SANGHYUK CHUN

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RESEARCH INTERESTS

My research goal is making practical and provable trustworthy machine learning models. In particular, I am interested in the following topics: (i) Understanding machine learning models by interpretable and explainable ML, (ii) Building generalizable models to different biases, corruptions, or domains. (iii) Developing probabilistic machines with well-calibrated confidence, (iv) Learning with insufficient human supervision.

ACADEMIC PAPERS

[arXiv'19] Learning De-biased Representations with Biased Representations.
Hyojin Bahng, **Sanghyuk Chun**, Sangdoo Yun, Jaegul Choo, Seong Joon Oh

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

[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

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

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

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

RESEARCH PRESENTATIONS

"Learning generalizable representations with CutMix and REBIS", 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).

WORK & RESEARCH EXPERIENCES

NAVER, Search & Clova
Research Scientist at Clova AI Research

Feb 2018 - Now

Seongnam, Korea

- I have participated in many research projects targeted at major machine learning related conferences such as ICML, NeurIPS, ICLR, CVPR, ICCV, and ICASSP. Please see the full paper list for more details.
- I worked as the main developer for the personalized handwritten Korean font generation project. We generate 11,172 Korean characters using the Pix2pix based image translation method using only 152 characters. I contributed to the model research and the distributed serving system development.
- I worked as the main developer for a cross-domain emoji recommender system, which recommends emojis similar to the given human face. I developed the whole production pipeline, including the data tagging system, the face detector system, the tag-based recommender system, and the serving API and demo.

NAVER LABS Europe
Visiting Researcher

Oct 2019 - Dec 2019

Grenoble, France

- I have worked with probabilistic embedding for cross-modal retrieval in NAVER Labs Europe (NLE). The probabilistic embedding maps an input to a probabilistic distribution (e.g., Gaussian), not a deterministic point embedding. As a part of the collaboration, I visit NLE for three months to apply the probabilistic embedding to the cross-modal retrieval machine in NLE. This work is a collaboration with Rafael Sampaio de Rezende and Diane Larlus.

Kakao corp.
Research Engineer at ART (Advanced Recommendation Technology)

Feb 2016 - Jan 2018

Seongnam, Korea

- I developed 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.
- I researched and developed machine learning models for recommender systems. In particular I worked with content-based representation modeling (for textual, visual, and musical data), collaborative filtering modeling (matrix factorization), hyperparameter optimization (Bandit-based approach, Bayesian optimization), user embedding, user clustering (K-means based online clustering), and ranking system based on Multi-armed Bandit (online ranking system).
- I researched and developed a personalized item push notification system for 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".
- I developed a large-scale text-based auto-tagging system for Daum Shopping, which has a web-scale data size, an unbalanced label distribution, and noisy labels.

M.S. researcher
Algorithmic Intelligence Lab in KAIST

Mar 2014 - Feb 2016

Deajeon, Korea

- I developed an efficient algorithm and initialization for a robust PCA and K-means based clustering. I also provided theoretical guarantees for the local convergence property and perfect clustering conditional for the proposed initialization method (Master's thesis).
- I designed a robust algorithm for ECG Authentication in noisy environments using Machine Learning techniques (by low-rank approximation) with SAMSUNG Electronics.
- I 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)