

Gaoxiang Luo

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EDUCATION

UNIVERSITY OF PENNSYLVANIA

Ph.D. in Computer & Information Science

2022-X | Philadelphia, PA

UNIVERSITY OF MINNESOTA

B.S. in Computer Science
Minor in Math

2018-2022 | Minneapolis, MN

Graduated with High Distinction

LINKS

Google Scholar: [z.umn.edu/gi-scholar](https://scholar.google.com/citations?user=z.umn.edu/gi-scholar)

Blog: gaoxiangluo.github.io

LinkedIn: [z.umn.edu/gi-linkedin](https://www.linkedin.com/in/z.umn.edu/gi-linkedin)

Github: [z.umn.edu/gi-git](https://github.com/z.umn.edu/gi-git)

RESEARCH INTEREST

Federated Learning

Representation Learning

AI for Healthcare

3D Computer Vision

OOD Generalization

Robustness

Optimization

Causal AI

HONORS/AWARDS

2021 [Google CSRMP^a Scholar](#)

Mentor: [Dr. Feng Yang](#)

2021 [UROP^b Scholarship x 2](#)

2021 Maximillian Lando
Scholarship^c

2021 [UMN CSspotlight^d](#)

2018-2021 [CSE Dean's List^e](#)

2021 [Tau Beta Pi^f](#)

SKILLS

Python • C/C++ • MATLAB

PyTorch • MONAI • Cisco Flame

Docker • Kubernetes • MQTT

LaTeX • Agile Scrum

^aCS Research Mentorship Program

^bUndergrad Research Opportunities Program

^cCSE Merit Departmental Scholarship

^dSee Media section

^eSemester-based honor for GPA>3.7

^fInvitation only to top 3% of senior class

PUBLICATION

ACADEMIC PAPER

- [1] Le Peng, Hengyue Liang, **Gaoxiang Luo**, Taihui Li, Ju Sun^a. *Rethink Transfer Learning in Medical Image Classification*. In preparation for IEEE T-MI. [<https://arxiv.org/abs/2106.05152>] [Project Page]
- [2] Le Peng, **Gaoxiang Luo**, Andrew Walker, Ju Sun, Christopher J Tignanelli, et al. *Evaluation of Federated Learning Variations for COVID-19 Diagnosis Using Chest Radiographs from 42 US and European Hospitals*. Under review of JAMIA.
- [3] Majid Farhadloo, Carl Molnar, **Gaoxiang Luo**, Yan Li, Shashi Shekhar^b, et al. *SAMCNet for Spatial-configuration-based Classification: A Summary of Results*. Accepted to ACM SIGKDD 2022. [<https://arxiv.org/abs/2112.12219>]
- [4] John Burns, Zachary Zaiman, **Gaoxiang Luo**, Le Peng, et al. *Pixel Color Averages by Race in Chest X-Ray*. Accepted to [SIIM 2022].
- [5] Jayant Gupta, Carl Molnar, **Gaoxiang Luo**, Joe Knight, Shashi Shekhar. *Towards Comparative Physical Interpretation of Spatial Variability Aware Neural Networks: A Summary of Results*. [<https://arxiv.org/abs/2110.15866>]

RESEARCH

UNIVERSITY OF MINNESOTA | Undergrad Research Assistant

August 2020 – May 2022 | Minneapolis, MN

- Improved AUPRC of chest x-ray COVID-19 classification by 9% compared to local training, by implementing real-data federated learning with several partner institutes. The case study is featured in the white paper – *Federated Learning for Healthcare Using NVIDIA Clara*. (Advisor: [Prof. Ju Sun](#))
- Proposed a novel **truncated transfer learning** (TL) method in medical imaging classification under data-poor regimes, that consistently leads to comparable or superior performance than its non-truncated counterpart as well as other TL strategies. Our method can be **applied to different deep neural networks** and **generalized to other tasks** (e.g., segmentation). See Publication [1]. (Advisor: [Prof. Ju Sun](#))
- Outperformed current state-of-the-art point set classifiers in terms of accuracy and F1-score on our tumor cell datasets by designing a novel **Spatial-interaction Aware Multi-Category deep neural Network (SAMCNet)**, contributing **location representation and point pair attention layers** for multi-categorical point set classification. See Publication [3]. (Advisor: [Prof. Shashi Shekhar](#))
- Added to the transparency of **Spatial Variability Aware Neural Networks (SVANNs)** by exploring the physical interpretation based on geographically heterogeneous features (e.g., remote sensing indices), using a case study of wetland mapping. See Publication [5]. (Advisor: [Prof. Shashi Shekhar](#))

^aCV Reference Contact: Prof. Ju Sun [www.sunju.org]

^bCV Reference Contact: Prof. Shashi Shekhar [www-users.cse.umn.edu/~shekhar]

VOLUNTEER

NEURIPS 2021 | Live Monitor
December 6th-14th, 2021

ICML 2021 | Session Volunteer
July 18th-24th, 2021

ICLR 2021 | Helpdesk
May 2nd-8th, 2021

MURAJ | Reviewer
October 2020 – May 2022

Minnesota Undergraduate Research & Academic Journal (MURAJ) Math and Computer Science Reviewer

