Sangwoo Cho

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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 IN COMPUTER SCIENCE — *May 2021*
- Dissertation: Contextual Understanding of Sequential Data Cross Multi-Modalities
- Advisors: Fei Liu and Hassan Foroosh

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, et al. One paper is under review in ***EMNLP***, 2021

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 - May 2021*
- **Text summarization**: Researched summarization methods that utilize a mathematical optimization method and deep neural models for different types of documents, news, transcript, and book: Determinantal Point Processes (DPP), and Capsule Network or BERT are combined for better context information retrieval; XLNet is used to find sub-sentence segments; and VQVAE is employed for training a unsupervised model. (Pytorch, Keras, Tensorflow, Matlab)
- **Human action recognition**: Researched Temporal CNN and Self-Attention network to retrieve short and long term temporal context from videos. Different modalities (images, optical flows, and body joints) are used for different methods. (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: temporal stereo reconstruction, and 3D trajectory reconstruction of target objects. (C++, Python, Matlab, OpenCV, Eigen, Qt)

Tencent AI Lab
Seattle, WA, USA

NLP RESEARCH INTERN, MENTOR: XIAOYANG WANG, KAIQIANG SONG
Jun. 2021 - Present

- Long document summarization

Adobe Research
San Jose, CA, USA

RESEARCH INTERN, MENTOR: FRANCK DERNONCOURT, TIM GANTER, WALTER CHANG
May. 2020 - Sep. 2020

- Developed a unsupervised summarization system for live streaming videos: a Vector Quantized Variational AutoEncoder (VQVAE) with Transformer encoder and decoder to summarize transcripts of streaming videos, which contain many chit-chats and dialogues unrelated to topics (Pytorch)

SRI International
Princeton, NJ, USA

RESEARCH INTERN, MENTOR: GIEDRIUS BURACHAS, YI YAO
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, MENTOR: HAOWEI LIU, DAVID GOSSOW
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, et, al., One patent pending in the USA.

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**	*Orlando, FL, USA*
2018, 2019	**UCF Graduate Presentation Fellowship**	*Orlando, FL, USA*