Jinkyu Kim

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Education

Univ. of California, Berkeley — *Berkeley, CA, USA*
Ph.D. in Computer Science (Advisor: Prof. John Canny) — *Sep 2015 - Dec 2019*

Korea University — *Seoul, South Korea*
Master in Electrical Computer Engineering (Advisor: Prof. Sungroh Yoon) — *Sep 2008 - Aug 2010*

Korea University — *Seoul, South Korea*
Bachelor in Electrical Engineering — *Mar 2005 - Aug 2008*
- *Summa Cum Laude* (GPA: 4.45/4.5) from the College of Engineering

Current Research Interests

1. eXplainable AI (XAI)

Deep networks have shown promise for end-to-end control of self-driving vehicles, but such networks are notoriously cryptic. There are no interpretable states or labels in such a network, and representations are fully distributed as sets of activations. Interpretability is important for a number of reasons: (i) user acceptance – self-driving vehicles are a radical technology for users to accept, and require a very high level of trust, (ii) understanding and extrapolation of vehicle behavior – users ideally should be able to anticipate what a vehicle, and to communicate effectively it is important that they understand the reasons for its decisions.

Publications:

Jun 2020	**Jinkyu Kim and Mayank Bansal**, "Attentional Bottleneck: Towards an Interpretable Deep Driving Network"	*CVPRW*
Oct 2018	**Jinkyu Kim and John Canny**, "Explainable Deep Driving by Visualizing Causal Attention"	*The Springer Series on Challenges in Machine Learning*
Sep 2018	**Jinkyu Kim, Anna Rohrbach, Trevor Darrell, John Canny, and Zeynep Akata**, "Textual Explanations for Self-Driving Vehicles"	*ECCV*
Dec 2017	**Jinkyu Kim, Anna Rohrbach, Trevor Darrell, John Canny, and Zeynep Akata**, "Show, Attend, Control, and Justify: Interpretable Learning for Self-Driving Cars"	*NeurIPS Symposium*
Oct 2017	**Jinkyu Kim and John Canny**, "Interpretable Learning for Self-Driving Cars by Visualizing Causal Attention"	*ICCV*

2. Advisable AI

Recent success suggests that deep neural control networks are likely to be a key component of self-driving vehicles. These networks are trained on large datasets to imitate human actions, but they lack semantic understanding of image contents. This makes them brittle and potentially unsafe in situations that do not match training data. Here, we propose to address this issue by augmenting training data with natural language advice from a human. Advice includes guidance about what to do and where to attend. We present a first step toward advice giving, where we train an end-to-end vehicle controller that accepts advice. The controller adapts the way it attends to the scene (visual attention) and the control (steering and speed).

Publications:

June 2020	**Jinkyu Kim, Suhong Moon, Anna Rohrbach, Trevor Darrell, and John Canny**, "Advisable Learning for Self-driving Vehicles by Internalizing Observation-Action Rules"	*CVPR*
June 2020	**Jinkyu Kim, Suhong Moon, Anna Rohrbach, Trevor Darrell, and John Canny**, "Advisable Learning for Self-driving Vehicles by Internalizing Observation-Action Rules"	*CVPRW*
June 2019	**Jinkyu Kim, Teruhisa Misu, Yi-Ting Chen, Ashish Tawari, and John Canny**, "Grounding Human-to-Vehicle Advice for Self-driving Vehicles"	*CVPR*

3. Deep Driving

General perception is still unsolved and is the focus of major efforts within the research community. Perception is much more tractable within the context of autonomous driving. This is due to a number of factors. For example, the number of object classes is smaller, the classes are more distinct, rules offer a strong prior on what objects may be where at any point in time, and expensive, high-quality laser sensing is appropriate. Nevertheless, perception is still very challenging due to the extremely low acceptable error rate.

