Reinforcement Learning Workshop</i>, 2018.</li></ul>

## PREPRINTS / TECHNICAL REPORTS

- **L. Ding** and L. Fridman, “Object as Distribution,” *arXiv preprint arXiv:1907.12929*, 2019.
- **L. Ding**, J. Terwilliger, R. Sherony, B. Reimer, and L. Fridman, “Value of Temporal Dynamics Information in Driving Scene Segmentation,” *arXiv preprint arXiv:1904.00758*, 2019.
- **L. Ding** and C. Xu, “Tricorner: A Hybrid Temporal Convolutional and Recurrent Network for Video Action Segmentation,” *arXiv preprint arXiv:1705.07818*, 2017.

## HONORS AND AWARDS

### SCHOLARSHIPS

- |   |      |
|---|------|
| Half-Tuition Scholarship for Graduate Study, <i>University of Rochester</i>         | 2016 |
| Excellent Youth of the Year (top 2%), <i>Central Univ. of Finance and Economics</i> | 2015 |

### COMPETITIONS

- |  |      |
|--|------|
| 4th Place (among 150 teams, top 3%), <i>MIT 6.869 Miniplaces Challenge</i> | 2019 |
| Bronze Medal (107th of 1972, top 6%), <i>Kaggle Data Science Bowl</i>      | 2017 |
| Meritorious Winner (top 5%), <i>COMAP Mathematical Contest In Modeling</i> | 2015 |

## RESEARCH PROJECTS

### **Large-Scale Driving Scene Segmentation** 2017 - present

*Research project at MIT, funded by Toyota Collaborative Safety Research Center*

- Lead the 3-year project on driving scene perception that consists of large-scale data annotation, algorithm development, system prototype deployment, and real-world evaluation.
- Propose a framework combining image representations and temporal dynamics in a joint-learning problem that reveals the contribution of each towards improving dynamic scene segmentation, under review at IEEE Transactions on Intelligent Vehicles.
- Develop a perceptive evaluation metric and a GAN-based generative and real-time diagnosis system for scene segmentation, based on a probabilistic representation of semantic images, under review at IEEE CVPR 2020.

### **Cognitive Load Estimation with Eye Dynamics Analysis** 2018 - present

*Research project at MIT, funded by Veoneer and AHEAD Consortium*

- Develop a real-time deep learning model for joint blink, pupil, and eye landmarks detection, apply temporal smoothing and physiological constraints to improve detection on videos.
- Propose methods using pupil movement dynamics to estimate human cognitive load.
- Manage large-scale data collection, annotation, and validation.

### **Black Betty: MIT Human-Centered Autonomous Vehicle** 2018 - present

*Research project at MIT, funded by Veoneer*

- Lead the development of a real-time camera-based perception and control system that enables semi-autonomous driving of a full-scale testing vehicle with on-board computation.
- Study the principles of shared autonomy, propose an arguing machine framework that improves machine prediction with human-in-the-loop, published in IEEE CVPR 2019 Workshop.
- Propose a statistics-based object representation for detecting highly-overlapped objects.

### **Human Action Recognition in Video Sequences** 2017

*Research project at Univ. of Rochester, funded by NSF BIGDATA*

- Study the action recognition and localization problem with different levels of supervision.
- Propose a training strategy and an improved deep learning architecture for weakly supervised action localization using only the order of actions, published in IEEE CVPR 2018.

PRESENTATIONS	Data-Driven Computer Vision Research for Human-Centered Autonomous Vehicles	2019.10
	<i>Invited talk at MIT CSAIL (Data Systems Group)</i>	
	Weakly-Supervised Action Segmentation with Iterative Soft Boundary Assignment	2018.6
	<i>Poster presentation at IEEE CVPR 2018</i>	
	Human Action Recognition with Deep Convolutional Neural Networks	2017.5
	<i>Poster presentation at Center for Integrated Research Computing, University of Rochester</i>	
PROFESSIONAL EXPERIENCE	<b>VisualDX</b> , Rochester, NY	2017.3 - 2017.5
	<i>Software Engineer Intern (Master Degree Practicum)</i>	
	<ul style="list-style-type: none"> <li>Worked on abnormal user behavior detection using sequence modeling on web requests.</li> </ul>	
	<b>PricewaterhouseCoopers</b> , Shanghai, China	2016.1 - 2016.4
	<i>Data Scientist Intern</i>	
	<ul style="list-style-type: none"> <li>Worked on statistical machine learning with large-scale insurance data.</li> </ul>	
ACADEMIC EXPERIENCE	REVIEWER	
	IEEE Transactions on Circuits and Systems for Video Technology	2018
	IEEE Access	2018
	TEACHING ASSISTANT	
	MIT 6.S094: Deep Learning for Self-Driving Cars	Winter 2018, 2019
	MIT 6.S093: Human-Centered Artificial Intelligence	Winter 2019
	MIT 6.S099: Artificial General Intelligence	Winter 2018
	SIDE PROJECTS	
	Create tutorials and competitions for MIT Deep Learning courses (6k stars on Github)	
	Prepare interview materials for MIT AI Podcast (5M views on Youtube)	
MISC.	Language: Mandarin Chinese (native), English (working proficiency).	
	Programming: Python, JavaScript, C++.	
	Deep Learning: TensorFlow, PyTorch, Keras, TensorFlow.js.	
	Others: Linux/Unix, Bash, Git, L <sup>A</sup> T <sub>E</sub> X, Docker, OpenCV, FFmpeg, ROS, MySQL.	