Sungjun Yoon

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EDUCATION

Korea Advanced Institute for Science and Technology (KAIST), Daejeon, South Korea
M.S., in Electrical Engineering
GPA 3.72 / 4.3

Mar. 2016 ~ Feb. 2018

Sejong University, Seoul, South Korea
B.S., in Information and Communication
GPA 4.39 / 4.5, *1 ranked GPA in the College* (*Summa cum laude*)

Mar. 2009 ~ Feb. 2016

RESEARCH EXPERIENCE

iLab, LG Electronics

- Have researched a Convolutional Neural Network (CNN) based face parsing (i.e. face segmentation) algorithm focusing on data imbalance among facial labels.

Nov. 2021 ~ NOW

iLab, LG Electronics

- *Paper:*
  - *Perceptual Image Quality Assessment with Transformers*
  - *NTIRE 2021 Challenge on Perceptual Image Quality Assessment*
- *Award: Winner Award on NTIRE 2021, CVPRW*
- Proposed an image quality transformer (IQT) that is based on the transformer architecture for a perceptual full-reference image quality assessment (IQA).

Jan. 2021 ~ June 2021

iLab, LG Electronics

- *Paper: NTIRE 2020 Challenge on Image Demoireing*
- *Award: Honorable Mention Award on NTIRE 2020, CVPRW*
- Proposed a multi-scale based deep residual network and a novel adaptive pointwise convolution (APC) that uses spatially variant learnable kernel weights for each pixel feature in order to solve a single image demoireing problem.

Jan. 2020 ~ June 2020

Camera Research Lab, LG Electronics

- Researched and developed a real-time portrait segmentation algorithm based on the DeepLab v3 on the Android device with the Qualcomm Snapdragon 855 and Adreno 640 GPU using the Qualcomm SNPE and the TensorFlow.

Oct. 2018 ~ Dec. 2019

Video and Image Computing Lab, KAIST

- *Paper: A Study on Hierarchical CNN based Frame Rate Up-Conversion*
- *Award: Best Paper Award, Image Processing and Image Understanding (IPIU) 2018*
- Video frame interpolation for synthesizing frames to be interpolated using deep convolutional neural network (CNN)
- Proposed a novel CNN architecture which is called hierarchical shift-able convolution that estimates convolution kernels covering 357x357 receptive field at a time in order to handle high-speed motions.
- The proposed method can effectively solve large-scale regression problems when handling high resolution videos such as HD1080 and 4K UHD.

July 2017 ~ Dec. 2017

Video and Image Computing Lab, KAIST and SiliconWorks Inc.

- *Paper: Hierarchical Extended Bilateral Motion Estimation based Frame Rate Up - Conversion using Learning based Linear Mapping*
- Frame rate up-conversion for synthesizing frames to be interpolated using machine learning method, kernel ridge regression
- Proposed a hierarchical extended bilateral motion estimation and a novel frame synthesizing scheme which learns a structural edge information in voxel structures between neighboring frames.
- The proposed method significantly outperforms the state-of-the-art method with average 1.42dB higher in terms of peak signal-to-noise ratio (PSNR).

Jan. 2017 ~ Sep. 2017

Video and Image Computing Lab, KAIST

- Self-example based Super-Resolution for single image
- Improved the SR algorithm, 2013 CVPR "*Fast Image Super-Resolution Based on In-place Example Regression*" which assumes characteristics of blur caused by Gaussian smoothing filter and Bicubic interpolation are similar.
- The proposed method outperformed the 2013 CVPR SR algorithm with 1.11dB higher in terms of peak signal-to-noise ratio (PSNR) in Set5 dataset.

Mar. 2016 ~ June 2016

Multimedia Signal Processing Lab, Sejong University

- *Paper: Weighted DCT-IF for Image up Scaling*
- When resizing images, conventional interpolation filters including the DCT-IF which is adopted for intra-prediction in 5th video codec, HEVC standards tend to make poorly high frequency corresponding to edge which is important for subjective visual quality.
- The proposed method interpolates pixels with high frequency by learning relationships between low-resolution and adaptive edge enhanced patches in the DCT domain.

Sep. 2014 ~ Jan. 2016

WORK and PROJECT EXPERIENCE

iLab, LG Electronics

- Have developed the deep-learning based face detector that works on Amazon Elastic Compute Cloud (Amazon EC2) (e.g. g4dn.xlarge) under the Amazon Elastic Kubernetes Service (Amazon EKS) environment.
- My role is as follows:
  - Researching and optimizing the deep-learning based face detector (e.g. RetinaFace) with the TensorRT and the AWS Neuron. *(Github: https://github.com/vujadeyoon/TensorRT-Torch2TRT)*
  - Developing the data plane in the Amazon EKS to release the researched and developed deep-learning algorithms for service on the AWS cloud.

June 2020 ~ NOW

iLab, LG Electronics

- Developed a solution for real-time automatic zoom utilizing facial landmarks detector based on the inception modules on the Android device using the OpenCV and the Qualcomm SNPE.

Sep. 2019 ~ Sep. 2020

Big Data Architect, SK

- Implemented deep learning based anomaly detection algorithm, *2018 ICLR "Deep Autoencoding Gaussian Mixture Model for Unsupervised Anomaly Detection"* using PyTorch and researched anomaly detection for time-series data such as network KPI data.

Jan. 2018 ~ July 2018

Video and Image Computing Lab, KAIST

- *Github: https://github.com/vujadeyoon/MATLAB2016b-imresize*
- Implemented MATLAB built-in function, imresize(), which includes anti-aliasing filter for down-scaling and interpolation filter for image resizing such as i) nearest neighbor method, ii) bilinear, iii) bicubic, iv) lanczos2 (4-tab filter), v) lanczos3 (6-tab filter) with C language.

