Changho Shin

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RESEARCH INTERESTS

My research is focused on **foundation models**, including **large language models** and **multimodal foundation models**. Some of my work aims to efficiently help these models adopt new skills. This involves two prongs: **(1) approaches for obtaining and selecting fine-tuning data**, often by using a strategy called **weak supervision** and **(2) efficient adaptation**, including training-free approaches like **representation editing**.

EDUCATION

University of Wisconsin-Madison Sep. 2020 –
- Ph.D. Computer Science, M.S. Mathematics
- Advisor: Professor Frederic Sala

Seoul National University Mar. 2015 – Feb. 2017
- M.S. Machine Learning
- Advisor: Professor Wonjong Rhee

Seoul National University Mar. 2011 – Feb. 2015
- B.A. in Psychology, B.S. in Computer Science and Engineering
- Graduated with honors (Cum Laude)

HONORS & AWARDS

Qualcomm Innovation Fellowship Finalist 2024
Best Paper Award Honorable Mention (NeurIPS R0-FoMo Workshop) 2023
NeurIPS 2023 Scholar Award 2023
Winner in DataComp competition (Filtering Track, Small) 2023
CS Departmental Scholarship (University of Wisconsin-Madison) 2020

CONFERENCE PUBLICATIONS

[C5] **Changho Shin**, Jitian Zhao, Sonia Cromp, Harit Vishwakarma, Frederic Sala, "OTTER: Improving Zero-Shot Classification via Optimal Transport", *Neural Information Processing Systems (NeurIPS)*, 2024.

[C4] Dyah Adila*, **Changho Shin***, Linrong Cai, Frederic Sala, "Zero-Shot Robustification of Zero-Shot Models With Auxiliary Foundation Models", *International Conference on Learning Representations (ICLR)*, 2024.

Workshop version [W1]: **Best Paper Award Honorable Mention, Oral Presentation** at *NeurIPS 2023 R0-FoMo Workshop*.

[C3] **Changho Shin**, Sonia Cromp, Dyah Adila, Frederic Sala, "Mitigating Source Bias for Fairer Weak Supervision", *Neural Information Processing Systems (NeurIPS)*, 2023.

[C2] **Changho Shin**, Winfred Li, Harit Vishwakarma, Nicholas Roberts, Frederic Sala, "Universalizing Weak Supervision", *International Conference on Learning Representations (ICLR)*, 2022.

[C1] **Changho Shin**, Sunghwan Joo, Jaeryun Yim, Hyoseop Lee, Taesup Moon, Wonjong Rhee, "Subtask Gated Networks for Non-Intrusive Load Monitoring", *AAAI Conference on Artificial Intelligence*, 2019.

JOURNAL PUBLICATIONS

[J2] **Changho Shin**, Eunjung Lee, Jeongyun Han, Jaeryun Yim, Hyoseop Lee, Wonjong Rhee, "The ENERTALK Dataset, 15 Hz Electricity Consumption Data from 22 Houses in Korea", *Nature Scientific Data*, 2019 (Impact Factor = 5.929).

[J1] **Changho Shin**, Seungeun Rho, Hyoseop Lee, Wonjong Rhee, "Data Requirements for Applying Machine Learning to Energy Disaggregation", *Energies*, May 2019 (Impact Factor = 2.707).

WORKSHOP PUBLICATIONS

[W4] Dyah Adila*, **Changho Shin***, Linrong Cai, Frederic Sala, "Foundation Models Can Robustify Themselves, For Free", *NeurIPS 2023 R0-FoMo Workshop*. **Best Paper Award Honorable Mention, Oral Presentation**.

[W3] **Changho Shin***, Joon Suk Huh*, Elina Choi, "Pool-Search-Demonstrate: Improving Data-wrangling LLMs via better in-context examples", *NeurIPS 2023 Table Representation Learning (TRL) Workshop*. **Oral Presentation**.

[W2] **Changho Shin***, Tzu-heng Huang*, Sui Jiet Tay, Dyah Adila, Frederic Sala, "Multimodal Data Curation via Object Detection and Filter Ensembles", *ICCV 2023 Datacomp Workshop* (Rank #1 in DataComp competition filtering track (small)).

