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RESEARCH INTERESTS

Reliable machine learning with limited supervisions. Real-world machine learning models often suffer from unreliability issues such as the lack of generalizability to biases and improper uncertainty estimation. A large amount of annotations in every possible situation, e.g., traffic signs with every possible weather condition, is required to reliable machine learning, which is impractical and unachievable in most cases. Instead of collecting or generating all possible situations, I am interested in developing reliable machine learning models with only limited supervision. In particular, I am interested in the following types of supervision: (1) human inductive bias without additional labeling, (2) extra multi-modal information related to the original task, (3) weak supervision, or semi-supervision which requires a reasonable number of additional annotations.

ACADEMIC PAPERS (PEER-REVIEWED CONFERENCES AND WORKSHOPS)

* *indicates equal contribution.*

[ICML'20] Learning De-biased Representations with Biased Representations.
Hyojin Bahng, **Sanghyuk Chun**, Sangdoo Yun, Jaegul Choo, Seong Joon Oh

[CVPR'20] Evaluating Weakly Supervised Object Localization Methods Right.
Junsuk Choe*, Seong Joon Oh*, Seongho Lee, **Sanghyuk Chun**, Zeynep Akata, Hyunjung Shim

[CVPR WS'20] Toward High-quality Few-shot Font Generation with Dual Memory.
Junbum Cha, **Sanghyuk Chun**, Gayoung Lee, Bado Lee, Seonghyeon Kim, Hwalsuk Lee

[ICASSP'20] Data-driven Harmonic Filters for Audio Representation Learning.
Minz Won, **Sanghyuk Chun**, Oriol Nieto, Xavier Serra

[ICCV'19] CutMix: Regularization Strategy to Train Strong Classifiers with Localizable Features.
Sangdoo Yun, Dongyoon Han, Seong Joon Oh, **Sanghyuk Chun**, Junseok Choi, Youngjoon Yoo

[ICCV'19] Photorealistic Style Transfer via Wavelet Transforms.
Jaejun Yoo*, Youngjung Uh*, **Sanghyuk Chun***, Byungkyu Kang, Jung-woo Ha

[ISMIR Late Break Demo'19] Automatic Music Tagging with Harmonic CNN.
Minz Won, **Sanghyuk Chun**, Oriol Nieto, Xavier Serra

[ICML WS'19] Visualizing and Understanding Self-attention based Music Tagging.
Minz Won, **Sanghyuk Chun**, Xavier Serra

[ICML WS'19] An Empirical Evaluation on Robustness and Uncertainty of Regularization methods.
Sanghyuk Chun, Seong Joon Oh, Sangdoo Yun, Dongyoon Han, Junsuk Choe, Youngjoon Yoo

[ICLR WS'19] Where To Be Adversarial Perturbations Added? Investigating and Manipulating Pixel Robustness Using Input Gradients.
Jisung Hwang*, Younghoon Kim*, **Sanghyuk Chun***, Jaejun Yoo, Jihoon Kim, Dongyoon Han

[BigData'17] A Study on Intelligent Personalized Push Notification with User History.
Hyunjong Lee, Youngin Jo, **Sanghyuk Chun**, Kwangseob Kim

ACADEMIC PAPERS (PREPRINTS)

* indicates equal contribution.

[arXiv'20] Slowing Down the Weight Norm Increase in Momentum-based Optimizers.
Byeongho Heo*, **Sanghyuk Chun***, Seong Joon Oh, Dongyoon Han, Sangdoo Yun, Youngjung Uh, Jung-Woo Ha

[arXiv'20] Few-shot Compositional Font Generation with Dual Memory.
Junbum Cha, **Sanghyuk Chun**, Gayoung Lee, Bado Lee, Seonghyeon Kim, Hwalsuk Lee

[arXiv'19] Neural Approximation of Auto-Regressive Process through Confidence Guided Skimming.
YoungJoon Yoo, **Sanghyuk Chun**, Sangdoo Yun, Jung-Woo Ha, Jaejun Yoo

[arXiv'19] Toward Interpretable Music Tagging with Self-attention.
Minz Won, **Sanghyuk Chun**, Xavier Serra

[arXiv'18] Multi-Domain Processing via Hybrid Denoising Networks for Speech Enhancement.
JangHyun Kim*, Jaejun Yoo*, **Sanghyuk Chun**, Adrian Kim, Jung-woo Ha

RESEARCH PRESENTATIONS

"Reliable Machine Learning", NAVER interactive sessions at CVPR 2020.

"Neural Architectures for Music Representation Learning", NAVER (2020).

"Learning generalizable representations with CutMix and ReBias", NAVER Labs Europe (2019).

