Sangwoo Cho

PhD 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, Florida, USA*

PhD student in Computer Science, anticipated graduation in Dec. 2020 — *Aug. 2015 - PRESENT*

- Advisors: Hassan Foroosh and Fei Liu

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

Computing Skills

Programming Language C/C++, Python, Matlab, MFC, Android, Java, LaTeX

Framework and Library Pytorch, Tensorflow, Keras, Spacy, MatConvNet, NLTK, OpenCV, OpenGL, Eigen, Qt, Protocol Buffers, Git

Experience

University of Central Florida — *Orlando, Florida, 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 obtain sub-sentences for summarization. (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)

Adobe — *San Jose, CA, USA*

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

- Developed a supervised and unsupervised summarization system based on transcripts of live streaming videos (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, California, USA*

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

- Developed a prototype software that calibrates between eyes (a stereo camera) and a VR/AR device in order 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, North Carolina, 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

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

602d Aviation Support Battalion, 2nd ID

Uijeongbu, S. Korea

Production Control Operator, KATUSAs (Korean Augmentation to U.S. Army)

Nov. 2000 – Jan. 2003

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

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

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

2018	**Graduate Presentation Fellowship,** University of Central Florida	*USA*
2006	**Brain Korea 21 Program Scholarship,** Korean Research Foundation	*S. Korea*
2004	**1st Place,** Grand Award for Micromouse Competition at Sogang University	*S. Korea*
2003	**1st Place,** Grand Award for Academic Competition at Sogang University (Autonomous Mobile Robot)	*S. Korea*
2000	**3rd Place,** 1st National Intelligent Robot Competition	*S. Korea*