Publications:

Jinkyu Kim, Reza Mahjourian, Mayank Bansal, Scott Ettinger, Brandyn White, Ben Sapp, Dragomir Anguelov,
Under review

Reza Mahjourian, Jinkyu Kim, Mingxing Tan, Ben Sapp, Yuning Chai, Dragomir Anguelov,
Under review

Daehee Kim, Youngjun Yoo, Seunghyun Park, Jinkyu Kim, Jaekoo Lee,
Under review

Mar 2020	**Ye Xia, Jinkyu Kim, John Canny, Karl Zipser, and David Whitney**, "Periphery-Fovea Multi-Resolution Driving Model guided by Human Attention"	*WACV*
Dec 2018	**Ye Xia, Danqing Zhang, Jinkyu Kim, Ken Nakayama, Karl Zipser, and David Whitney**, "Predicting Driver Attention in Critical Situations"	*ACCV*
Nov 2018	**Jinkyu Kim, Hyunggi Cho, Myung Hwangbo, John Canny, and Youngwook Paul Kwon**, "Deep Traffic Light Detection for Self-driving Cars from a Large-scale Dataset"	*IEEE ITSC*
Jul 2018	**Donghan Lee, Youngwook Paul Kwon, Jinkyu Kim, and Jongsang Suh**, "A Novel Trajectory Prediction of Traffic Participants for Autonomous Lane Change Assistance"	*AVEC*

Projects:

Berkeley DeepDrive — *UC Berkeley*
Develop new and emerging technologies with real-world applications in the automotive industry. — *Sep 2016 - Dec 2019*

eXplainable AI (XAI) — *DARPA*
Produce more explainable models, which enable end-users to understand its rationale — *Sep 2017 - Dec 2019*

Previous Research Interests

1. Collaborative Analytics

As a great deal of data has been accumulated in various disciplines, the need for the integrative analysis of separate but relevant data sources is becoming more important. Combining data sources can provide global insight that is otherwise difficult to obtain from individual sources. Because of privacy, regulations, and other issues, many large-scale data repositories remain closed off from the outside, raising what has been termed the data silo issue. The huge volume of today's big data often leads to computational challenges, adding another layer of complexity to the solution.

Publications:

May 2016	**Jinkyu Kim, Heonseok Ha, Byung-Gon Chun, Sungroh Yoon, and Sang K. Cha**, "Collaborative Analytics for Data Silos"	*IEEE ICDE*
Dec 2015	**Heonseok Ha, Jinkyu Kim, and Sungroh Yoon**, "Distributed Ensemble Learning for Analyzing Nationwide Health-Insurance Databases"	*NeurIPS workshop*

2. Bioinformatics

Capillary electrophoresis (CE) of nucleic acids is a workhorse technology underlying high-throughput genome analysis and large-scale chemical mapping for nucleic acid structural inference. Despite the wide availability of CE-based instruments, there remain challenges in leveraging their full power for quantitative analysis of RNA and DNA structure, thermodynamics, and kinetics. In particular, the slow rate and poor automation of available analysis tools have bottlenecked a new generation of studies involving hundreds of CE profiles per experiment.

Publications:

Jul 2011	**Sungroh Yoon, Jinkyu Kim, Justine Hum, Hanjoo Kim, Seunghyun Park, Wipapat Kladwang and Rhiju Das**, "HiTRACE: High-throughput robust analysis for capillary electrophoresis"	*Bioinformatics (IF: 5.481)*
May 2011	**Jinkyu Kim, Hanjoo Kim, Hyeyoung Min and Sungroh Yoon**, "Constructing Accurate Contact Maps for Hydroxyl Radical Cleavage Based High-Throughput RNA Structure Inference"	*IEEE TBME (IF: 4.288)*
May 2009	**Jinkyu Kim, Seunghak Yu, Byonghyo Shim, Hanjoo Kim, Hyeyoung Min, Eui-Young Chung, Rhiju Das and Sungroh Yoon**, "A Robust Peak Detection Method for RNA Structure Inference by High-Throughput Contact Mapping"	*Bioinformatics (IF: 5.481)*