[W1] **Changho Shin**, Alice Schoenauer-Sebag, "Can we get smarter than majority vote? Efficient use of individual rater's labels for content moderation", NeurIPS Efficient Natural Language and Speech Processing (ENLSP) Workshop, 2022.

PREPRENTS

[P3] **Changho Shin**, John Cooper, Dyah Adila, Frederic Sala, "Weak-to-Strong Generalization Through the Data-Centric Lens", *Under Review*, 2024.

[P2] Dyah Adila, **Changho Shin**, Yijing Zhang, Frederic Sala, "Is Free Self-alignment Possible?", *Under Review*, 2024.

[P1] Yijing Zhang, Dyah Adila, **Changho Shin**, Frederic Sala, "Personalize Your LLM: Fake it then Align it", *Under Review*, 2024.

JOB EXPERIENCE

Snorkel AI, California, USA — Jun. 2024 –
Research Intern
• Mentor: Christopher Glaze, Paroma Varma

Twitter, San Francisco, USA — Jun. 2022 – Aug. 2022
ML Engineer Intern
• Mentor: Alice Schoenauer Sebag • Manager: Milind Ganjoo
• Improving toxicity classification via weak supervision [W4]

Encored Technologies, Seoul, Korea — Jan. 2018 – Jul. 2020
Data Scientist
• Advisor: Dr. Hyoseop Lee
• Non-intrusive load monitoring [C4, J1, J2], Energy forecasting

Korea Institute for Defense Analyses, Seoul, Korea — Jan. 2017 – Dec. 2017
Researcher

TEACHING EXPERIENCE

University of Wisconsin-Madison
• Teaching assistant for CS 839 (Foundation Models) — Fall 2023
• Teaching assistant for CS 300 (Programming II) — Fall 2022, Spring 2023
• Teaching assistant for CS 760 (Machine Learning) — Fall 2021, Spring 2022
• Teaching assistant for CS 320 (Data Programming II) — Spring 2021
• Teaching assistant for CS 220 (Data Programming I) — Fall 2020

GRADUATE COURSEWORK

• M2680.001300 Machine Learning for Information Studies @ SNU
• M2680.001400 Social Computing @ SNU
• 493.613 Mathematics for Intelligent Systems (Numerical Linear Algebra) @ SNU
• 493.701 Learning and Applications of Deep Neural Networks @ SNU
• M0000.005400 Convex Optimization @ SNU
• M0000.005400 Neural Networks @ SNU
• CS537 Introduction to Operating Systems @ UW
• CS639.004 Introduction to Computational Learning Theory @ UW
• CS726 Nonlinear Optimization 1
• CS744 Big Data Systems @ UW

• CS761 Mathematical Foundations of Machine Learning @ UW
• CS784 Foundations of Data Management @ UW
• CS787 Advanced Algorithms @ UW
• CS839 Probability and Learning in High Dimension @ UW
• CS880 Advanced Topics in Learning Theory @ UW
• Math521 Analysis I @ UW
• Math522 Analysis II @ UW
• Math551 Elementary Topology @ UW
• Math629 Introduction to Measure and Integration @ UW
• Math621 Analysis III (Analysis on Manifolds) @ UW
• Math721 A First Course in Real Analysis @ UW
• Math733 Theory of Probability I @ UW
• Math734 Theory of Probability II @ UW • Math761 Differentiable Manifolds @ UW
• Math833 Modern Discrete Probability @ UW
• Math888 Randomized Linear Algebra @ UW
• Stat992 Optimal Transport and Applications to Machine Learning @ UW

TECHNICAL SKILLS

Machine Learning / Deep Learning / Data Science
PyTorch, TensorFlow, Keras, scikit-learn, NumPy, Pandas, SciPy

DBMS
MySQL, MongoDB, PySpark

Research & Development Tools
Visual Studio Code, Jupyter, PyCharm, Docker, GitHub, CircleCI, Shell, AWS

Programming Languages
Python, R, MATLAB, Java, Go, C, LaTeX