Gukyeong Kwon

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Education

- **Georgia Institute of Technology** — Atlanta, GA
  Ph.D. in Electrical and Computer Engineering (Advisor: Dr. Ghassan AlRegib) — *August 2015 – Present*
  M.S. in Electrical and Computer Engineering (GPA: 4.0/4.0) — *August 2015 – May 2018*
- **Sungkyunkwan University (SKKU)** — Suwon, South Korea
  B.S. in Electronic and Electrical Engineering (GPA: 4.29/4.5) — *March 2009 – August 2015*

Research and Project

- **Characterizing Missing Knowledge in Deep Networks** — Georgia Tech
  Graduate Research Assistant — *January 2019 – Present*
  - Proposed a gradient-based representation for characterizing knowledge that deep networks have not learned during training and ensuring the robustness of deep networks.
  - Developed an anomaly detection algorithm based on the backpropagated gradient representation and achieved the state-of-the-art performance on MNIST, fMNIST, CIFAR-10, and CURE-TSR using PyTorch.
- **Aberrant Event Detection for Autonomous Vehicles** — Georgia Tech
  Graduate Research Assistant — *August 2018 – Present*
  - Developed algorithms to detect driving events occurring in unexpected ways to ensure safe autonomous driving.
  - Incorporated out-of-distribution detection into Faster-RCNN to detect abnormal objects in driving scenes.
- **Vision-Based Driver's Misbehavior Detection** — Panasonic Automotive
  Deep Learning Research Intern — *May 2018 – July 2018*
  - Developed driver's misbehavior detection algorithms through deep learning-based pose estimation and hand detection for autonomous vehicles using Tensorflow and C++.
  - Improved computational time for hand detection algorithm 99.97% and showcased developed algorithms in the Ford Innovation Drive and Tech Expo 2018.
- **Robust Visual Understanding Under Challenging Conditions** — Georgia Tech
  Graduate Research Assistant — *September 2017 – December 2017*
  - Introduced a large-scale (>2,000,000 images) traffic sign recognition dataset (CURE-TSR) which is among the most comprehensive datasets with controlled synthetic challenging conditions.
  - Benchmarked the robustness of data-driven algorithms and analyzed shortcomings using PyTorch.

Publications

- G. Kwon*, M. Prabhushankar*, D. Temel and G. AlRegib, "**Distorted Representation Space Characterization Through Backpropagated Gradients**," *2019 IEEE International Conference on Image Processing (ICIP), Taipei, Taiwan, 2019.* (*: equal contribution, ***Best Paper Award (top 0.1%)***) [arXiv] [GitHub] [Poster]
- M. Prabhushankar*, G. Kwon*, D. Temel and G. AlRegib, "**Semantically Interpretable and Controllable Filter Sets**," *2018 25th IEEE International Conference on Image Processing (ICIP), Athens, 2018.* (*: equal contribution) [arXiv] [GitHub] [Poster]
- D. Temel, G. Kwon*, M. Prabhushankar*, and G. AlRegib, "**CURE-TSR: Challenging Unreal and Real Environments for Traffic Sign Recognition**," *MLITS workshop in Neural Information Processing Systems (NIPS)*, Long Beach, U.S.A, 2017. (*: equal contribution) [arXiv] [GitHub] [Poster]
- M. Aabed, G. Kwon, and G. AlRegib, "**Power of Tempospatially Unified Spectral Density for Perceptual Video Quality Assessment**," *2017 IEEE International Conference on Multimedia and Expo (ICME), Hong Kong, 2017.* (***Finalist of the World's FIRST 10K Best Paper Award (top 3%)***) [arXiv] [GitHub] [Slides]

Awards & Scholarships

- **Best Paper Award (Top 0.1%) @ ICIP 2019** — September 2017
- **Finalist of the World's FIRST 10K Best Paper Award (Top 3%) @ ICME 2017** — July 2017
- **National Science Engineering Scholarship** — March 2013

Programming Skills

- **Languages**: Python, MATLAB, C/C++, **Deep Learning Framework**: PyTorch, Tensorflow