COURSEWORK

UNDERGRAD LEVEL

Data Structures and Algs (CSCI 4041)
Linux OS (CSCI 4061)
Artificial Intelligence (CSCI 4511W)
Applied Linear Algebra (MATH 4242)

GRAD LEVEL

Machine Learning (CSCI 5525)
Deep Learning (CSCI 8980)
Computer Vision (CSCI 5561)
Data Mining (CSCI 5523)
Machine Learning Theory (CSCI 8980)
Software Engineering (CSCI 5801)
Spatial Data Science (CSCI 5715)
Numerical Methods (MATH 5485)

Note: The levels of courses above are categorized based on [\[https://cse.umn.edu/cs/grad-breadth\]](https://cse.umn.edu/cs/grad-breadth). An undergrad is allowed to take grad courses under instructor's approval.

CISCO RESEARCH | Research Fellow
May 2021 – May 2022 | Remote

- Co-leading an initiative to develop an accurate and reliable automated fracture detection method combining **multi-modal** and **semi-supervised** approaches on chest CT scans and X-rays, to reduce the delays and errors that come along with the current practice of manually identifying fractures. This work is accepted to two undergraduate research conferences [NCRC 2022](#) and [NCUR 2022](#). (Advisor: Prof. Christopher Tignanelli & Prof. Ju Sun)

CISCO RESEARCH | AL/ML Research Intern
Feb 2022 – July 2022 | Remote

- Building a novel **scalable federated learning (FL) system** by implementing abstraction topologies to simplify FLOPs for ML engineers with a drastic reduction of deployment effort, filed 2 patents to improve model convergence and communication efficiency. This work is now open-sourced at [Project Flame](#). (Host: Dr. Myungjin Lee) [\[Slide\]](#)

TEACHING & TUTORING

UNIVERSITY OF MINNESOTA | Undergrad Teaching Assistant
September 2020 – December 2021 | Minneapolis, MN

- CSCI 2011 Discrete Math (Fall 2020 & Spring 2021)
 - Assisted 122 students in total in office hours.
 - Graded 385 students' homework and exams.
 - Have ELP^a score 1 for English proficiency in tutoring.
- CSCI 2033 Computational Linear Algebra (Fall 2021)

UNIVERSITY OF MINNESOTA LIBRARY | Peer Tutor
September 2020 – December 2020 | Minneapolis, MN

- Tutor single-and-multivariable calculus, linear algebra, intro physics, intro stats, and some programming in Python and C.

SELECTED COURSE PROJECTS

CSCI 8980 Special Advanced Topics: Think Deep Learning (Fall 2020)

- A Survey of Deep Semantic Segmentation on Computerized Tomography [\[z.umn.edu/medseg-survey\]](https://z.umn.edu/medseg-survey)
- 3D Rib Fracture Segmentation on Computed Tomography [\[z.umn.edu/ribseg\]](https://z.umn.edu/ribseg)

CSCI 5525 Machine Learning: Analysis and Methods (Spring 2021)

- A Survey of Causality in Visual Question Answering [\[z.umn.edu/causalvqa\]](https://z.umn.edu/causalvqa)

CSCI 8980 Special Advanced Topics: Modern Machine Learning (Fall 2021)

- Feature Disentanglement for Covariate Shift Adaptation in Federated Learning [\[https://z.umn.edu/fldis\]](https://z.umn.edu/fldis)

MEDIA

- [1] Gaoxiang Luo. *Application of Artificial Intelligence to Help Fight COVID-19* In Minnesota Undergraduate Research & Academic Journal (MURAJ), Vol.4 No.3, 2021. [\[https://pubs.lib.umn.edu/index.php/muraj/article/view/3876\]](https://pubs.lib.umn.edu/index.php/muraj/article/view/3876)
- [2] Gaoxiang Luo. *Wetland Mapping Using Spatial Variability Aware Neural Networks (SVANN)*. In 2021 Spring UMN Undergrad Research Symposium. [\[https://ugresearch.umn.edu/symposium/presenters2021/Gaoxiang-Luo\]](https://ugresearch.umn.edu/symposium/presenters2021/Gaoxiang-Luo)
- [3] *CSpotlight: Experiencing research as an undergrad*. In UMN Department of Computer Science & Engineering spotlight program. May 12, 2021. [\[https://cse.umn.edu/cs/news/cspotlight-experiencing-research-undergrad\]](https://cse.umn.edu/cs/news/cspotlight-experiencing-research-undergrad)
- [4] *First gen student chosen for Google mentorship program*. In UMN CS&E Department News. Nov. 19, 2021. [\[https://cse.umn.edu/cs/news/first-gen-student-chosen-google-mentorship-program\]](https://cse.umn.edu/cs/news/first-gen-student-chosen-google-mentorship-program)

^aThis is a measure by Spoken English Test for Teaching Assistants (SETTA). [\[https://cei.umn.edu/spoken-english-test-teaching-assistants-setta\]](https://cei.umn.edu/spoken-english-test-teaching-assistants-setta)