Jan. 2018

Video and Image Computing Lab, KAIST

- Implemented CNN based Super-Resolution algorithm with CUDA and OpenGL for real-time application.

Sep. 2017 ~ Oct. 2017

GoormEDU, Codigm Inc.

- Coding class instructor for C and C++ language

May 2017 ~ July 2017

Video and Image Computing Lab, KAIST and SiliconWorks Inc.

- Implemented Super-Resolution algorithm, *2016 IEEE TIP "Super-interpolation with edge-orientation-based mapping kernels for low complex 2× upscaling"* with C language.
- Hardware-friendly algorithm optimization considering memory bandwidth and computational complexity

Jan. 2016 ~ Feb. 2016

Human Computer Interaction Lab, Sejong University

- *Github: https://github.com/vujadeyoon/Speech-Enhancement-Spectral-Subtraction*

- Implemented spectral subtraction module for noise reduction in speech signal.

Dec. 2013 ~ Feb. 2014

Volunteer Experience

Volunteer staff, PyCon Korea

- PyCon Korea is a non-commercial conference held by Python Programming Communities in Korea

Aug. 2018

INTERESTS

Machine learning and deep learning for computer vison
Computational optimization for deep learning
On-device AI, AI on the cloud computing
Super-Resolution, Video Frame Interpolation, Frame Rate-Up Conversion
Face and facial landmarks detection, Face parsing

PUBLICATION

V. Ivan, I. Mistreanu, A. Leica, **S. Yoon**, M. Cheon, J. Lee, and J. Oh, "Improving Key Human Features for Pose Transfer", in *IEEE/CVF International Conference on Computer Vision Workshop (ICCVW)*, Oct. 2021, Virtual site.

M. Cheon, **S. Yoon**, B. Kang, and J. Lee, "Perceptual Image Quality Assessment with Transformers", in *IEEE/CVF Conference on Computer Vision and Pattern Recognition Workshop (CVPRW)*, June 2021, Virtual site.

M. Cheon, **S. Yoon**, B. Kang, and J. Lee, "NTIRE 2021 Challenge on Perceptual Image Quality Assessment", in *IEEE/CVF Conference on Computer Vision and Pattern Recognition Workshop (CVPRW)*, June 2021, Virtual site.

M. Cheon, **S. Yoon**, B. Kang, and J. Lee, "NTIRE 2020 Challenge on Image Demoireing: Methods and Results", in *IEEE/CVF Conference on Computer Vision and Pattern Recognition Workshop (CVPRW)*, June 2020, Virtual site.

J. Lee, **S. Yoon**, J. Kim, and J. Han, "Weighted DCT-IF for Image up Scaling", in *KSII trans. on Internet and Information Systems (TIIS)*, Feb. 2019

S. Yoon, H. Kim, and M. Kim, "Hierarchical Extended Bilateral Motion Estimation based Frame Rate Up-Conversion using Learning based Linear Mapping", in *IEEE trans. on Image Processing (TIP)*, Dec. 2018.

S. Yoon, Y. Kim, and M. Kim, "A Study on Hierarchical CNN based Frame Rate Up-Conversion", in *30th Workshop on Image Processing and Image Understanding (IPIU)*, Feb. 2018, Maison Glad Jeju.

S. Yoon, and J. Han, "An adaptive scaler for UHD video", in 2015 Summer Conference on Korea *Society of Broadcasting Engineering (CKSBE)*, pp.173-176, July 2015, Jeju National University.

PATENT

Method for scaling a resolution and an apparatus thereof *(KR 10-2015-0075788 / 10-1702937)*	Jan. 2017
Method for scaling a resolution and an apparatus thereof *(KR 10-2015-0075786 / 10-1683378)*	Nov. 2016

HONORS AND AWARDS

Winner Award on NTIRE 2021, CVPRW	June 2021
Honorable Mention Award on NTIRE 2020, CVPRW	June 2020
Best Paper Award, Image Processing and Image Understanding (IPIU) 2018	Feb. 2018
National Government Scholarship, KAIST	2016 – 2017
Academic Scholarship Awards, Sejong University	2013 – 2015
Academic Scholarship Awards, Sejong University	2009

SKILLS

Programming

Courses taken: Programming 1 (C language), Programming 2 (C++ language), Introduction to Computer–I (Computer Architecture), Introduction to Computer – M (MATLAB), Computer, Architecture, Operating System, Computer Networks, Data Communication, Interpretation of Digital Systems

Academic activities: T.A. in Programming Structures for Electrical Engineering (Fall semester 2016 and Spring semester 2017)

- Professional programming skills: C, C++, MATLAB, Python, GPU Parallel processing (CUDA)
- Familiar framework and libraries: PyTorch, TensorFlow, Qualcomm SNPE, OpenCV

Math

Courses taken: Calculus1, Calculus 2, Mathematics for Engineers 1, Mathematics for Engineers 2, Probability and Random Variables, Random Process, Engineering Random Process, Linear Algebra, Matrix Computations for Signal Processing

Signal Processing

Courses taken: Signals and Systems, Digital Signal Processing, Information Theory

Machine Learning

Courses taken: Artificial Intelligence and Machine Learning, Dimension Reduction and Optimization Techniques

Image Processing and Computer Vision

Course taken: Image Processing, Digital Video Processing, Visual Communication Systems, Image Understanding

LANGUAGE

Korean – Native
English – Advanced

DATE OF PREPARATION

Jan. 18, 2022.