

# 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 **model 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

- [C1] **Changho Shin**, Jitian Zhao, Sonia Crompt, Harit Vishwakarma, Frederic Sala, “OTTER: Improving Zero-Shot Classification via Optimal Transport”, *Neural Information Processing Systems (NeurIPS)*, 2024.
- [C2] 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 Crompt, Dyah Adila, Frederic Sala, “Mitigating Source Bias for Fairer Weak Supervision”, *Neural Information Processing Systems (NeurIPS)*, 2023.
- [C4] **Changho Shin**, Winfred Li, Harit Vishwakarma, Nicholas Roberts, Frederic Sala, “Universalizing Weak Supervision”, *International Conference on Learning Representations (ICLR)*, 2022.
- [C5] **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

- [J1] **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).
- [J2] **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

- [W1] **Changho Shin**, John Cooper, Dyah Adila, Frederic Sala, “Weak-to-Strong Generalization Through the Data-Centric Lens”, *ICML 2024 DMLR Workshop*, 2024.
- [W2] Dyah Adila, **Changho Shin**, Yijing Zhang, Frederic Sala, “Can Language Models Safeguard Themselves, Instantly and For Free?”, *ICML 2024 Next Generation of AI Safety Workshop*, 2024.
- [W3] 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**.
- [W4] **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**.
- [W5] **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)).
- [W6] **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

- [W1] Amanda Dsouza, Christopher Glaze, **Changho Shin**, Frederic Sala, “Understanding Long Context Models In Real-world Tasks: Benchmarks and Beyond”, *Under Review*, 2024.
- [W2] **Changho Shin**, Xinya Yan, Frederic Sala, “TARDIS: Mitigate Temporal Misalignment via Representation Steering”, *Under Review*, 2024.

## JOB EXPERIENCE

- Snorkel AI**, Palo Alto (Remote), USA Jun. 2024 – Aug. 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,  $\text{\LaTeX}$