"An empirical evaluation on the generalization ability of regularization methods",
ICML 2019 Expo Workshop: Recent Work on Machine Learning at NAVER (2019).

"Recent works on deep learning robustness in Clova AI Research",
ICLR 2019 Expo Talk Representation Learning to Rich AI Services in NAVER and LINE (2019).

"Recommendation system in the real world", Deepest Summer School (2018).

ACADEMIC ACTIVITIES

Reviewer CVPR 2020, NeurIPS 2020, WACV 2021.

WORK & RESEARCH EXPERIENCES

NAVER, Search & Clova   Feb 2018 - Now
Research Scientist at Clova AI Research   *Seongnam, Korea*

- Have participated in several research projects targeted at major machine learning related conferences such as ICML, NeurIPS, ICLR, CVPR, ICCV, ECCV and ICASSP. Please see the full paper list.
- Worked as the main developer for the personalized handwritten Korean font generation project. See `https://clova.ai/handwriting/list.html` for the full list of generated fonts.
- Worked as the main developer for a cross-domain emoji recommender system, which recommends emojis similar to the given human face. The whole production pipeline, including the data tagging system, the face detector system, the tag-based recommender system, and the serving API and demo, was covered.

Kakao corp.   Feb 2016 - Jan 2018
Research Engineer at ART (Advanced Recommendation Technology)   *Seongnam, Korea*

- Main developer of a large-scale real-time recommender system (Toros) for various services in Kakao.
  Textual domain: Daum News similar article recommendation, Brunch (blog service) similar post recommendation, Daum Cafe (community service) hit item recommendation.
  Visual domain: Daum Webtoon and Kakao Page (webcomic service) similar item recommendation, related video recommendation for a news article (cross-domain recommendation).

Musical domain: Personalized and similar music recommendation for Kakao Mini (smart speaker), Melon (the biggest music streaming service in Korea) and Kakao Music.

Online to offline: Kakao Hairshop personalized shop and style recommendation.

- Researches and tech transfers on machine learning based recommender systems; Content-based representation modeling for textual, visual, and musical domain, collaborative filtering (matrix factorization), hyperparameter optimization (bandit-based and Bayesian optimization), user embedding, user clustering (online clustering), and ranking system based on multi-armed bandit (online ranking system).

- Main developer of the personalized item push notification system for Daum news and webcomic services. The system can be interpretable to a personalized item recommendation with content-based user modeling. More details can be found in "A Study on Intelligent Personalized Push Notification with User History".

- Main developer of a large-scale text-based auto-tagging system for Daum Shopping, which has a web-scale data size (billion-scale items), an unbalanced label distribution, and noisy labels.

M.S. researcher   Mar 2014 - Feb 2016
Algorithmic Intelligence Lab in KAIST   *Deajeon, Korea*

- Researched an efficient algorithm and initialization for a robust PCA and K-means based clustering including theoretical guarantees for the local convergence property and the perfect clustering condition for the proposed initialization method (Master's thesis).

- Designed a robust algorithm for ECG Authentication in noisy environments using machine learning techniques (by low-rank approximation) with SAMSUNG Electronics.

- Participated in many internal study groups on convex optimization, randomized algorithm, Markov Chain Monte Carlo Methods, probabilistic graphical models, and other machine learning methods.

Internship experiences

- Research internship at NAVER Labs Korea (Aug. 2015 - Dec. 2015).

- Research internship at Algorithmic Intelligence Lab in KAIST (Fall 2013).

- Research internship at Networked and Distributed Computing System Lab in KAIST (Summer 2013). During the internship, I developed the index system described in Section 4 of [**USENIX'15**] **FloSIS: A Highly Scalable Network Flow Capture System for Fast Retrieval and Storage Efficiency.**

- Software engineering internship at IUM-SOCIUS (Jun. 2012 - Jan. 2013).

SKILLS

Programming Languages & Frameworks (Selected)

- Machine learning tools: PyTorch, Keras, Tensorflow, OpenCV, NumPy, Scikit-learn.
- Web development: Python Django/Flask, Ruby on Rails, HTML, JQuery.
- Database: MySQL, MongoDB, Redis, Apache Kafka, Elastic Search.
- System programming: Bash shell script, C/C++, Docker.

Language Proficiency

- Korean (Native proficiency)
- English (Full professional proficiency)

EDUCATION

M.S. in Electrical Engineering from **Korea Advanced Institute of Science and Technology (KAIST).** (Advisor: Jinwoo Shin) (Mar. 2014 - Feb. 2016)
Thesis: **Scalable Iterative Algorithm for Robust Subspace Clustering: Convergence and Initialization.**

B.S. in Electrical Engineering and Management Science (double major) from **Korea Advanced Institute of Science and Technology (KAIST).** (Mar. 2009 - Feb. 2014)