Gukyeong Kwon

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Summary

I am a fifth-year Ph.D. student expected to graduate in Spring 2021. My research focuses on deep learning, computer vision, and image/video processing. I am seeking a Summer 2020 internship position related to my expertise.

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 Professional Experience

Graduate Research Assistant (*Advisor: Dr. Ghassan AlRegib*) — Georgia Tech, Atlanta, GA

- **Missing Knowledge Characterization in Deep Networks** — *January 2019 – Present*
  - Proposed a gradient-based representation for characterizing knowledge that deep networks have not learned during training to ensure the robustness of deep networks.
  - Developed an anomaly detection algorithm based on the gradient-based representation and achieved state-of-the-art performance on MNIST, fMNIST, CIFAR-10 with an average AUROC of 0.934, 0.973, and 0.664, respectively.
- **Aberrant Event Detection for Autonomous Vehicles** — *August 2018 – Present*
  - Developed an accident event detection algorithm to detect abnormal situations in driving scenarios such as a pedestrian jumping in front of a car or a bumper of car in the middle of road.
  - Incorporated out-of-distribution detection into Faster-RCNN to detect abnormal objects on the road.
- **Robust Visual Understanding Under Challenging Conditions** — *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 such as rain, snow, and haze.
  - Benchmarked the robustness of data-driven algorithms and analyzed shortcomings using PyTorch.

Deep Learning Research Intern (*Mentor: Dr. Jin Woo Jung*) — Panasonic Automotive, Atlanta, GA

- **Vision-Based Driver's Misbehavior Detection** — *May 2018 – July 2018*
  - Developed driver's misbehavior detection algorithms using deep learning-based pose estimation (OpenPose) and hand detection algorithms for autonomous vehicles using Tensorflow.
  - Improved computational time for the hand detection algorithm from 0.35 ms to 11 μs (99.97% $\uparrow$) using Caffe and C++ on NVIDIA GTX 1080 Ti and showcased developed algorithms in the Ford Tech Expo 2018.

Selected 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]

Programming Skills

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