Sangwoo Cho

PH.D. STUDENT

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Research Interests

Natural Language Processing, Computer Vision, Machine Learning, Deep Learning, Text Summarization, Action Recognition

Education

University of Central Florida

Orlando, FL, USA

PHD STUDENT IN COMPUTER SCIENCE, ANTICIPATED GRADUATION IN DEC. 2020 — *Aug. 2015 - PRESENT*

- Dissertation: Contextual Understanding of Sequential Data Cross Multi-Modalities
- Advisors: Hassan Foroosh and Fei Liu

University of North Carolina

Chapel Hill, NC, USA

M.S IN COMPUTER SCIENCE — *Dec. 2014*

- Advisor: Jan-Michael Frahm

Korea University

Seoul, S. Korea

M.E IN ELECTRONICS AND COMPUTER ENGINEERING — *Feb. 2007*

- Thesis: Generating 2D and 3D indoor environment models for enabling interactive robot service
- Advisors: Yong-Moo Kwon and Hanseok Ko

Sogang University

Seoul, S. Korea

B.E IN ELECTRONIC ENGINEERING — *Feb. 2005*

- Thesis: Height measurement of arbitrary objects using a single image

Publications

Sangwoo Cho, Kaiqiang Song, Chen Li, Dong Yu, Hassan Foroosh, and Fei Liu. "Better Highlighting: Creating Sub-Sentence Summary Highlights." In Proceedings of the *2020 Empirical Methods in Natural Language Processing* ***(EMNLP)***, 2020

Sangwoo Cho, Muhammad Hasan Maqbool, Fei Liu, and Hassan Foroosh. "Self-Attention Network for Skeleton-based Human Action Recognition." In Proceedings of the *2020 IEEE Winter Applications of Computer Vision Conference* ***(WACV)***, Aspen, CO, USA, 2020

Sangwoo Cho, Chen Li, Dong Yu, Hassan Foroosh, and Fei Liu. "Multi-Document Summarization with Determinantal Point Processes and Contextualized Representations." In Proceedings of the *2019 Empirical Methods in Natural Language Processing* ***(EMNLP)****, Workshop*, Hong Kong, China, 2019

Sangwoo Cho, Logan Lebanoff, Hassan Foroosh, and Fei Liu. "Improving the Similarity Measure of Determinantal Point Processes for Extractive Multi-Document Summarization." In Proceedings of the *2019 Association for Computational Linguistics* ***(ACL)***, Florence, Italy, 2019. (Oral)

Sangwoo Cho and Hassan Foroosh. "Spatio-Temporal Fusion Networks for Action Recognition." In Proceedings of the *2018 Asian Conference on Computer Vision* ***(ACCV)***, Perth, Australia, 2018

Sangwoo Cho and Hassan Foroosh. "A Temporal Sequence Learning for Action Recognition and Prediction." In Proceedings of the *2018 IEEE Winter Applications of Computer Vision Conference* ***(WACV)***, Lake Tahoe, NV/CA, USA, 2018

Sangwoo Cho, Enrique Dunn, and Jan-Michael Frahm. "Rotation Estimation from Cloud Tracking." In Proceedings of the *2018 IEEE Winter Conference on Applications of Computer Vision* ***(WACV)***, Steamboat Springs, CO, USA, 2014

Experience

University of Central Florida

Orlando, FL, USA

RESEARCH ASSISTANT — *Aug. 2015 - PRESENT*

- **Text summarization**: A mathematical optimization technique for an extractive summarization method, Determinantal Point Processes (DPP), requires similarity and importance metric for pairs. Capsule Network and fine-tuned BERT models are used to compute better sentence similarity and importance scores for DPP. Also, XLNet is used to generate sub-sentence segments. (Pytorch, Keras, Tensorflow, Matlab)
- **Human action recognition**: Temporal CNN and Self-Attention network are used to retrieve short and long term temporal context from videos. Methods are based on different modalities: Images, optical flows, and joints of a human body. (Pytorch, Keras, Tensorflow, Matlab)
- **3D reconstruction of aerial objects**: 3D locations of target aerial objects in video frames are reconstructed with visual and sensor data. (Camera, IMU, GPS) Two methods are developed: A temporal stereo reconstruction, and a trajectory reconstruction of target objects. (C++, Python, Matlab, OpenCV, Eigen, Qt)

