

Sangwoo Cho

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Research Interests

Natural Language Processing, Computer Vision, Deep Learning, Information Extraction, **Text Summarization, Multimodal Machine Learning**

Experience

Tencent AI Lab

SENIOR RESEARCH SCIENTIST

Seattle, WA, USA

Sep. 2021 - Present

- **Structure-Aware Summarization, User Specific Summarization**

Tencent AI Lab

RESEARCH INTERN, MENTOR: [KAIQIANG SONG](#), [XIAOYANG WANG](#)

Seattle, WA, USA

Jun. 2021 - Aug. 2021

- **Long Document Summarization:** Developed a summarization system that can take long input and select the important sentences using internal document structure and Determinantal Point Processes (DPP)

University of Central Florida

RESEARCH ASSISTANT

Orlando, FL, USA

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)

Adobe Research

RESEARCH INTERN, MENTOR: [FRANCK DERONCOURT](#), [TIM GANTER](#), [WALTER CHANG](#)

San Jose, CA, USA

May. 2020 - Sep. 2020

- **Transcript Summarization:** Developed a [unsupervised summarization system](#) using a [Vector Quantized Variational AutoEncoder \(VQVAE\)](#) to summarize transcripts of live streaming videos, which contain many chit-chats and dialogues that may be unrelated to topics (Pytorch)

SRI International

RESEARCH INTERN, MENTOR: [GIEDRIUS BURACHAS](#), [YI YAO](#)

Princeton, NJ, USA

Jun. 2019 - Aug. 2019

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

Google

SOFTWARE ENGINEER INTERN, MENTOR: [HAOWEI LIU](#), [DAVID GOSSOW](#)

Mountain View, CA, USA

May. 2017 - Aug. 2017

- **Eye to Device Calibration System:** Developed a software that calibrates a stereo camera that mimics eyes to an 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

RESEARCH ASSISTANT

Chapel Hill, NC, USA

Aug. 2013 - Jul. 2014

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

Samsung Electronics

RESEARCH ENGINEER

Suwon, S. Korea

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)

STUDENT RESEARCHER

Seoul, S. Korea

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

PRODUCTION CONTROL OPERATOR, KATUSA (KOREAN AUGMENTATION TO THE U.S. ARMY)

Uijeongbu, S. Korea

Nov. 2000 - Jan. 2003

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

Education

University of Central Florida

PHD IN COMPUTER SCIENCE

- Dissertation: [Contextual Understanding of Sequential Data Cross Multi-Modalities](#)
- Advisors: [Fei Liu](#) and [Hassan Foroosh](#)

[Orlando, FL, USA](#)

May 2021

University of North Carolina

M.S IN COMPUTER SCIENCE

- Advisor: [Jan-Michael Frahm](#) and [Enrique Dunn](#)

[Chapel Hill, NC, USA](#)

Dec. 2014

Korea University

M.E IN ELECTRONICS AND COMPUTER ENGINEERING

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

[Seoul, S. Korea](#)

Feb. 2007

Sogang University

B.E IN ELECTRONIC ENGINEERING

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

[Seoul, S. Korea](#)

Feb. 2005

Publications

Sangwoo Cho, et al. Long Document Summarization, Under Review

Sangwoo Cho, Franck Dernoncourt, Tim Ganter, Trung Bui, Nedim Lipka, Walter Chang, Hailin Jin, Jonathan Brandt, Hassan Foroosh, and Fei Liu. “StreamHover: Livestream Transcript Summarization and Annotation” In Proceedings of the 2021 Empirical Methods in Natural Language Processing (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

Patents

Sangwoo Cho, et al., Topical Vector-Quantized Variational Autoencoders for Extractive Summarization of Video Transcripts, In preparation

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](#)

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