3. Others Econophysics | Computational Imaging | Computational Displays

May 2016	**Jinkyu Kim*, Xuaner Zhang*, Laura Waller, Brian A. Barsky, and Ren Ng**, "Free Your Eyes: Retinal Image Deblurring Display with Enlarged Viewing Zone" (*equally contributed)	*IEEE ICCP*
Jan 2014	**Jinkyu Kim, Wonyeol Lee, Jeonghoon Seo and Euiyeol Oh**, "An OLED Driving Currents Compensation Method with a CCD Camera"	*IEEE ICCE*
Jan 2013	**Jinkyu Kim, Gunn Kim, Sungbae An, Young-Kyun Kwon and Sungroh Yoon**, "Entropy-Based Analysis and Bioinformatics-Inspired Integration of Global Economic Information Transfer"	*PLOS ONE*

Professional Activities

Reviewer

AAAI (2020), CVPR (2019, 2020), ECCV (2020), NeurIPS (2018, 2019, 2020), ICCV (2019), ICLR (2019, 2020), ICML (2019), IEEE ITSC (2018, 2019), IROS (2020), IV (2019), T-IFS (2019)

Work Experience

Korea University — *Seoul, South Korea*
Assistant Professor — *03/01/2021 -*
- Department of Computer Science Engineering

Waymo LLC — *Mountain View, CA, USA*
Research Scientist (Full-time) — *01/27/2020 - 02/19/2021*
- Conditional Behavior Prediction for Self-driving Vehicles

Waymo LLC — *Mountain View, CA, USA*
Research Intern (Full-time) — *05/20/2019 - 08/23/2019*
- Explainable Learning for Self-driving Vehicles

Honda Research Institute — *Mountain View, CA, USA*
Research Intern (Full-time) — *05/14/2018 - 08/17/2018*
- Advisable Learning for Self-driving Vehicles

Honda Research Institute — *Mountain View, CA, USA*
Research Intern(Part-time) — *09/27/2018 - 12/14/2018*
- Advisable Learning for Self-driving Vehicles

Phantom AI Inc. (Start-up for Self-driving Vehicles) — *San Mateo, CA, USA*
Research Intern (Full-time) — *05/15/2017 - 08/11/2017*
- Low Latency Deep Neural Perception for Self-driving Cars

Phantom AI Inc. (Start-up for Self-driving Vehicles) — *San Mateo, CA, USA*
Research Intern (Part-time) — *09/19/2017 - 12/15/2017*
- Low Latency Deep Neural Perception for Self-driving Cars

Samsung SDS — *Seoul, South Korea*
Research Intern @Analytics Lab — *07/06/2015 - 07/24/2015*
- Deep Anomalies Detection for Manufacturing Process

Seoul National University — *Seoul, South Korea*
Research Assistant @SNU Data Science & Artificial Intelligence Lab — *07/01/2014 - 05/31/2015*
- Collaborative Analytics by Ensemble Learning for Resolving Data-Silo issues

LG Display Co. Ltd. — *Seoul, South Korea*
Research Engineer @Research Center — *11/30/2010 - 03/14/2014*
- Display Device Image Quality Optimization & SW Algorithm Development
- For the fulfillment of three years of mandatory military service in South Korea

Collaborators

2019- **Applied Research Team**, Waymo LLC, USA
2018- **Human-Machine Interaction Research Team**, Honda Research Institute, USA
2017- **Zeynep Group**, Univ. of Amsterdam Computer Science
2017- **Darrell Group**, Berkeley Computer Science
2017- **Whitney Group**, Berkeley Psychology
2017- **Deep Perception Team**, Phantom AI Inc, USA
2016- **Computational Imaging Research Group**, Berkeley Computer Science

Scholarship & Awards

2016 **Frank and Margaret Lucas Scholarship**, UC Berkeley *Scholarship*
2015 **Samsung Scholarship**, Samsung Foundation *Scholarship*
2015 **Fulbright Graduate Program Award (*Declined*)**, Fulbright *Scholarship*
2013 **CEO Award (Best Research Engineer)**, LG Display Co., Ltd. *Award*
2009 **STX Scholarship**, STX Foundation *Scholarship*
2008 **Summa Cum Laude**, Korea University *Award*
2008 **STX Scholarship**, STX Foundation *Scholarship*
2005 **Undergraduate Scholarship**, Korea University *Scholarship*