Sangwoo Cho

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Research Interests

Natural Language Processing, Computer Vision, Machine Learning, Deep Learning, Information Extraction, 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

Experience

Tencent AI Lab
Seattle, WA, USA

Senior Research Scientist — *Sep. 2021 - Present*

Tencent AI Lab
Seattle, WA, USA

NLP Research Intern, Mentor: Xiaoyang Wang, Kaiqiang Song — *Jun. 2021 - Aug. 2021*

- Long document summarization

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)

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)

Publications

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** *Orlado, FL, USA*

2018, 2019 **UCF Graduate Presentation Fellowship** *Orlado, 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