Adobe Research — *San Jose, CA, USA*

Research Intern — *May. 2020 - Sep. 2020*

- Developed supervised and unsupervised summarization systems based on transcripts of live streaming videos: a sentence-based Transformer model and a Transformer model with Vector Quantized Variational AutoEncoder (VQVAE) (Pytorch)

SRI International — *Princeton, NJ, USA*

Research Intern — *Jun. 2019 - Aug. 2019*

- Developed a Visual Question Answering (VQA) system based on a hierarchical Transformer model for explaining relations of text and image. (Pytorch)

Google — *Mountain View, CA, USA*

Software Engineer Intern — *May. 2017 - Aug. 2017*

- Developed a prototype software that calibrates a stereo camera that mimics eyes and a AR/VR device to render proper images from the point of view of two eyes. (C++, Python, OpenCV, Bash, Eigen, Ceres, Tango)

University of North Carolina — *Chapel Hill, NC, USA*

Research Assistant — *Aug. 2013 - Jul. 2014*

- Camera orientation estimation based on cloud image tracking (C++, Android)
- Query-based large scale image retrieval system: FINDER (C++, Python)

Samsung Electronics — *Suwon, S. Korea*

Research Engineer — *Feb. 2007 – Jun. 2012*

- Developed a stereo camera rectification software. (C++, OpenGL)
- Developed an intermediate viewpoint image generation software using stereo images for reducing stereo fatigue. (C++, MFC)
- Developed a stereoscopic image generation software based on 2D street-view image. (C++, MFC, Android)

Korea Institute of Science and Technology (KIST) — *Seoul, S. Korea*

Student Researcher — *Feb. 2005 – Jan. 2007*

- Developed an indoor 3D reconstruction system and designed an apparatus for data gathering consisting of a wide-view camera and a laser scanner. (C++, MFC)
- Developed an eye gaze tracking system. (C++, MFC)

602d Aviation Support Battalion, 2nd Infantry Division — *Uijeongbu, S. Korea*

Production Control Operator, KATUSA (Korean Augmentation To the U.S. Army) — *Nov. 2000 – Jan. 2003*

- Honor Graduation (9th place) of Primary Leadership Development Course (PLDC)

Computing Skills

Programming Language C/C++, Python, Matlab, Git, Java, Android, ReactJS, LaTeX

ML Tools / Library Pytorch, Tensorflow, Keras, Spacy, NLTK, MatConvNet, OpenCV, OpenGL, Eigen, Qt

Patents

Sangwoo Cho, Yong-Moo Kwon, Sung-Kyu Kim, Jeon Kyeong Won, Ki Jeongseok, "System And Method For 3-Dimensional Interaction Based On Gaze System And Method For Tracking 3-Dimensional Gaze.", Patent No. 1008206390000, 2008

Sangwoo Cho, Yong-Moo Kwon, "Apparatus And Method For Creating A Circumstance Map Of An Indoor Circumstance.", Patent No. 1007577510000, 2007

Sangwoo Cho, Yong-Moo Kwon, Sung-Kyu Kim, Jai Kyung Shul, Jinwoo Park, "Gaze-based Computer Interface Apparatus and Method of Using the Same.", Patent No. 100651104000, 2006

Awards

2019 **ACL Student Volunteer** — *Florence, Italy*

2019 **UCF Doctoral Research Support Award** — *Orlado, FL, USA*

2018, 2019 **UCF Graduate Presentation Fellowship** — *Orlado, FL, USA*